



Australian Government

Assessment Requirements for UEERA0027

Design secondary refrigerant systems

Release: 1

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Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

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 required operating functions and parameters from the design specification
- developing the design within the safety, regulatory and functional requirements and budget limitations
- documenting and presenting design effectively
- negotiating design alteration requests successfully
- obtaining approval for final design
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk controls
- designing secondary refrigeration systems
- preparing to design secondary refrigeration systems.

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:

- secondary refrigeration system design, components and piping design, safe working practices and relevant standards, codes and regulations, including:
 - technical standards, regulations and codes for secondary refrigeration systems:
 - environmental and safety considerations in the use and disposal of secondary refrigerants:
 - toxicity and food compatibility
 - flammability
 - environmental effects
 - safe disposal
 - safety data sheets (SDS)/material safety data sheet (MSDS) samples
 - registration requirements for transport and on-site use

- secondary refrigeration systems design requirements:
 - applications of secondary refrigeration systems in refrigeration
 - introduction to secondary refrigeration
 - applications in industrial refrigeration: cold storage, food processing and climatic test chamber
 - application in commercial refrigeration: supermarkets and small commercial systems
 - advantages and disadvantages of secondary refrigerants over the direct use of primary refrigerants
- properties, application and limitations of available secondary refrigerants:
 - general classification of secondary refrigerant types – single phase, volatile and phase change
 - general types of single phase secondary refrigerants available: glycols, alcohols, brines, hydrocarbons, silicone oils and water
 - common types of volatile and phase change secondary refrigerants available: CO₂ and ice slurries
 - thermal and transport properties of most widely used single phase secondary refrigerants (MEG, PG, ethyl alcohol, CaCl₂, potassium brines)
 - pump selection for viscous fluids
- application concepts and principles:
 - main and loop circuits, use of variable speed pumps and overflow valves
 - buffer and storage tanks, benefits and disadvantages
 - loop temperature control and loop pump selection
 - control valve options: regulating and on/off, two-way and three-way, mixing and diverting
 - expansion and contraction of components, compensation for pipe expansion and effect of pipe pre-insulation
 - expansion and contraction of secondary refrigerant, use of membrane expansion tanks versus open expansion tank
 - air purging
- secondary refrigeration system components and piping:
 - corrosion and material selection:
 - materials compatibility table
 - thermal and other properties of materials in use
 - pipe material and jointing methods/materials
 - pumps, impellers and seals
 - isolation and control valves
 - heat exchangers
 - pipe and insulation materials:
 - metal pipe
 - plastic pipe

- post-installation insulation (in situ foaming, formed insulation and closed cell flexible insulation)
- pre-insulated pipe material
- vapour barrier – importance and maintenance
- heat exchangers:
 - plate heat exchangers, brazed, welded, semi-welded and gasketed; design considerations in conjunction with primary refrigerant, flooded, direct expansion, and pump circulated primary refrigerant
 - shell and tube and plate and shell heat exchangers
 - fan coil units
- system control:
 - primary pump speed and staging control
 - maintenance of minimum flow and control valve pressure head
 - overflow valves
 - secondary loop temperature control
 - room humidity and temperature control with fan-coil units
- problem-solving techniques
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace budget, quality, policies and procedures
- relevant workplace documentation.

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

Companion Volume implementation guides are found in VETNet - -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6>