



**Australian Government**

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

# **CPCCSV6007A Assess structural requirements for buildings up to three storeys**

Release: 1

## **CPCCSV6007A Assess structural requirements for buildings up to three storeys**

### **Modification History**

Not Applicable

### **Unit Descriptor**

**Unit descriptor** This unit of competency specifies the outcomes required to assess the structural requirements of buildings up to three storeys and with a maximum floor area not exceeding 2000 square metres.  
It includes the application of design concepts to the selection, positioning and sizing of all structural members and materials that form a building structure.

### **Application of the Unit**

**Application of the unit** This unit of competency supports the attainment of the understanding and skills to assess structural requirements for buildings up to three storeys within the context of relevant legislation, the Building Code of Australia (BCA) and Australian standards.

### **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. Identify structural requirements and loads commonly used in structural design.	<p>1.1. Assessment of <i>structural requirements</i> relating to equilibrium, stability, strength, functionality, economy and aesthetics is undertaken.</p> <p>1.2. Different types of loading and unloading methods and the effect on structures are identified and documented in accordance with BCA, relevant Australian standards, suppliers' technical data and empirical methods and <i>adherence to legislative requirements for BCA Class 2 to 9 buildings</i>.</p>
2. Analyse effects of force and moments on structural elements.	<p>2.1. Force, moments and equilibrium of force and the effects on structures are identified and recorded.</p> <p>2.2. Equilibrium of forces for co-planar systems in consideration of stability is identified and compared for performance.</p>
3. Analyse properties and behaviour of structural materials.	<p>3.1. Effect of force on materials in tension, compression, stress, strain and elasticity is identified and recorded.</p> <p>3.2. Structural properties and performances are differentiated for common materials and recorded.</p>
4. Identify section properties of structural elements and their effect on structural performance.	<p>4.1. Cross-sectional geometry and common structural shapes are identified.</p> <p>4.2. Section properties and the relationship between first and second area moments, section models and gyration and deflection of beams are identified and compared for performance.</p> <p>4.3. Section properties' values for I (moment of inertia), Z (section modulus) and R (radius) for common sections are determined using tables or standard formulas and compared for performance.</p>
5. Compare performance and properties of spanning elements.	<p>5.1. Structural considerations of loaded spanning elements for bending moments, shear forces, deflection and torsion are determined and compared for performance.</p> <p>5.2. Bending behaviour and performance of loaded support beams of various types, shapes, spans and loads are determined and compared for performance.</p> <p>5.3. Effects that connections have upon the structural performance of beams are identified and compared for performance.</p> <p>5.4. Principles of slab behaviour in relation to spans and stress distribution are identified and compared for performance.</p>
6. Compare	<p>6.1. Effect of slenderness ratio that changes in length,</p>

**ELEMENT****PERFORMANCE CRITERIA**

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performance criteria  
for columns.

cross-sections, connections and materials will have  
on the strength of a column is determined and  
compared for performance.  
6.2. Eccentric and axial load effect on the strength of  
column section and materials are determined and  
compared for performance.

ELEMENT	PERFORMANCE CRITERIA
7. Compare methods of stress distribution in connections between structural elements.	7.1. Transmission of forces between structural elements are identified and interpreted. 7.2. Methods of distributing stresses in connections between structural elements are identified and compared for performance.
8. Determine how loads of various types occur and impinge on a building structure.	8.1. Differences between <i>types of loading</i> , including dead load, live load, wind load, earthquake load and other load, causing actions are determined and compared for performance. 8.2. Dead loads are determined using BCA and relevant Australian standards. 8.3. Indication of direction of wind pressures on the various surfaces of buildings specified in BCA and relevant Australian standards are determined.
9. Evaluate design of high performance structural elements.	9.1. Factors that determine the form of long span structural elements, including bending movement, deflection and shear forces, are researched, considered and evaluated. 9.2. Performance in <i>high performance structural elements</i> is identified and evaluated. 9.3. <i>Use of steel to reinforce concrete</i> is investigated and evaluated and the outcomes or results are recorded.

## 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:

- ability to recognise procedures, follow instructions, respond to change and contribute to workplace responsibilities, such as current work site environmental and sustainability frameworks or management systems
- communication skills to:
  - enable clear and direct communication, using questioning to identify and confirm requirements, share information, listen and understand
  - evaluate own actions to make judgements about performance and necessary improvements
  - read and interpret:

## **REQUIRED SKILLS AND KNOWLEDGE**

- BCA
- legislation
- relevant Australian standards
- other relevant documentation
- use language and concepts appropriate to cultural differences
- use and interpret non-verbal communication
- written skills to report findings and provide reports
- numeracy skills to analyse and apply complex mathematical information
- teamwork skills to work effectively with others.

### **Required knowledge**

Required knowledge for this unit is:

- behaviour of structural members undergoing stress, strain, compression, bending or combined actions
- grading processes and grade markings used to categorise timber and timber products
- nature of materials and effect on performance
- processes for the interpretation of working drawings and specifications
- processes for the preparation of documentation
- relevant federal, state or territory legislation and local government policy and procedures
- research methods
- structural and design principles for buildings.

# 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 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:

- comply with OHS regulations applicable to workplace operations
- apply organisational management policies and procedures, including quality assurance requirements where applicable
- assess, identify and report on findings for the design, positioning and sizing of structural members of at least one three storey building project or equivalent
- provide reports to appropriate body/individual as determined by the project brief
- apply design principles relating to performance of structural members.

### 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:

- an induction procedure and requirement
- 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



## EVIDENCE GUIDE

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

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 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

## EVIDENCE GUIDE

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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.

Assessment of ***structural requirements***:

- includes:
  - analysis of engineering drawings
  - evaluation of site physicality
  - identification of safe structural practices
- may require actual site visits.

***Adherence to legislative requirements for BCA Class 2 to 9 buildings*** is limited to:

- three storey buildings
- not exceeding a maximum floor area of 2000 square metres.

***Types of loading*** include:

- static
- dead
- dynamic
- earthquake
- settlement
- snow
- thermal.

***High performance structural elements*** include:

- castellated beams
- connections
- fire resistance

## RANGE STATEMENT

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Evaluation of *use of steel to reinforce concrete* includes:

- laminated beams
- prestressed beams and slabs
- trusses
- waffle slabs.
- bond stress and development length
- carry over movements
- compression reinforcement
- eccentric loading
- location of steel in relation to shear stress
- location of steel in relation to tensile stress
- reinforcement ratio.

## Unit Sector(s)

Unit sector                      Construction

## Co-requisite units

Co-requisite units              Nil

## Functional area

Functional area