



Government of **Western Australia**
Department of **Communities**
Housing

HOUSING

CONSTRUCT SPECIFICATION

BCA Class 1a and 10 buildings

Single and grouped dwellings

NATSPEC October 2019

This reference specification has been developed by NATSPEC in conjunction with the Western Australia Department of Communities, Housing. The requirements in this specification are generic and are to be read in conjunction with project specific documents from the Design consultant, including drawings, schedules and appendices. It does not cover the requirements for every project situation.

The Design consultants' documents take precedence over this reference specification. Check the consultants' documents for any variations to the requirements of this specification.

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PREFACE

This reference specification has been developed for use on all housing projects by the Western Australia Department of Communities, Housing of BCA class 1a and 10 buildings. It includes framed construction (steel and timber), masonry veneer and full masonry construction. It may include requirements which are not applicable to the project. Read this specification in conjunction with other project specific documents, including drawings, schedules and appendices, and refer/conform to the applicable requirements.

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0131 PRELIMINARIES**1 GENERAL****1.1 PERMITS, FEES AND CONTRIBUTIONS****Applications and approvals**

Contractor's responsibilities: Cover all authority application and approval requirements, including fees and contributions.

Written confirmation of authority approvals: Provide to the principal before installing, including all relevant drawings.

Building applications

Applications: Submit to the Permit Authority a completed Certified Building Permit Application (BA1) and other documents required, including Certificate of Design Compliance (BA3) and Demolition Permit Application (BA5), if required.

Drawings and specifications submitted with application: Demonstrate compliance with the NCC and provide evidence that other relevant approvals have been obtained, including local government authority approval of public health requirements.

Building and Construction Industry Training Fund (BCITF) levy: Cover all costs and requirements, including additional payments required if the construction costs varies by more than \$25,000. Submit proof of BCITF Levy payment (receipt) with the Building Permit Application (BA1) submission.

Headworks/infrastructure contribution

Requirement: Cover all contribution fees and services connection/reconnection fees required for the project by the utility authority or service provider. Retain proof of payment for reimbursement by the Department of Communities, Housing.

1.2 THE SITE**Project signboards**

General: Provide project-specific signboards and conform to the following:

- Locate where directed by the principal.
- Maintain in good condition for duration of the work.
- Obtain permission for removal.
- Remove on completion.

Rectification

Accessways and services: Rectify immediately any obstruction or damage to roadways and footpaths, drains and watercourses and other existing services in use on or adjacent to the site. Provide temporary services whilst repairs are carried out.

Property: Rectify immediately any interference or damage to trees and property which are to remain on or adjacent to the site, including adjoining property encroaching onto the site.

Existing services

Service to be continued: Repair, divert or relocate service, as documented.

Trenches: If the existing service crosses the line of a required trench or will lose support when the

trench is excavated, provide permanent support for the existing service.

Redundant services: Remove redundant parts and make safe.

Interruption to services: Minimise the number and duration of interruptions.

Proposals: Submit proposals for action to be taken to existing services before starting this work.

- Purpose of submission: For review.

Location of services: Verify the location of existing services from the appropriate authority and/or Dial Before You Dig (see www.1100.com.au), as required.

- Verges: Locate services before start of landscaping.

Damaged services: Rectify or replace services damaged during construction. If required, obtain permits from the appropriate authority to do so.

Use of existing services

General: Existing services may be used as temporary services for the performance of the contract subject to conditions of use, as documented.

Adjoining property

Notice: At least 10 working days before commencing work, submit to owners and occupants of adjoining property written notice of intention to commence work and an outline description of the type and extent of work.

Revealed encroachments: If the works reveal unknown encroachments of adjoining property on to the site or of existing site structures on to adjoining property, immediately seek instructions.

Records: For each property which may be affected adversely by the works, carry out the following:

- Inspect the property with the principal and owner and occupant of the property, before commencement of work.
- Make detailed records of conditions existing within the property, especially structural defects and other damage or defacement.
- Arrange for at least 2 copies of each record, including drawings, written descriptions, and photographs, endorsed by the owner and occupant of the property, or their representatives, as evidence of conditions existing before commencement of work.

Endorsed copies: Submit one endorsed copy of each record. Keep the other endorsed copy on site.

- Purpose of submission: Information only.

Parking

Principal's existing parking areas: Use spaces only in designated parking areas.

