Australian Government

UEENEEJ190A Select basic commercial refrigeration system equipment, components and accessories

Release 4

INDUSTRY SKILLS COUNCILS
Creating Australia's Future

UEENEEJ190A Select basic commercial refrigeration system equipment, components and accessories

Modification History

Release	Action	Core/Elective	Details	Points
4	Update		Update pre-requisite UEENEEE103A - Solve problems in ELV single path circuits	

Unit Descriptor

Unit Descriptor **1)**

1.1) Descriptor

Scope

This unit covers the selection of basic commercial refrigeration system equipment and components, pipe work and controls. It encompasses the selection of the refrigerant, condensing unit, evaporator, refrigerant controls, accessories, refrigerant and condensate pipe work, and system controls based on specifications, standards and manufacturer catalogues to determine calculated and deemed-to comply solutions and documenting all selection information. It also includes predicting the refrigeration system's balance point to achieve design conditions.

Application of the Unit

Application of the Unit **4)**

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training or institutional based delivery at the aligned AQF 4 level.

Licensing/Regulatory Information

1.2) License to practice

The skills and knowledge described in this unit do not require a license to practice in the workplace. However, practice in this unit is 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.

UEENEEJ110A	Select refrigerant piping, accessories and associated controls
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEJ103A	Establish the basic operating conditions of vapour compression systems
UEENEEJ129A	Establish heat loads for commercial refrigeration and/or air conditioning applications

Prerequisite Unit(s) **2)**

UEENEEJ127A	Establish the thermodynamic parameters of refrigeration and air conditioning systems
UEENEEJ192A	Analyse the psychrometric performance of HVAC/R systems
and	
UEENEEJ193A	Analyse the thermodynamic performance of HVAC/R systems
or	
UEENEEJ109A	Verify functionality and compliance of refrigeration and air conditioning installations
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE103A	Solve problems in ELV 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
UEENEEJ10	Install refrigerant pipe work, flow controls

Prerequisite Unit(s) **2)**

6A	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
UEENEEJ111A	Diagnose and rectify faults in air conditioning and refrigeration systems and components
UEENEEJ113A	Commission air conditioning and refrigeration systems
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
UEENEEP017A	Locate and rectify faults in low voltage composite appliances using set procedures
UEENEEP024A	Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply
UEENEEP025A	Attach cords, cables and plugs to electrical equipment for connection to 1000 Va.c. or 1500 Vd.c. supply

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 select basic commercial refrigeration system equipment and components	1.1	The extent and nature of the refrigeration installation is determined from job specifications.
		1.2	Safety and other regulatory requirements to which the refrigeration system shall comply, are identified, obtained and understood
2	Develop pipe work arrangements	2.1	The intended location of refrigeration equipment is determined from job specifications and site drawings or deemed to comply arrangements.
		2.2	Pipe work arranged to ensure safe and functional operation of the system.
		2.3	Pipe work is arranged to comply with technical standards and job specifications and requirements.

ELEMENT	PERFORMANCE CRITERIA	
3 Select basic commercial refrigeration system equipment and components	3.1	Pipe and tubing is selected for suitability for the environments in which it is to be installed
	3.2	Pipe and tubing is sized to meet refrigeration parameters and capacity requirements for the refrigerant to be used.
	3.3	Pipe and tubing quantities are determined from equipment location diagrams and job specifications.
	3.4	Refrigeration system equipment and components are selected to meet load requirements based on calculated or deemed-to-comply solutions.
	3.5	Refrigerant liquid expansion valves are selected to meet functional, specified and regulatory requirements.
	3.6	Automatic control devices are selected to meet functional, specified, regulatory requirements. And current, voltage and IP ratings.
	3.7	Evidence is obtained that the selected refrigeration equipment and components comply with all requirements.
4 Document selection of system equipment and components	4.1	Reasons for selections made, including calculations, are documented in accordance with established procedures.
	4.2	Refrigeration installation arrangement and specifications for all selected items are documented in accordance with established procedures and forwarded to appropriate person(s).

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 selecting basic commercial refrigeration system equipment and components.

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

KS01-EJ190A Basic commercial refrigeration system equipment, and components and accessories selection

Evidence shall show an understanding of basic commercial refrigeration system components and piping selection, applying safe working practices and relevant Standards, Codes and Regulations to an extent indicated by the following aspects:

T1 Calculation of capacity in heat exchangers:

- $Q = UA (LMTD)$
- $Q = mc\Delta t$
- $Q = m \Delta h$

T2 Evaporators

- commercial types and applications
- coil bypass factor
- effects of evaporator TD on space humidity
- effects of air circulation on product conditions
- selection criteria and selection tables

T3 Condensers

- commercial types and applications
- effects of ambient conditions
- condenser control
- heat rejection factor
- condenser TD
- selection criteria and selection tables

T4 Compressors

- types and applications
- capacity

REQUIRED SKILLS AND KNOWLEDGE

- displacement
- volume flow rate
- theoretical capacity
- total volumetric efficiency
- effect of operating conditions, including suction pressure drop and superheating
- actual capacity
- power
- theoretical requirement
- effects of operating conditions
- actual requirements
- post defrost loads
- pull down torque requirements, high, medium and low back pressure compressors
- selection tables, motor selection

T5 Refrigerant flow controls

- types, operation and applications
- effects from sub-cooling
- distributor types, operation and applications
- selection tables

T6 System load balance point

- graphical representation

T7 Line sizing and design

- quick selection tables
- velocity tables
- pressure drop in lines and fittings
- oil migration stabilisation
- refrigerant velocity
- effect of varying system capacity
- oil traps
- risers
- liquid migration

T8 Automatic controls

- fin spacing, suction temp to evaporator suction
- hot-gas bypass valves
- electronic control of valves PLC control
- refrigerant regulating valves

REQUIRED SKILLS AND KNOWLEDGE

- solenoid valves
- condenser pressure regulating valves
- evaporator pressure regulating valves
- crankcase pressure regulating valves
- cycling controls
- pressure-stats
- thermostats,
- defrost controls
- monitoring and alarm controls
- refrigeration automation systems
- control strategies
- control modes

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

EVIDENCE GUIDE

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 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:

EVIDENCE GUIDE

- 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:
  - Select basic commercial refrigeration system equipment and components as described in 8) and including:

    A Arranging pipe work to comply with regulatory and functional requirements.

    B Selecting appropriate type, size and quantity of pipe and tubing

    C Selecting refrigeration equipment and components that meets load requirements

    D Selecting automatic control devices that meet functional and regulatory requirements.

    E Documenting pipe work arrangement, specification for items selected and reasons for the selections made

    F 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

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 selecting refrigerant pipe/tube, accessories and associated controls.

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:

UEENEED001B Use basic computer applications

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 the selection of basic commercial refrigeration system equipment and components, pipe work and controls for two different refrigeration systems. These include the following; refrigerant, condensing unit, evaporator, refrigerant controls, accessories, refrigerant and condensate pipe work, and system controls selection of refrigerant pipe/tube, accessories and associated controls.

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	5	Writing	5	Numeracy	5

Custom Content Section

Competency Field **5**)

Refrigeration and Air Conditioning