



Australian Government

UEENEEJ138A Analyse vibration and noise in refrigeration and air conditioning systems

Release: 3

UEENEEJ138A Analyse vibration and noise in refrigeration and air conditioning systems

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

1)

1.1) Descriptor

This unit covers the analysis of refrigeration and air conditioning systems to provide solutions to noise and vibration issues. It encompasses working safely, apply extensive knowledge of noise and vibration parameters, gathering and analysing data, applying problem solving techniques, developing and documenting results and solutions for use in design work.

Application of the Unit

Application of the Unit 4)

This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training or institutional based delivery. It applies to any formal recognition for this standard at the aligned AQF 6 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, codes of work practice and standard work procedures related to the operation of automated machinery.

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.

UEENEEJ165A: Evaluate thermodynamic and fluid parameters of refrigeration systems

UEENEEJ164A Analyse the operation of HVAC air and hydronic 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

UEENEEE003B Solve problems in extra-low voltage single path circuits

UEENEEE105A Fix and secure electrotechnology

Prerequisite Unit(s)

2)

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

Prerequisite Unit(s) 2)
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 analyse noise and vibration in refrigeration and air conditioning systems	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 noise and vibration issue is determined from performance specifications and situation reports and in consultations with relevant persons.

ELEMENT	PERFORMANCE CRITERIA
2 Analyse noise and vibration in refrigeration and air conditioning systems.	1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work.
	1.5 Effective strategies are formed to ensure solution development and implementation is carried out efficiently.
	2.1 OHS risk control measures and procedures for carrying out the work are followed.
	2.2 Knowledge of noise, vibration and thermodynamics are applied to analytical solutions to refrigeration and air conditioning systems.
	2.3 Parameters, specifications and performance requirements in relation to refrigeration and air conditioning systems are obtained in accordance with established procedures.
	2.4 Approaches to analysing noise and vibration parameters are carried out to provide the most effective solution.
3 Document and report on the results of the noise and vibration analysis and actions taken.	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 organizational or professional standards
	3.1 Solutions to noise and vibration issues are evaluated to determine their effectiveness and modified where necessary.
	3.2 Analysis is documented including details of all findings, calculations and assumptions.
	3.3 Analysis is reported to appropriately personnel to establish appropriate action to be taken based on findings.
	3.4 Justification for findings and any actions to be undertaken in relation to the equipment is documented for inclusion in work/project or development records in accordance with 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 analysing noise and vibration in refrigeration and air conditioning systems.

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

KS01-EJ138A Noise and vibration in refrigeration and air conditioning systems

Evidence shall show an understanding of noise and vibration in refrigeration and air conditioning systems, applying safe working practices and relevant Standards, Codes and Regulations to an extent indicated by the following aspects:

T1 Fundamentals of sound

- frequency
- decibels
- octave bands
- direct sound
- velocity
- sound pressure level
- sound power level
- sound meters

T2 Noise and people

- physical measurement of sound
- weighting networks
- NR curves
- noise damage to hearing
- evaluate daily noise exposures
- peak noise levels
- attenuation for hearing protectors
- excess noise levels permissible
- noise abatement acts
- advanced noise and vibration control

T3 Sound in confined and unconfined spaces

- Inverse square laws
- Direct and reflective sound

REQUIRED SKILLS AND KNOWLEDGE

- Define reverberation time
- Sabine's formula
- Absorption coefficients of surfaces
- Types of absorbers and their operation
- Insulation performances of partitions

T4 Identify and analyse problems

- one-dimensional sound waves
- standing waves
- energy in a sound wave
- sources
- effects of air turbulence
- transmitters
- amplifiers
- absorptivity
- reflectivity
- room characteristics
- acoustic design in buildings
- fan and air noise transmission in ducts

T5 Methods of control

- natural attenuation
- sound absorbing materials, placement
- duct lining
- lined plenums
- lined duct splitters
- duct attenuators
- white noise
- vibration isolators

T6 Acoustic specifications

- attenuator ratings

T7 Sound insulation

- Plant room breakout
- Controlling plant room noise

T8 Duct borne noise

- Sound power spectra for fans
- Noise attenuation in ducts and fittings
- Reducing fan noise transmission
- Regeneration noise
- Sources of regenerated noise

REQUIRED SKILLS AND KNOWLEDGE

- Use tables to estimate regenerative noises
- Breakout situations
- Fan noise breakout
- List methods of controlling breakout

T9 Controlling the cost

- Economical use of attenuation

T10 Vibration

- SHM (Simple Harmonic Motion)
- Period
- Frequency
- Amplitude
- Estimate frequencies for fans, pumps and refrigeration plant
- Estimate transmission of vibration
- Vibration control for building structures
- Use transmissibility graphs to select springs, vibration eliminators and pads
- Types of isolation materials and mounting devices
- Select isolation and mounting devices
- Inertia blocks

T11 Relevant standards, regulation and codes

T12 Noise and vibration analysis computer software packages

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

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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/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:

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- 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:
 - Analyse noise and vibration in refrigeration and air conditioning systems as described in 8) and including:
 - A Understanding the noise and vibration issues
 - B Forming effective strategies for analysing refrigeration and air conditioning systems performance
 - C Obtaining noise and vibration parameters, specifications and performance requirements appropriate to each situation.
 - D Evaluating the results of the analysis
 - E Documenting analysis details of all findings, calculations and assumptions.
 - F Documenting justification of actions to be implemented in accordance with professional standards
 - G 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

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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 analysing noise and vibration in refrigeration and air conditioning systems.

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 analysing noise and vibration in at least two different refrigeration and air conditioning systems.

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
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Custom Content Section

Competency Field 5)

Refrigeration and Air Conditioning