1.3 DRAINAGE**Stormwater drainage**

Requirement: Liaise with the local government authority for the preferred method of drainage and other stormwater requirements. Provide installation to the authority's requirements.

1.4 PROTECTION OF PEOPLE AND PROPERTY

General

Temporary works: Provide and maintain required hoardings, barricades, guards, fencing, shoring, temporary roadways, footpaths, signs, lighting, watching and traffic management until practical completion. Provide all measures required to guard against vandalism or works and materials on site.

Vandalism: Do not claim for costs or loss from vandalism of works, materials, plant or equipment on site.

Accessways and services: Do not obstruct or damage roadways and footpaths, drains and watercourses and other existing services in use on or adjacent to the site. Determine the location of such services.

Property: Do not interfere with or damage trees and property which are to remain on or adjacent to the site, including adjoining property encroaching onto the site.

Occupied premises

General: For the parts of the site, designated as an occupied premise, conform to the following:

- Allow occupants to continue in secure possession and occupancy of the premises for the required period.
- Maintain safe access for occupants.
- Arrange work to minimise nuisance to occupants and for their safety.
- Protect occupants against weather, dust, dirt, water or other nuisance.

Proposals: Submit details of proposed methods.

- Purpose of submission: Information only.

Protective clothing

Protective clothing: Make available protective clothing for the use of visitors.

- Safety helmets: To AS/NZS 1801, Type 1.
- Certification: Required.
 - . Certification provider: An organisation accredited by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ).

Safety

Accidents: Promptly notify the architect of the occurrence of the following:

- Accidents involving death or personal injury.
- Accidents involving loss of time.
- Incidents with accident potential such as equipment failure, slides and cave-ins.

Accident reports: Submit reports of accidents.

- Purpose of submission: Information only.

Dust, dirt, water and fumes

Protection: Undertake measures to prevent dust, water, and noise from affecting and inconveniencing adjacent properties and the public. Obtain permission from the adjoining property owners/occupants before entering their property.

1.5 BUILDING THE WORKS

Contractor's representative

General: Must be accessible, and fluent in English and technical terminology.

Subcontracting

General: Submit a complete list of proposed subcontractors and suppliers.

Authority application

Watering exemption: Apply to the WA Water Corporation for a temporary watering roster exemption for new lawns and gardens.

Exemption period: 42 days.

Survey marks

Definition: A survey peg, bench mark, reference mark, signal, alignment, level mark or any other mark used or intended to be used for the purpose of setting out, checking or measuring the work.

Care of survey marks: Preserve and maintain the principal's survey marks in their true positions.

Rectification: If survey marks are disturbed or obliterated, immediately rectify.

Materials

Requirement: All materials must be new, unless documented otherwise.

Items supplied by the principal

General: Materials and other items supplied free of charge to the contractor for installation in the execution of the works. Unload and take delivery, inspect for defects and take care of the items. If defects are found, advise. Return unused items to the principal.

Disposal of waste

Site waste (including food waste): Dispose of in compliance with state regulations and local government authority waste management requirements, including the following:

- *Environmental Protection Act 1986 (WA)*.
- *Environmental Protection Regulations 1987 (WA)*.
- *Health (Miscellaneous Provisions) Act 1911 (WA)*.
- *Local Government Act 1995 (WA)*.
- *Waste Avoidance and Resource Recovery Act 2007 (WA)*.

Waste containing asbestos: Handle, transport and dispose of in compliance with state regulations including the following:

- *Environmental Protection (Controlled Waste) Regulations 2004 (WA)*.
- *Environmental Protection (Rural Landfill) Regulations 2002 (WA)*.
- *Environmental Protection (Clearing of Native Vegetation) Regulations 2004 (WA)*.

1.6 COMPLETION OF THE WORKS

Notice of Completion Certificate

Submission: Within 7 days of completing the construction works, submit a Notice of Completion Certificate (BA7) to the Permit Authority with other required documentation.

Occupancy permit

Application: Upon practical completion, apply for Occupancy permit (BA9) or Occupancy permit strata (BA11).

Final cleaning

General: Before the date for practical completion, clean throughout, including interior and exterior surfaces exposed to view. Vacuum carpeted and soft surfaces. Clean debris from the site, roofs, gutters, downpipes and drainage systems. Remove waste and surplus materials.

