



Australian Government

Assessment Requirements for UEERA0017

Design complex air conditioning systems and select equipment

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:

- developing outlines of alternative designs
- developing the design within the safety, regulatory, functional requirements and budget limitations
- documenting and presenting design effectively
- successfully negotiating design alteration requests
- obtaining approval for final design
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using risk control measures
- designing complex commercial refrigeration system
- preparing to design complex air conditioning system.

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:

- complex heating, ventilation and air conditioning (HVAC) system design, safe working practices and relevant standards, codes and regulations, including:
 - HVAC load estimating of multiple zone and multi-storey buildings:
 - system design parameters:
 - human comfort
 - system requirements in accordance with AS 1668 The use of ventilation and air conditioning in buildings SAA refrigeration code
 - heat transfer calculations for complex structures and building components
 - heat and radiation transfer calculations through complex glass structures including various internal and external shading devices
 - indoor air quality

- olfs and decipols
- complex shading:
 - solar data, azimuth and altitude angles
 - shading from adjacent structures
- computer software:
 - heat load estimating
 - building thermal performance analysis and simulation software
- advanced psychrometrics:
 - complex psychrometric processes:
 - revise sensible cooling and heating and evaporative (adiabatic) cooling
 - cooling and dehumidification
 - cooling and dehumidification with high latent load
 - cooling and dehumidification all outdoor air
 - cooling and dehumidification all outdoor air with dehumidified air requirements less than supply air
 - cooling with evaporative humidification
 - cooling with near isothermal humidification
 - spray process to include cooling and dehumidification, cooling and humidification with heated spray water, heating and humidification
 - partial load processes
 - reheat
 - bypass of, RA only and mix of RA and OA
 - variable air volume
 - variable coil effective surface temperature
 - split coil, horizontal, vertical and intertwined
 - system performance:
 - saturation efficiency of sprayers
 - system capacity calculated from air quantity and enthalpy change
 - required plant capacity and airflow rates:
 - effects of coil bypass factor and ADP
 - calculation of dehumidified air quantity, using both TSH and ERSR methods
 - recap on psychrometrics formulae and charts:
 - properties of air
 - gas constants
 - derivation of air constants
 - combined gas laws
 - Dalton's law of partial pressures
 - carrier's equation
 - psychrometric property tables
 - psychrometric charts

- air mixing equations
- air quantity equations
- indirect evaporative coolers
- analysis of cooling coil selection and performance
- psychrometric analysis of:
 - air conditioning in tropics
 - all outdoor air
 - LCV/HWF systems
 - psychrometric analysis using equations and tables
- air conditioning system design:
 - design parameters for multi-storey building:
 - customer and objective
 - customer concept of environment desired
 - economic
 - client brief
 - relevant design criteria:
 - building purpose, location, orientation and shape
 - external environment ambient conditions
 - internal load diversity
 - thermal capacity behaviour
 - thermal load (full and partial)
 - zoning and building usage:
 - space and building
 - occupancies, single purpose and multi-purpose
 - system selection criteria:
 - economics
 - environment
 - control requirements
 - existing structures
 - new structures
 - system components
 - space for equipment and system
 - selection of appropriate system
 - system and applications:
 - design features, engineering procedures and controls
 - direct expansion - self-contained room/zone, heat pump, multi-zone fan-coils and central station
 - all water - room fan-coil
 - all-air - constant volume variable temperature, face and bypass, reheat, constant temperature variable volume, constant volume induction, dual-duct and

- dual-conduit
- air water - induction unit and primary air fan-coil
- HVAC energy conservation techniques:
 - heat recovery systems
 - night cycle
 - optimum stop/start
 - purge cycles
 - chiller/boiler/cooling tower sequencing
 - economy cycles (based on temperature or enthalpy)
 - supply air reset
 - supply water reset
 - condenser water temperature reset
 - power demand control
 - load limiting
 - load shedding
 - set point relaxation
 - ventilation cycles
 - plant - fixed OA to economy, boiler to electric reheat and constant volume to variable air volume (VAV)
 - cost-benefit (payback)
- 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>