



Australian Government

FWPTMM5209 Determine prefabricated timber building systems designs for compliance, manufacture and installation

Release: 1

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Modification History

Release	Comments
Release 1	This version released with FWP Forest and Wood Products Training Package Version 4.0.

Application

This unit of competency describes the skills and knowledge required to determine design solutions for panelised and/or modular prefabricated timber building systems to meet structural and safety compliance, off-site manufacture and on-site installation. The main job functions are to facilitate collaborative design and achieve detailed and integrated design solutions for prefabricated timber building systems.

The unit applies to individuals who work as designers in a building design team. These include architects, design engineers, draftspersons, structural engineers, building services engineers, architectural technicians and timber systems designers from manufacturing plants. They demonstrate in-depth knowledge in a specific technical area and analyse, design and communicate solutions to sometimes complex problems.

In order to undertake this unit, individuals must have a relevant building design qualification or equivalent.

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

Pre-requisite Unit

Nil

Unit Sector

Timber Manufactured Products

Elements and Performance Criteria

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>

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1. Interact with supply chain stakeholders to design prefabricated timber building systems	1.1 Communicate with the developer during the design process to ensure that prefabricated timber building system is fully fit for purpose and meets client functional requirements 1.2 Use Building Information Modelling (BIM) system or similar and conduct further collaborative analysis with the fabricator, builder, component suppliers and regulators to achieve a design configuration that allows for lean processes during all stages of timber building system life cycle, meets regulations and does not complicate other design considerations 1.3 Ensure that the design accounts for fabrication capabilities 1.4 Implement a continuous improvement process during the design life of prefabricated timber building system to report, record and resolve issues
2. Determine design solutions and specifications for structural compliance	2.1 Identify the National Construction Code (NCC) Performance Requirements for structural robustness, which the prefabricated timber building system and its components need to satisfy 2.2 Discuss structural design actions with appropriate stakeholders to ensure that the prefabricated timber building system meets the minimum NCC structural requirements and performs without risks when used as intended through its design life 2.3 Obtain experimental and observational data for the strength of materials, structural components, connections or assemblies to determine design values, and consult with appropriate engineers to indicate the actual robustness and reliability of the physical building system 2.4 Contribute to the design verification for structural compliance and process documentation according to the NCC, standards and codes to facilitate design certification and approvals 2.5 Determine durability requirements for the materials of prefabricated timber building system according to the nominated design life and planned maintenance, and ensure that they are specified in design documentation for prefabricators
3. Determine design solutions and specifications for safety compliance	3.1 Determine early in the design process hazards to health and safety during all stages of prefabricated timber building system life cycle according to the workplace health and safety laws, regulations and the NCC 3.2 Determine and apply health and safety design control measures according to standards, codes and technical guides to eliminate or

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	minimise health and safety risks during all stages of prefabricated timber building system life cycle 3.3 Verify design documentation and ensure that health and safety provisions are specified for all stages of prefabricated timber building system life cycle according to standards, codes and technical guides 3.4 Verify design documentation and ensure that detailed maintenance provisions are specified for all components of the prefabricated timber building system being designed according to its intended functions
4. Determine design solutions and specifications for services	4.1 Identify the NCC Performance Requirements for fire resistance and acoustic and thermal properties, which the prefabricated timber building system and its components need to satisfy 4.2 Verify design documentation and ensure that intended materials, separations, insulations, fire warnings and fire-fighting management systems are specified for the required fire, acoustic, thermal and waterproofing performance according to standards, codes and technical guides 4.3 Use design control actions to mitigate any possible effects of transportation, handling, on-site installation or maintenance on the integrity of intended connections, insulations or materials 4.4 Determine early in the design phase where points of entry are required in the prefabricated timber building system, components and materials for services installation 4.5 Verify design documentation and ensure that installation and connections provisions are specified for each service according to standards, codes and technical guides 4.6 Ensure that all tolerances for the prefabricated timber building system and its components are specified in the design specifications according to standards to facilitate off-site manufacture and on-site installation 4.7 Verify and ensure that approval and compliance certification for installation of services, partitions and floor elements are performed to the appropriate standards for thermal, acoustic and fire performance and according to local requirements before on-site installation
5. Determine design solutions and specifications for transportation and on-site installation	5.1 Determine maximum dimensions and weight for the building system being designed to meet restrictions provided by vehicles, lifting plants, road configuration around the construction site and local regulations 5.2 Ensure that lifting requirements are specified for all stages of the

