



Australian Government

Assessment Requirements for UEERE0012 Develop effective engineering strategies for energy reduction in buildings

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:

- determining the extent of the evaluation
- setting up and conducting appropriate examinations and tests
- reporting evaluation including recommendation for improving energy efficiency
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
 - implementing workplace procedures and practices
 - using of risk control measures
- applying sustainable energy principles and practices
- developing sustainable engineering strategies for energy reduction in buildings
- documenting and reporting engineering strategies for effective energy reduction in buildings
- planning to develop strategies for effective energy reduction in buildings.

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:

- energy efficient building design, including:
 - climate and thermal comfort encompassing:
 - characteristics of the different Australian climatic types
 - use of climatic data in published and electronic forms to extract the quantities relevant to energy efficient design
 - relationship between climate and comfort using bioclimatic or psychrometric charts
 - calculation of heating or cooling degree days or degree hours for various locations
 - calculation of thermal neutrality for a given location
 - solar geometry and radiation encompassing:

- definition of the terms: declination, hour angle, zenith angle, azimuth and altitude angles, and the equation of time
- conversion of solar time to local time and vice versa
- position of the sun and the length of shadows with the aid of algorithms, tables, sun charts or computer software
- daily irradiation incident on a wall, window or roof of a given tilt and orientation
- relative summer and winter irradiation of windows facing the cardinal orientations
- heat transfer encompassing:
 - thermal processes of conduction, convection and radiation apply to the transfer of heat in buildings
 - calculation of the summer and winter U-values of building elements using tables and software
 - calculation of the infiltration heat transfer in a building
- glazing systems encompassing:
 - different types of glazing systems and their characteristics
 - different types of shading devices and the window orientations for which they are most appropriate
 - solar heat gain for different glazing types and angles of incidence
 - calculation of the average daily irradiation of a window partly shaded by eaves, using computer software
 - calculation of the average daily heat gain through a window partly shaded by eaves
- insulation encompassing:
 - different types of insulation and where they are used
 - how different types of insulation are installed in roofs, walls and floors
 - determination of the minimum R-values of roof insulation for different locations using Australian Standard AS 2627 Thermal insulation of dwellings or similar standards
- thermal mass encompassing:
 - advantages and disadvantages of using substantial thermal mass in different climate types and for different heating and cooling regimes
 - where thermal mass can be located in a building
 - definition of the following terms: time lag, decrement factor, admittance and response factor
- comfort control strategies encompassing:
 - interpretation of the usefulness of a design strategy with the aid of a psychrometric chart showing control potential zones for a particular location
 - selection of the most useful comfort control strategies for Australian climatic regions
- energy efficiency in buildings encompassing:
 - determination of the direction of the following: both true and magnetic, north winter and summer sunrise, winter and summer sunset
 - solar access in summer and winter to various possible house locations on a site and room locations within the house
 - how vegetation can be used to both funnel and deflect wind

- using cross ventilation as a cooling strategy
- thermal performance of a building encompassing:
 - heating requirements of a building using the heating degree day or hour method
- dynamic performance predicted by a computer simulation program such as nationwide house energy rating scheme (NatHERS) or building energy rating scheme (BERS) integration of active solar systems encompassing:
 - active solar system types available which can provide hot water, space heating and cooling
 - the best location on the roof, and the optimum tilt and orientation of the collector panels
 - function of the main components of an air or water-based solar space heating system
 - schematic of the fluid circuit of an air or water-based space heating system
 - main solar cooling system types
- energy rating schemes encompassing:
 - differences in approach used by house energy rating schemes in Australia
 - energy performance of a number of houses using a computer simulation program such as NatHERS or BERS
 - other methods to reduce energy consumption within and outside a building, including appliance efficiency, human behaviour changes, building management strategies and transportation minimisation
 - additional cost of energy efficiency measures and cost savings using life cycle cost or simple pay back methods according to AS 3595 and AS/NZS 4536 Life cycle costing
- sustainable and safe building materials encompassing:
 - common building materials and their embodied energy content
 - environmental impact of the production of various building materials
 - problems associated with the use or disposal of building materials
- engineering principles
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- sustainable energy principles and practices.

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 other simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to developing strategies for effective energy reduction in buildings
- 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>