



Australian Government

UEERA0004 Analyse vibration and noise in refrigeration and air conditioning systems

Release: 1

UEERA0004 Analyse vibration and noise in refrigeration and air conditioning systems

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 analyse vibration and noise in refrigeration and air conditioning systems.

It includes analysing refrigeration and air conditioning system to provide solutions to noise, sound and vibration issues. It also includes working safely, gathering and analysing data, applying problem-solving techniques, and developing and documenting results and solutions for use in design work.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERA0042 Evaluate thermodynamic and fluid parameters of refrigeration systems

UEERA0001 Analyse the operation of HVAC air and hydronic systems

UEERA0002 Analyse the psychrometric performance of HVAC/R systems

and

UEERA0003 Analyse the thermodynamic performance of HVAC/R systems

or

UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0036 Establish the basic operating conditions of vapour compression systems

UEERA0035 Establish the basic operating conditions of air conditioning systems

UEERA0050 Install refrigerant pipe work, flow controls and accessories

UEERA0081 Select refrigerant piping, accessories and associated controls

UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS

Elements describe the essential outcomes.

1 Prepare refrigeration and air conditioning system to analyse noise and vibration in

PERFORMANCE CRITERIA

Performance criteria describe the performance needed to demonstrate achievement of the element.

- 1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied
- 1.2** WHS/OHS risk control measures and workplace procedures are followed
- 1.3** Extent of the noise and vibration issue is determined from performance specifications, situation reports and consultations with relevant person/s
- 1.4** Work activities are planned to meet scheduled timelines in consultation with others involved in the work

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|----------|--|--|
| | 1.5 | Effective strategies are formed to ensure solution development and implementation is carried out efficiently |
| 2 | Analyse refrigeration and air conditioning system noise and vibration | |
| | 2.1 | WHS/OHS risk control measures and workplace procedures for carrying out the work are followed |
| | 2.2 | Noise, vibration and thermodynamic analytical solutions are applied to refrigeration and air conditioning system |
| | 2.3 | Parameters, specifications and performance requirements in relation to refrigeration and air conditioning system are obtained in accordance with workplace procedures |
| | 2.4 | Approaches to analysing noise and vibration parameters are carried out to provide the most effective solution |
| | 2.5 | Unplanned events are dealt with safely in accordance with workplace procedures and regulatory requirements in a manner that minimises risk to personnel and equipment |
| | 2.6 | Refrigeration and air conditioning system work quality is monitored against performance agreement and/or workplace or industry standards |
| 3 | Document actions taken and report on noise and vibration analysis | |
| | 3.1 | Solutions to noise and vibration issues are evaluated to determine their effectiveness and modified, as required, in accordance with workplace procedures |
| | 3.2 | Refrigeration and air conditioning system analysis is documented and includes details of findings calculations and assumptions |
| | 3.3 | Refrigeration and air conditioning system analysis is reported to appropriate person/s to determine 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 industry standards and workplace procedures |

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.

Analysing noise, sounds and vibration must include at least the following:

- two different refrigeration and air conditioning systems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ138A Analyse vibration and noise in refrigeration and air conditioning systems.

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 UEERA0004 Analyse vibration and noise in refrigeration and air conditioning systems

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 one occasion and include:

- understanding the noise and vibration issues
- forming effective strategies for analysing refrigeration and air conditioning systems performance
- obtaining noise and vibration parameters, specifications and performance requirements appropriate to each situation
- evaluating the results of the analysis
- documenting analysis details of all findings, calculations and assumptions
- documenting justification of actions to be implemented in accordance with professional standards
- dealing with unplanned events
- applying problem-solving procedures, including using appropriate theorems
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices.

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:

- noise and vibration in refrigeration and air conditioning systems, safe working practices and relevant standards, codes and regulations, including:
 - fundamentals of sound:
 - frequency
 - decibels
 - octave bands
 - direct sound
 - velocity

- sound pressure level
- sound power level
- sound meters
- 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
- sound in confined and unconfined spaces:
 - inverse square laws
 - direct and reflective sound
 - reverberation time
 - Sabine's formula
 - absorption coefficients of surfaces
 - types of absorbers and their operation
 - insulation performances of partitions
- identification and analysis of 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
- methods of control:
 - natural attenuation
 - sound absorbing materials and placement
 - duct lining

- lined plenums
- lined duct splitters
- duct attenuators
- white noise
- vibration isolators
- acoustic specifications:
 - attenuator ratings
- sound insulation:
 - plant room breakout
 - controlling plant room noise
- duct borne noise:
 - sound power spectra for fans
 - noise attenuation in ducts and fittings
 - reducing fan noise transmission
 - regeneration noise
 - sources of regenerated noise
 - use tables to estimate regenerative noises
 - breakout situations
 - fan noise breakout
 - list methods of controlling breakout
- controlling the cost:
 - economical use of attenuation
- vibration:
 - simple harmonic motion (SHM)
 - 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
- noise and vibration analysis computer software packages
- relevant job safety assessments or risk mitigation processes
- relevant technique, process or measurement methods to obtain sound, noise and vibration data, including problem-solving procedures and appropriate theorems
- 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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