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	prefabricated timber building system life cycle in the design documentation, and they are according to the NCC to facilitate and maintain prefabricated timber building system integrity and adequate performance 5.3 Determine the effects of cargo restraints and exposure to acceleration forces on the strength (structural attributes) of prefabricated timber building system during transportation, and use design control actions to allow for the forces applied 5.4 Verify the design and ensure that necessary restraint conditions during transport and residual risks to the prefabricated timber building systems resulting from transportation are specified 5.5 Ensure that the sequence for the installation of prefabricated timber building systems and components is specified in design documentation

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential for performance in this unit of competency but are not explicit in the performance criteria.

Skill	Description
Oral communication	Communicate information verbally about complex, detailed technical design information
Numeracy	Conduct complex structural design calculations
Navigate the world of work	Monitor adherence to legal and industry standards and responsibilities
Interact with others	- Identify the perspectives of others as part of work role - Seek specialist input into problem-solving and decision-making
Get the work done	Use three-dimensional models, BIM or computer-aided design tools to design, monitor design processes and access and organise complex design data

Unit Mapping Information

Code and title current version	Code and title previous version	Comments	Equivalence status
FWPTMM5209 Determine prefabricated timber building systems designs for compliance, manufacture and installation	Not applicable	New unit	No equivalent unit

Links

Companion Volumes, including Implementation Guides, are available at VETNet: -
<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=0d96fe23-5747-4c01-9d6f-3509ff8d3d47>

Assessment Requirements for FWPTMM5209 Determine prefabricated timber building systems designs for compliance, manufacture and installation

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Performance Evidence

An individual demonstrating competency in this unit must satisfy all of the elements and performance criteria of this unit. There must be evidence that the individual has assessed complete sets of timber building design documentation for two construction projects relating to different classes of buildings that, as defined in the National Construction Code (NCC), allow the use of one or more panelised or modular prefabricated timber building system types, including:

- cross-laminated timber floor and wall systems
- post and beam systems (Glulam, laminated veneer lumber)
- panelised floor cassette systems
- panelised wall systems (including cladding, insulation, windows or doors)
- panelised and pre-finished wall systems (inclining above, electrical, mechanical, plumbing or lining)
- pre-finished and fully finished timber-based modules

In doing the above, the individual has:

- determined and confirmed with stakeholders whether the design is fit for purpose and meets capabilities within the supply chain regarding prefabrication, storage, transportation and on-site installation
- determined the compliance requirements of physical prefabricated timber building system for:
 - structural robustness
 - durability
 - fire resistance and acoustic and thermal properties
 - health and safety hazards during all stages of the life cycle
 - transportation
- assessed whether the design provides adequate solutions to meet all compliance requirements, determining design actions according to standards to fill the design gaps

- verified design considerations regarding services installation and mitigation of possible effects during transportation, handling, on-site installation or maintenance
- verified the level of provisions in design documentation to demonstrate or specify:
 - structural compliance
 - health and safety information for each stage of prefabricated timber building system life cycle
 - prefabricated timber building system and components maintenance during prefabricated timber building system design life
 - materials, separations, insulations, fire warnings, a fire-fighting management system for required fire, acoustic, thermal and waterproofing performance
 - installation and connections requirements for each service
 - tolerances for prefabricated timber building system and its components
 - lifting requirements for each stage of prefabricated timber building system life cycle
 - restraint conditions during transportation
 - installation sequence for prefabricated timber building systems and components.

