



Australian Government

CPCSUS4002A Use building science principles to construct energy efficient buildings

Release: 1

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Modification History

New unit.

This version first released with CPC08 Construction, Plumbing and Services Training Package Version 9.

Unit Descriptor

This unit of competency specifies the outcomes required to incorporate building science principles into the construction of energy efficient buildings.

The unit is relevant for those involved in the construction of energy efficient buildings. It requires the ability to use constructive thinking and problem-solving processes to identify appropriate solutions.

The unit also requires consultation with others.

Application of the Unit

This unit of competency applies to those who apply building science principles to the construction of new buildings in the residential and commercial building sector.

Licensing/Regulatory Information

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

Pre-Requisites

Nil

Employability Skills Information

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.

Performance criteria describe the required performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge and/or the range statement. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

1	Define performance measures and expectations of the building envelope.	1.1	<i>Relevant stakeholders</i> are consulted to identify expected type of use for the building and energy efficiency expectations of its owners or occupiers.
		1.2	Durability expectations of the building are identified and factored in to decisions relating to construction methods and materials to be used.
		1.3	Occupants' indoor activities and health and safety considerations are identified to inform recommendations of building products, materials and systems.
		1.4	Environmental and climatic conditions impacting the building are researched and <i>extreme weather conditions</i> are noted for planning and construction purposes to determine resiliency opportunities.
		1.5	Relevant legislation, standards, <i>regulations and codes</i> are consulted to identify minimum energy efficient standards to be met.
		1.6	Relevant domestic and international codes, standards and examples of best practice that meet or exceed current energy efficient standards are consulted to reflect client expectations.
2	Review building methods and construction materials for energy efficiency.	2.1	Building science principles supporting energy efficiency are reviewed with reference to <i>contemporary information sources</i> .
		2.2	Embodied energy of the specified product or materials is reviewed in relation to the energy efficiency

- expectations of the client.
- 2.3 Heating, ventilation and air conditioning (HVAC) systems are researched to identify best contemporary practice that delivers high levels of energy efficiency while minimising risks of inadequate ventilation and poor indoor air quality for occupants.
 - 2.4 Mechanical ventilation systems and equipment to aid air flows are reviewed for appropriateness and operational costs.
 - 2.5 Materials for interior and exterior moisture and vapour barriers are researched to identify best contemporary practice that delivers high levels of energy efficiency, durability and appropriateness for the building envelope.
- 3 Evaluate and select building design and construction methods and materials for energy efficiency.
 - 3.1 Site location and building position are identified and maximised for energy efficiency according to environmental factors, climatic conditions and identified use of building.
 - 3.2 Planned opportunities for heat, air and moisture flows throughout the building are identified and assessed against energy efficiency expectations.
 - 3.3 Planned *cavities* in the building are identified and strategies for sealing or minimising unwanted air leakages are developed.
 - 3.4 HVAC systems are evaluated and selected for the site to use minimal energy while minimising risks of inadequate ventilation and poor indoor air quality for occupants.
 - 3.5 Mechanical ventilation systems and equipment are evaluated and selected for appropriateness to the site and operational costs.
 - 3.6 Materials for interior and exterior barriers are evaluated and selected for energy efficiency, durability and appropriateness for building site.

Required Skills and Knowledge

This section describes the skills and knowledge required for this unit.

Required skills

- learning skills to:
 - evaluate own actions and make judgments about performance and necessary improvements
 - respond to change, such as differences in current work site environmental and sustainability requirements
- numeracy skills to measure and interpret energy efficiency readings presented in numerical or graphical formats
- oral communication skills to:
 - enable clear and direct communication, using questioning to identify and confirm expectations, and share information
 - report hazards involved in the work
 - use language and concepts appropriate to cultural differences
- reading skills to:
 - conduct own research into current building and construction methodologies and new materials technology
 - interpret documentation, including drawings and specifications
 - understand written instructions, procedures and signage
- writing skills to provide recommendations regarding ways to improve energy efficiency outcomes of buildings

Required knowledge

- application and limitations of energy efficient construction materials
- general construction terminology
- impacts of different climate zones and environmental conditions on the built environment
- processes for the evaluation of energy efficiencies in buildings
- theories and principles of energy efficiency applied to buildings and construction processes
- types, uses and limitations of different construction materials and the role of embodied energy when selecting construction materials and products for energy efficient buildings
- work health and safety (WHS) requirements in different jurisdictions

Evidence Guide

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Overview of assessment This unit of competency could be assessed by performing a range of tasks in the workplace or a close simulation of the workplace environment, provided that simulated or project-based assessment techniques fully replicate construction workplace conditions, materials, activities, responsibilities and procedures.

Critical aspects for assessment and evidence required to demonstrate competency in this unit A person should demonstrate the ability to:

- apply building science methodologies as outlined in this unit to the construction of two new construction projects
- undertake research into a range of energy efficient design and construction methods for the two new construction projects with a specific focus on:
 - energy efficient heating, ventilation and air conditioning systems
 - energy efficient materials and construction methods
- locate, interpret and apply relevant information, standards and specifications
- comply with site safety plan and WHS legislation, regulations and codes of practice applicable to workplace operations
- comply with organisational policies and procedures, including quality requirements
- communicate and work effectively and safely with others.

Context of and specific resources for assessment Assessment of this unit:

- must be in the context of the work environment
- may be conducted in an off-site context, provided it is realistic and sufficiently rigorous to cover all aspects of workplace performance, including task skills, task management skills, contingency management skills and job role environment skills
- must meet relevant compliance requirements.

Resource implications for assessment include:

- an induction procedure
- realistic tasks or simulated tasks covering the mandatory task requirements
- relevant specifications and work instructions
- tools and equipment appropriate to applying safe work practices
- support materials appropriate to activity

- workplace instructions relating to safe work practices and addressing hazards and emergencies
- research resources, including industry-related systems information
- safety data sheets.

Method of assessment Assessment for this unit must verify the practical application of the required skills and knowledge, using one or more of the following methods:

- direct observation of tasks in real or simulated work conditions
- questioning to confirm the ability to consistently identify and correctly interpret the essential underpinning knowledge required for practical application
- review of relevant authenticated documentation from third parties, such as existing supervisors, team leaders or specialist training staff.

Guidance information for assessment This unit could be assessed on its own or in combination with other units relevant to the job function.

Reasonable adjustments for people with disabilities must be made to assessment processes where required. This could include access to modified equipment and other physical resources, and the provision of appropriate assessment support.

Assessment processes and techniques should, as far as is practical, take into account the language, literacy and numeracy capacity of the candidate in relation to the competency being assessed.

Range Statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Relevant stakeholders may include:

- architects
- builders
- building owners or investors
- building designers
- developers
- engineers

- facility managers
 - occupants.
 - cyclonic activity
- Extreme weather conditions*** may include:
- extreme heat and risk of fire
 - heavy rain and flooding
 - storm weather.
- Regulations and codes*** must include:
- local planning codes and regulations
 - National Construction Code.
- Contemporary information sources*** may include:
- local and international research into building science methods
 - systems theory and analysis
 - manufacturer websites and technical data for energy efficient construction materials and systems.
- Cavities*** may include:
- gaps around ceiling down lights
 - gaps around insulating material
 - gaps under and around doors
 - openings for floor or ceiling ducts used to transmit heating or cooling
 - wall, floor or ceiling cracks
 - window seals.

Unit Sector(s)

Construction

Custom Content Section

Not applicable.