



Australian Government

UEERA0029 Develop heat exchanger design specifications

Release: 1

UEERA0029 Develop heat exchanger design specifications

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 develop heat exchanger design specifications.

It includes working safely, applying refrigeration parameters, gathering and analysing data, and developing and documenting results and solutions for work/project and/or development records.

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

Pre-requisite Unit

UEERA0004 Analyse vibration and noise in refrigeration and air conditioning systems

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 to develop specifications for exchanger designs

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 procedures are followed in preparation for the work
- 1.3** Scope of analysis to develop specifications is determined from design brief, relevant reports and/or consultations with relevant person/s
- 1.4** Activities are planned in accordance with workplace procedures for timelines in consultation with others involved in the work

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| | 1.5 | Strategies are formed to ensure analysis is carried out in accordance with workplace procedures and relevant industry standards |
| 2 | Develop specifications for exchanger designs | |
| | 2.1 | WHS/OHS risk control measures and workplace procedures for carrying out the work are followed |
| | 2.2 | Relevant refrigeration parameters are applied to developing heat exchanger specifications in accordance with workplace procedures and relevant industry standards |
| | 2.3 | Parameters and performance requirements in relation to refrigeration systems are obtained in accordance with workplace procedures and relevant industry standards |
| | 2.4 | Refrigeration parameters are analysed to provide effective solutions in accordance with workplace procedures |
| | 2.5 | Unplanned events are dealt with in accordance with problem-solving techniques and workplace procedures |
| | 2.6 | Quality of work is monitored in accordance with workplace procedures and relevant industry standards |
| 3 | Document specifications for exchanger design | |
| | 3.1 | Analysis, findings, calculations and assumptions are documented in accordance with workplace procedures |
| | 3.2 | Specifications for heat exchanger are developed from analysis findings and in accordance with workplace procedures |
| | 3.3 | Developed specification and analysis is reported to relevant person/s for endorsement in accordance with workplace procedures |
| | 3.4 | Justification for findings and actions undertaken in relation to the design is documented in accordance with workplace procedures and relevant industry standards for work/project and/or development records |

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.

Developing specifications for heat exchangers • two different designs
must include at least the following:

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ149A Develop heat exchanger design specifications.

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 UEERA0029 Develop heat exchanger design specifications

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:

- interpreting compliance documents
- setting up and conducting appropriate examinations and tests
- identifying non-compliance defects
- reporting examination and test results and non-compliance issues clearly and accurately
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using risk control measures
- developing specifications for exchanger designs
- documenting specifications for exchanger designs
- identifying analysis, findings, calculations and assumptions
- preparing to develop specifications for exchanger designs
- reporting findings and actions.

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:

- heat exchanger design, safe working practices and relevant standards, codes and regulations, including:
 - advanced thermodynamics:
 - heat transfer:
 - modes of heat transfer
 - conduction through a flat plate, series flat plates, thick and thin wall pipe, and composite pipes (e.g. lagged pipes and drums)
 - convection at a flat surface or tube
 - radiation from a flat surface or tube for black or grey bodies
 - combined conduction and convection through single or multiple flat plates or thin wall tubes

- combined convection and radiation
- combined conduction, convection and radiation such as fluid in a tank (convection to wall), through wall and/or insulation
- (conduction) to outside air (convection and radiation)
- heat exchangers - parallel, counter flow and cross flow
- refrigeration/heat pump:
 - basic principles and terminology
 - vapour compression cycle
 - performance criteria
 - types of refrigerant - designation, properties advantages and disadvantages
 - refrigerant properties using the pH diagram
 - ideal vapour compression cycle on the pH diagram
 - energy balance and heat transfers in compressor, evaporator and condenser
 - actual vapour compression cycle and variations from the ideal
 - pressure loss in lines and non-ideal compression
 - superheating and subcooling with or without suction/liquid heat exchanger
 - Carnot principle applied to refrigerator and heat pump
 - principles of evaporative refrigeration, absorption refrigeration, air cycle refrigeration and thermo-electric refrigeration
- heater exchanger design:
 - concepts
 - design parameters and limitations
 - construction material and components
 - testing requirements
- problem-solving techniques
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace quality, 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 suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable 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 simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

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