Knowledge Evidence

An individual must be able to demonstrate the knowledge required to perform the tasks outlined in the elements and performance criteria of this unit. This includes knowledge of:

- basic uses of BIM (Building Information Modelling) software or similar for sharing and coordinating information among stakeholders during the prefabricated timber building system life cycle
- principles of collaborative design analysis:
 - Design for Manufacture and Assembly
 - lean processes (off-site manufacture, storage, transportation and on-site installation)
 - Failure Mode and Effects Analysis
- readily available prefabrication technologies for different types of prefabricated timber building systems (two- and three-dimensional) and components including:
 - structural timber
 - cross-laminated timber
 - laminated veneer lumber
 - Glulam
 - I-Joists
 - floor trusses
 - services
 - windows, glazing and plasterboard
- relevant legislation, standards and technical design guides or codes for:
 - structural design of prefabricated timber buildings and systems
 - implementation of safe design principles
 - installation of hydraulic, electrical, mechanical, fire protection and acoustic systems

- transportation restrictions and load restraint requirements
- NCC Performance Requirements for prefabricated timber building systems as classified via their function:
 - structural robustness
 - structural safety
 - fire resistance, thermal performance and acoustic performance
- elements of valid approval and compliance processes with reference to:
 - NCC assessments, calculations and evidence requirements for controlling the risk of structural failure and safety
 - fire, acoustic, thermal resistance and waterproofing of prefabricated timber building systems for complying with standards
- considerations and industry-accepted design solutions for prefabricated timber building systems (including structural and non-structural timber components and connections) as required by NCC, standards and technical design guides for:
 - structural robustness, verification methods and traceability of risks
 - structural durability with reference to environmental and specific conditions affecting durability of timber components and connections, high-risk areas within the building structure (including bathroom and external walls), specific hazards (particularly insect and fungal attack, weathering, moisture exposure and fire) and solutions considering preservative treatments, moisture contents, weatherproofing insulations and cladding
 - fire engineering measures, sound propagation and thermal resistance with reference to structural deflection of fire-rated elements and use of fire, vibrational/acoustical and thermal insulations; relevant design procedure for joint/connections involving timber structures to retain the integrity of insulation, material and system while considering effects of transport, handling and installation processes on connections
 - acceptable tolerances for material quality, off-site manufacture and on-site installation
 - services installation including hydraulic, electrical, mechanical, fire protection and acoustic systems
 - health and safety risks about the off-site manufacture, storage, transportation, on-site installation, use and maintenance of prefabricated timber building system
 - transportation and lifting requirements with reference to different load characteristics and appropriate road trucks and cranes or lifting plants, factors influencing lifting stability, behaviour/fatigue of timber and connections to temporary lifting loads, load restraint methods and friction factors affecting strength resistance and structural response of prefabricated timber building system
- design provisions and technical specifications as required by the Safe Design of Structures Code of Practice, NCC and other standards and technical guides for any person who carries out work activities in relation to a prefabricated timber building system:
 - health and safety provisions
 - connections specifications
 - design tolerances and specifications
 - thermal, acoustic and fire compliance provisions
 - transport and handling modes including lifting and stacking specifications

- installation sequencing provision
- maintenance provision.

Assessment Conditions

Assessment of skills must take place under the following conditions:

- resources, equipment and materials:
 - timber building design documentation for two construction projects relating to different classes of buildings that allow the use of panelised or modular prefabricated timber building systems
 - computer with internet access and BIM software that is currently used in building design practices to view and print three-dimensional models, finite element models, two-dimensional computer-aided design drawings and design documentation
 - access to current legislation, standards, codes and technical design guides relevant to prefabricated timber building systems
- specifications:
 - access to relevant codes, standards and government regulations.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

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