



Australian Government

Department of Education, Employment and Workplace Relations

CPCCSV5015A Assess structural requirements for domestic scale buildings

Release: 1

CPCCSV5015A Assess structural requirements for domestic scale buildings

Modification History

Not Applicable

Unit Descriptor

Unit descriptor This unit of competency specifies the outcomes required to assess the structural requirements of domestic scale buildings and those of a similar loading, construction and size, such as small industrial, commercial or public buildings.
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 domestic scale buildings 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

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.	1.1. Structural requirements relating to equilibrium, stability, strength, functionality, economy and aesthetics are determined in adherence to legislative requirements. 1.2. Different types of loading and loading methods and the effect on structures are identified and documented in accordance with BCA, relevant Australian standards, suppliers' technical data and empirical methods.
2. Analyse the effects of force and moments on structural elements.	2.1. Force, moments and equilibrium of force and the effects on structures are identified and analysis is conducted and recorded. 2.2. Equilibrium of forces for co-planar systems in consideration of stability is identified and compared for performance.
3. Analyse properties and behaviour of structural materials.	3.1. Effect of force on materials in tension, compression, stress, strain and elasticity is identified and recorded. 3.2. Structural properties and performances are differentiated for common materials and recorded.
4. Identify section properties of structural elements and their effect on structural performance.	4.1. Cross-sectional geometry and common structural shapes are identified. 4.2. Section properties and the relationship between first and second area moments, section modules and gyration and deflection of beams are identified and compared for performance. 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.
5. Compare the performance and properties of spanning elements.	5.1. Structural considerations of loaded spanning elements for bending moments, shear forces, deflection and torsion are determined and compared for performance. 5.2. Bending behaviour and performance of loaded support beams of various types, shapes, spans and loads are determined and compared for performance. 5.3. Effect that connections have upon the structural performance of beams is identified and compared for performance. 5.4. Principles of slab behaviour in relation to spans and stress distribution are identified and compared for performance.

ELEMENT	PERFORMANCE CRITERIA
6. Determine performance criteria for columns.	6.1. Effect of slenderness ratio that changes in length, cross-sections, connections and materials will have on the strength of a column are 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.
7. Identify factors affecting design of connections between structural elements.	7.1. Transmission of forces between structural elements are determined and compared for performance. 7.2. Methods of distributing stresses in connections between structural elements are determined and compared for performance.
8. Outline how loads of various types occur and impinge on a building structure.	8.1. Differences between types of loading, including dead load, live load, wind load, earthquake load and other load, causing actions are determined and compared for performance. 8.2. Dead and live loads using BCA and relevant Australian standards are determined. 8.3. Indication of direction of wind pressures on the various surfaces of buildings specified in BCA and relevant Australian standards are determined.

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 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
 - read and interpret:
 - BCA
 - relevant Australian standards
 - other relevant documentation

REQUIRED SKILLS AND KNOWLEDGE

- 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
- planning and organisational skills to collect, organise and analyse information
- technological skills to:
 - complete documentation and calculations
 - enable information gathering and analysis.

Required knowledge

Required knowledge for this unit is:

- behaviour of structural members undergoing stress, strain, compression, bending or combined actions
- 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

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 domestic scale building project or equivalent
- provide reports to appropriate body/individual as determined by the project brief.

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
- workplace instructions relating to safe work practices and addressing hazards and

EVIDENCE GUIDE

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 supplementary evidence.

EVIDENCE GUIDE

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

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 is limited to:

- domestic scale buildings (similar in characteristics to those of residential dwellings in terms of loading, construction and size and may include small industrial, commercial and public buildings).

Analysis includes:

- 'I' (moment of inertia) values
- base unit mass, density, velocity, acceleration, force and stress
- column changes in length, cross-sectional, restraints, material and eccentricity
- cross-sectional geometry and common structural shapes
- deflections for symmetrically loaded, simply supported timber beams of various shapes, spans and loads

RANGE STATEMENT

- directions of wind pressure loads
- force on materials in tension, compression, stress, strain and elasticity
- forces associated with levers identified by direction and value
- forces for co-planar non-current force systems
- load differences, including:
 - dead load
 - live load
 - wind load
 - earthquake load
- minimum bracing requirements
- removal of trusses
- restraints for use with beams
- second area moments and deflection of beams
- simple roof truss transmission force
- structural properties differentiated for common materials
- symmetrically loaded simply supported situations for:
 - bending moments
 - deflection
 - shear forces
 - torsion
- tension and compression stresses of roof members
- wind forces and wind velocity for bracing.

Unit Sector(s)

Unit sector Construction

Co-requisite units

Co-requisite units Nil

Co-requisite units Nil

Functional area

Functional area