



**Australian Government**

**Department of Education, Employment and Workplace Relations**

# **CPCBC4010B Apply structural principles to residential low rise constructions**

**Release: 1**

## **CPCBC4010B Apply structural principles to residential low rise constructions**

### **Modification History**

Not Applicable

### **Unit Descriptor**

#### **Unit descriptor**

This unit of competency specifies the outcomes required to apply structural principles to the erection or demolition of low rise residential structures using conventional methods. The unit addresses those structures classified by the Building Code of Australia (BCA) as Class 1 and Class 10. Knowledge of the application of structural principles in accordance with Australian standards is essential.

### **Application of the Unit**

#### **Application of the unit**

This unit of competency supports the needs of builders, site managers, forepersons and other managers in the building and construction industry responsible for overseeing and managing the demolition or erection of structures.

### **Licensing/Regulatory Information**

Not Applicable

## Pre-Requisites

**Prerequisite units** Nil

## Employability Skills Information

**Employability skills** This unit contains employability skills.

## Elements and Performance Criteria Pre-Content

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Elements describe the essential outcomes of a unit of competency.

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

## Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Apply structural principles when planning the erection or demolition of a structure.	1.1. Main <i>structural principles</i> that apply to the erection or demolition of a <i>residential low rise</i> structure are identified. 1.2. Structural performance of a structure is described in terms of the effect of section properties on various materials. 1.3. Structural performance characteristics of slabs, floors, beams, columns and retaining walls are explained and applied to the planning of the construction work. 1.4. Demolition of existing structures is coordinated in accordance with legislative and planning requirements, environmental standards, and safe work practices.
2. Analyse and plan for the structural integrity of Class 1 and Class 10 buildings.	2.1. Relevant <i>industry professionals</i> are consulted as required to provide advice regarding the design process and the structural integrity of the proposed Class 1 or Class 10 building. 2.2. <i>Project documentation</i> is collected and analysed to assist in the analysis of plans and specifications. 2.3. Project documentation is analysed for compliance with BCA requirements for bushfire, high wind, earthquake and alpine environments. 2.4. New and emerging building technologies are assessed for application to the construction process and their compliance with BCA requirements and Australian standards. 2.5. Pre-commencement site inspection is conducted to confirm analysis.
3. Plan, coordinate and manage the laying of footings.	3.1. Footings are set out in accordance with building's plan. 3.2. Structural integrity of the footings specified in building's plan is assessed for compliance with relevant codes and accepted industry construction principles. 3.3. <i>Footings</i> specified in building's plan are laid and checked for compliance with project documentation. 3.4. Damp coursing, provision of termite barriers, and other relevant techniques are planned, implemented and checked in accordance with codes, standards and industry practice.
4. Plan, coordinate and manage the laying of	4.1. Concrete slab or bearers and joists specified in building's plan are assessed for structural integrity

ELEMENT	PERFORMANCE CRITERIA
floor system.	and compliance with relevant codes and accepted industry construction principles.
5. Plan, coordinate and manage the building of structural and non-structural wall systems.	<p>4.2. Laying of <i>floor system</i> specified in building's plan is supervised and checked for compliance with project documentation.</p> <p>5.1. Technical construction principles and performance of <i>materials</i> used in the construction are identified and analysed in the planning of the building and construction project.</p> <p>5.2. Application of bracing requirements, tie-downs, tolerances, allowances, and fixing and installation of components are planned, implemented and checked for compliance with relevant Australian standards, codes and manufacturer specifications.</p> <p>5.3. Structural timber members are selected for low rise buildings to conform to AS1684 requirements.</p> <p>5.4. Processes are put in place and managed to ensure quality of the frame, whether factory pre-cut and pre-nailed, factory pre-cut and assembled on site, or cut and assembled on site.</p> <p>5.5. Vapour permeable sarking or a waterproof membrane, relevant to construction method, is attached and checked.</p>
6. Plan, coordinate and manage the building of roof system.	<p>6.1. Structural integrity of roof system components specified in building's plan is assessed for compliance with relevant codes and accepted industry construction principles.</p> <p>6.2. Erection of roof trusses is planned, implemented and checked in accordance with requirements of building plan, <i>type of roof</i> being constructed, relevant codes and accepted industry construction principles.</p> <p>6.3. Processes are put in place and managed to ensure quality of the manufactured roof trusses or hand-cut roof system.</p> <p>6.4. Roof sarking and cladding are planned and installation is supervised and checked for compliance with codes, standards and industry practice.</p>
7. Plan, coordinate and manage the external wall cladding of structure.	<p>7.1. Structural performance of <i>cladding</i> to be used for bracing in the frame construction is assessed for compliance with relevant codes, manufacturer specifications and accepted industry construction principles.</p> <p>7.2. Installation of the cladding, as specified in building's plan, is supervised and checked for compliance with standards and accepted industry construction</p>

**ELEMENT****PERFORMANCE CRITERIA**

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- principles.
- 7.3. Installation of windows and external doors is supervised to ensure compliance with relevant codes, manufacturer specifications and accepted industry construction principles.

