



Australian Government

Department of Education, Employment and Workplace Relations

UEENEEJ129A Establish heat loads for commercial refrigeration and/or air conditioning applications

Release: 2

UEENEEJ129A Establish heat loads for commercial refrigeration and/or air conditioning applications

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

1)

1.1) Descriptor

This unit covers the determination of the heat loads for commercial refrigeration and/or air conditioning applications. It encompasses working safely; determining heat loads using quick selection, short form paper and computer based methods and documenting results.

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 require a license to practice in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. In some States/Territories a licence is required to practise this unit in the workplace subject to regulations for undertaking refrigeration and air conditioning work and in particular working with refrigerants. 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.

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

Prerequisite Unit(s)

2)

utilities industry components

UEENEEE003B Solve problems in extra-low voltage 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

UEENEEJ106A Install refrigerant pipe work, flow controls 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

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 determine the heat loads for commercial refrigeration and/or air conditioning applications.	1.1	OHS procedures for a given work area are identified, obtained and understood
		1.2	Established OHS risk control measures and procedures are followed in preparation for the work
		1.3	The extent of the heat load analysis is determined from project specifications and discussion with appropriate personnel
		1.4	Activities are planned to meet scheduled timelines in consultation with others involved in the work
		1.5	Effective strategies are determined to ensure solution development and implementation is carried out efficiently

ELEMENT	PERFORMANCE CRITERIA
2 Determine the heat loads for commercial refrigeration and/or air conditioning applications.	2.1 OHS risk control measures and procedures for carrying out the work are followed.
	2.2 Knowledge of commercial refrigeration and/or air conditioning system operating parameters is applied when performing heat loads estimation
	2.3 Parameters, specifications and performance requirements in relation to commercial refrigeration and/or air conditioning system are set in accordance with established procedures
	2.4 Approaches to determine the heat loads are carried out to provide most effective solutions
	2.5 Unplanned events are dealt with safely and effectively consistent with regulatory requirements and enterprise policy
	2.6 Quality of work is monitored against personal performance agreement and/or established organisational or professional standards
3 Complete and report heat loads for commercial refrigeration and /or air conditioning applications.	3.1 Heat load estimations is documented including details of all findings, calculations and assumptions
	3.2 Completed heat loads are submitted to an appropriate person to be checked for accuracy and compliance with project specifications and evaluated to determine whether performance requirements are met
	3.3 Heat loads estimation is reported to appropriately personnel to establish appropriate action to be taken based on findings
	3.4 Quality of work is monitored against personal performance agreement and/or established organizational or professional standards

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 determining the heat loads for commercial refrigeration and/or air conditioning applications.

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

KS01-EJ129A Commercial refrigeration heat load estimating

Evidence shall show an understanding of heat load estimating for commercial refrigeration applications, applying safe working practices and relevant Standards, Codes and Regulations to an extent indicated by the following aspects:

T1. Heat transfer

- factors affecting heat transfer
- insulation material characteristics
- vapour barriers (seals)
- ambient conditions
- composite walls (heat flows)
- types of common insulation
- thermal conductivity
- film factors

T2. Cabinet construction and design

- deep freeze case
- meat case
- dairy case
- fruit and vegetable case
- drink cabinets

T3. Air change load

- room volumes
- room usage (average, medium, heavy)
- heat removed from cooling air to refrigerated conditions
- air curtains
- temperature differences
- door opening sizes
- Tamm's equation

T4. Product load

- sensible heat
- latent heat
- heat of respiration

REQUIRED SKILLS AND KNOWLEDGE

- storage temperatures
- unit running times
- humidity
- air flows
- stacking of products
- freeze, chill, thaw times

T5. Total freezer/cool room loads

- wall load
- air change load
- product load
- miscellaneous
- total load, safety factor and unit running times
- floor loads in cool rooms
- door opening loads (ASHRAE & RADS methods)
- door opening loads (for trucks)

T6. Process cooling loads

- cooling chemical reactions
- energy balance methods
- sensible & latent cooling of gases
- sensible & latent cooling of water vapour in gas streams

T7. Computer programs

KS02-EJ129A Commercial air conditioning heat load estimating

Evidence shall show an understanding of heat load estimating for commercial air conditioning applications, applying safe working practices and relevant Standards, Codes and Regulations to an extent indicated by the following aspects:

T1. Heat flow in buildings

- conduction
- convection
- radiation
- heat paths

T2. Thermal storage

T3. Different methods of calculations

- ASHRAE
- Carrier
- finite difference

T4. U Values.

T5. Film coefficients.

T6. Solar heat

- direct

REQUIRED SKILLS AND KNOWLEDGE

- diffuse
- sol air temperature
- sun position calculations

T7. Design conditions

- outdoor
- monthly/daily corrections
- comfort/critical
- indoor
- effective temperature

T8. Thermal comfort.

T9. Space characteristics.

T10. Equipment location.

T11. Zoning

T12. Internal loads

- lighting
- equipment
- people
- load profiles
- internal partitions

T13. Fresh air/AS 1668

T14. Calculation of fabric loads

- walls
- roofs
- floors

T15. Windows

- glass types and factors
- shade factors
- internal and external shading
- shading from adjacent structures

T16. Air quantity calculation

- psychrometrics
- by-pass factor
- coil load
- VAV air quantities

T17. Piping and other losses.

T18. Refrigeration plant load.

T19. Computer software

- responsible use

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 and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of 9.2)

EVIDENCE GUIDE

evidence required to demonstrate competency in this unit

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:
 - Determine the heat loads for commercial refrigeration and/or air conditioning applications as described in 8) and including:
 - A Establishing system parameters for heat load
 - B Select appropriate head load calculation tools
 - C Identifying heat loads accurately
 - D Using calculation methods accurately
 - E Documenting heat loads correctly

EVIDENCE GUIDE

- 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

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 determining the heat loads for commercial refrigeration and air conditioning applications.

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

9.5)

There are no concurrent assessment recommendations for this

EVIDENCE GUIDE

other units 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 determining heat loads using quick selection short form paper and/or computer based methods for a refrigeration and/or air conditioning system.

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	4	Writing	4	Numeracy	4
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2.2) Literacy and numeracy skills

Competency Field 5)

Refrigeration and Air Conditioning

