



Australian Government

UEENEEJ102A Prepare and connect refrigerant tubing and fittings

Release: 3

UEENEEJ102A Prepare and connect refrigerant tubing and fittings

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

1)

1.1) Descriptor

This unit covers the basic connection of refrigeration and air conditioning piping/tubing and fittings. It encompasses the safe use of hand, fixed and portable power tools for cutting, flaring, bending, swaging, silver brazing copper tube to copper tube, Bundy tube and brass and steel fittings, measurement and reading drawings and diagrams.

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).

Application of the Unit 4)

Practice in the 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 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 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.

UEENEEE10 1A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
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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 fabricate tubing and attach fittings for refrigeration and/or air conditioning 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 work supervisor.
	1.4 The nature of work is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
	1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.

ELEMENT	PERFORMANCE CRITERIA
	1.6 Sources of materials that may be required for the work are accessed in accordance with established routines and procedures.
	1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety
2 Fabricate tubing and attach fittings for refrigeration and/or air conditioning systems	2.1 Established OHS risk control measures and procedures for carrying out the work are followed.
	2.2 Work in strict accordance with OHS requirements and when necessary conducted within established safety procedures
	2.3 Established methods used to cut, flare, swage, bend, silver braze tubing and fittings as they apply to the refrigeration/air conditioning equipment arrangements.
	2.4 Refrigerant tubing and fittings are silver brazed with the use of dry nitrogen to prevent contamination.
	2.5 Fabricate tubing and attach fittings are prepared efficiently without waste of materials or damage/contamination to apparatus and the surrounding environment or services and using sustainable energy practices.
	2.6 Routine quality checks are carried out in accordance with work instructions/or specifications including dimensions and pressure testing.
3 Complete work and report	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 Work supervisor is notified of the completion of the work 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 preparing refrigerant tubing and fittings.

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

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Refrigerant tubing and fittings techniques

Evidence shall show an understanding of cutting, bending and joining refrigeration piping and tubing tools, equipment and techniques, applying safe working practices and relevant Standards, Codes and Regulations to an extent indicated by the following aspects:

T1 Piping

- Refrigeration & water grade copper tube
- Maintaining cleanliness (always capped, do not blow out with mouth etc)
- Soft and hard drawn tube
- Tubing applications (soft, hard, pair coil, water grade etc)
- Tube qualities - diameter, wall thickness (gauge) and pressure ratings (R410A etc)
- Pipe insulation (types - tube, slit tube, sheet etc and joining methods - glue, tape etc)
- Other tube materials (Bundy, steel, aluminum, brass)

T2 Cutting

- Cutting tools (Imps, normal & large pipe cutters, tube cutting rings etc)
- Precautions while cutting (sharp burrs, sharp blades etc)
- Deburring tools (reamers, deburrers etc)

T3 Bending

- Bending tools (springs, levers, presses etc)
- Precautions while bending (work hardening, collapsing etc)
- Bending hard drawn tube - the process of annealing

T4 Joining

- Flare nuts (plain, short barrel, frost proof, reducing)
- Flaring tools (flare block, eccentric with clutch for high pressure tube)
- Precautions while flaring (deburred, length past block face, cleanliness)
- Swaging tools (punch, flare block, expander etc)

REQUIRED SKILLS AND KNOWLEDGE

- Precautions while swaging (length past block face, tube shortening effect, cleanliness etc)
- Other tube fittings (BSP to flare elbows, tees, unions, plugs, flare washers, Lokrings etc)
- Thread sealants (tapes, pastes etc)
- Access valves (Schrader, piercing, cut-away of service valve/s)
- Precautions using access valves (refrigerant leakage, core removal, limitations on piercing valves etc)

T5 Soldering and brazing equipment

- Gas types (oxy acetylene, air acetylene, propane, Mapp gas)
- Hazards associated with their use (cylinder transport, remove regulator, oil & oxy = bang)
- Personal safety (MSDS - oxy, acetylene, propane, MAPP gas)
- Flash back arrestors
- Setting up equipment (fitting regulator, adjusting pressures, tip selection)
- Igniting and flame types (flint guns, oxidising, neutral, carburising)
- Care and maintenance of equipment (hoses, regulator, tips, cylinders, flash back arrestors)

T6 Silver solder

- Types (yellow, brown, blue and their metal components)
- Personal safety (MSDS - silver brazing alloys)
- Flux and its use (dissimilar metals)
- Personal safety (MSDS - flux)
- Preparing surfaces (removing oxides, oils, applying flux)

T7 Soldering techniques

- Dry nitrogen
- Personal safety (MSDS - nitrogen)
- Applying dry nitrogen to a piping circuit
- Silver soldering copper to copper
- Silver soldering copper to dissimilar metals
- Annealing copper tube

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

EVIDENCE GUIDE

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 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

EVIDENCE GUIDE

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, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Prepare refrigerant tubing and fittings as described in 8) and including:
 - A Applying tubing and fitting appropriately to equipment layout
 - B Using established methods to cut, flare, bend, swage and silver brazing copper tube
 - C Attaching fittings correctly
 - D Conducting component routine quality checks
 - 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

EVIDENCE GUIDE

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.

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 preparing refrigerant tubing and fittings.

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 preparing refrigerant tubing and fittings for at least two basic different refrigeration/air conditioning equipment layouts, which require cutting, flaring, bending, swaging, silver brazing copper tube to copper tube, Bundy tube, brass and steel fittings.

Note:

This includes piping/tubing and fittings for high pressure refrigerants.

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
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2.2) Literacy and numeracy skills

Competency Field 5)

Refrigeration and Air Conditioning