## Required Skills and Knowledge

### REQUIRED SKILLS AND KNOWLEDGE

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

#### Required skills

Required skills for this unit are:

- apply manufacturer specifications and Australian standards and codes
- apply structural principles to a variety of structures within BCA Classes 1 and 10
- communication skills to:
  - consult with industry professionals
  - enable clear and direct communication, using questioning to identify and confirm requirements, share information, listen and understand
  - read and interpret project documentation
  - use language and concepts appropriate to cultural differences
  - use and interpret non-verbal communication
- identify and analyse relevant information
- select structural members based on project or specification requirements
- work safely to OHS regulations and site requirements.

#### Required knowledge

Required knowledge for this unit is:

- building and construction industry contracts
- relevant state or territory building and construction codes, standards and government regulations
- underlying mathematics related to structural analysis
- workplace safety requirements.

# Evidence Guide

## EVIDENCE GUIDE

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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 the effective application of structural principles and concepts in accordance with the range of variables and application to only one sector of the building and construction industry.

This unit of competency can be assessed 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 who demonstrates competency in this unit must be able to provide evidence of the ability to:

- assess the structural integrity of a variety of structures found on building and construction sites
- apply the structural principles behind the safe erection and demolition of a low rise structure classified within the BCA as Class 1 and 10
- apply technical construction principles to the appropriate selection, integration and building in of construction elements and components
- coordinate, plan, implement and check the building of a low rise structure.

### Context of and specific resources for assessment

This competency is to be assessed using standard and authorised work practices, safety requirements and environmental constraints.

Assessment of essential underpinning knowledge will usually be conducted in an off-site context.

Assessment is to comply with relevant regulatory or Australian standards' requirements.

Resource implications for assessment include:

- documentation that should normally be available in either a building or construction office
- relevant codes, standards and government

## EVIDENCE GUIDE

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regulations

- office equipment, including calculators, photocopiers and telephone systems
- computers with appropriate software to view 2-D CAD drawings, run costing programs and print copies
- technical reference library with current publications on measurement, design, building construction and manufacturers' product literature
- suitable work area appropriate to the construction process.

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.

### Method of assessment

Assessment methods must:

- satisfy the endorsed Assessment Guidelines of the Construction, Plumbing and Services Training Package
- include direct observation of tasks in real or simulated work conditions, with questioning to confirm the ability to consistently identify and correctly interpret the essential underpinning knowledge required for practical application
- reinforce the integration of employability skills with workplace tasks and job roles
- confirm that competency is verified and able to be transferred to other circumstances and environments.

Validity and sufficiency of evidence requires that:

- competency will need to be demonstrated over a period of time reflecting the scope of the role and the practical requirements of the workplace
- where the assessment is part of a structured learning experience the evidence collected must relate to a number of performances assessed at different points in time and separated by further learning and practice, with



## EVIDENCE GUIDE

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a decision on competency only taken at the point when the assessor has complete confidence in the person's demonstrated ability and applied knowledge

- all assessment that is part of a structured learning experience must include a combination of direct, indirect and supplementary evidence.

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. Supplementary evidence of competency may be obtained from relevant authenticated documentation from third parties, such as existing supervisors, team leaders or specialist training staff.

## Range Statement

### RANGE STATEMENT

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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.

***Structural principles*** include:

- behaviour of structural materials
- loads and loading
- performance of beams
- performance of columns
- performance of roof trusses
- section properties
- solution of force systems
- wind bracing.

***Residential low rise*** buildings as described within the BCA are:

- Class 1
- Class 10.

***Industry professionals*** include:

- architects
- draftspersons

## RANGE STATEMENT

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- Project documentation*** includes:
- engineers
  - quantity surveyors
  - surveyors.
  - building approval plans
  - contract plans
  - designs and specifications
  - engineer footing designs and specifications
  - original contour survey plan
  - registered plans
  - retaining walls
  - site plans
  - soil investigation reports
  - structural floor systems, wall systems and roof systems
  - tanking designs and specifications
  - underpinning, rock anchors and shoring designs and specifications.
- Footings*** include:
- bored pier footings
  - columns or stumps
  - concrete slab floors
  - piers and beams.
- Floor system*** components of the bearers and joists include:
- compressed sheet wet area flooring
  - engineered floor joists
  - fitted (cut-in) floors
  - platform floor construction
  - sheet flooring
  - tongue and groove flooring.
- Materials*** include:
- cavity brick
  - concrete block
  - structural steel
  - timber.
- Type of roof*** includes:
- box gable
  - dual pitch roof
  - Dutch gable
  - Dutch hip
  - gable end
  - hip and valley
  - north light
  - skillion.
- Cladding*** used on timber frame
- brick veneer

**RANGE STATEMENT**

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constructions includes:

- coatings over base materials
- colourbond or zincalume sheeting
- fibre cement or compressed wood panelling
- weatherboards.

**Unit Sector(s)**

<b>Unit sector</b>	Construction
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**Co-requisite units**

<b>Co-requisite units</b>	Nil
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**Functional area**

<b>Functional area</b>	
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