Samples: Remove non-incorporated samples, prototypes and sample panels.

Reinstatement

General: Before the date for practical completion, clean and repair damage caused by installation or use of temporary work and restore existing facilities used during construction to original condition.

Adjoining properties

Evaluation: At practical completion, inspect each property with the architect, owner and occupant of the property, recording any damage that has occurred since the pre-commencement inspection.

Pest eradication

General: Employ suitably qualified pest exterminators. At practical completion, verify that completed works are free of pest types as documented.

Removal of temporary works and plant

General: Within 10 working days after practical completion, remove temporary works, services and construction plant.

Handover

Keys: Provide two keys for each set of locks keyed alike and two keys for each lock keyed to differ.

Record submission

Warranties: Register with manufacturers, as necessary, and provide copies of manufacturers' warranties.

Instruction manuals: Provide the manufacturers' instruction manuals.

Surveyor's certificate: Provide a certificate which confirms that the work, including boundary fences, has been correctly located.

Authorities' approvals: Provide evidence of approval from the local government authority or principal accredited certifier and statutory authorities whose requirements apply to the work.

Services as-constructed records: At practical completion, submit the services as-constructed drawings to the principal.

- New buildings: Prepare drawings accurately showing the site and the as-constructed location of services including details required for future maintenance.

- Underground services: Provide a plan which shows the location of underground services.

Electrical services and TV installations: Submit records with details of the following:

- Layout of submains.
- Layout of common services circuits.

- Switchboard layouts.
 - Line diagrams of installations.
 - Route of underground cabling and pit location.
- Submission format: Submit records in plastic folders and fix folders inside main switchboard cabinets.

1.7 MISCELLANEOUS**Contractor and principal to observe confidentiality**

Publicity: Do not issue information concerning the project for publication in the media without prior written approval of the principal. Refer to the principal, enquiries from the media concerning the project.

Compliance with the law

Requirements of authorities: The principal, before entering into the contract, has given the notices, paid the fees, and obtained the permits, approvals and other authorisations, as documented.

Graffiti removal

Plant and equipment: Make sure all plant and equipment, including temporary offices and lunch rooms, are free of graffiti.

Removal: Remove any graffiti applied to buildings, plant and equipment.

Failure to remove: If graffiti is not removed within the time nominated by the principal, the Department of Communities, Housing will remove the graffiti and recover the cost from the contract.

Maintenance during the defects liability period

Emergency maintenance: Start within 24 hours after instructions issued by the principal, repairs/rectification of the following:

- Failure of the dwelling electrical power and/or lighting.
 - Electrical shocks or sparks.
 - Stoves which are not operational.
 - Gas leaks.
 - Burst water pipes.
 - Blocked W.C.s and sanitary plumbing, resulting in overflows inside the dwelling.
- Priority maintenance: Start within 72 hours after instruction issued by the principal, repairs/rectification of the following:
- Blocked sanitary plumbing overflowing externally.
 - No hot water.
 - Cracked W.C. pan.
 - Faulty external entry door locks.

Emergency outside normal working hours: If the contractor is not contactable, or if priority maintenance does not start 72 hours after issuance of the instructions, then the Department of Communities, Housing will complete the work and recover the cost from the contract.

0171 GENERAL REQUIREMENTS**1 GENERAL****1.1 APPLICABILITY****General**

Requirement: Conform to this worksection, as appropriate, in all worksections.

1.2 PERFORMANCE**Bushfire protection**

Conformance: In areas designated as bushfire prone, comply with statutory and local authority requirements.

Standard: To AS 3959.

Energy efficiency

Energy efficiency approval commitments: To the performance requirements of BCA 2.6, the construction requirements of BCA 3.12, and as documented.

Structural design actions

Standard: To the AS/NZS 1170 series and AS 4055, as appropriate.

1.3 STANDARDS**Current editions**

General: Use referenced Australian or other standards (including amendments), and the NCC including state and territory variations which are current three months before the date of the contract except where other editions or amendments are required by statutory authorities. Any local authority requirements take precedence.

1.4 INTERPRETATION**Abbreviations**

General: For the purposes of this specification the following abbreviations apply:

- BCA: National Construction Code 2019 series Volume Two: Building Code of Australia Class 1 and Class 10 buildings.
- NCC: National Construction Code 2019.

Definitions

General: For the purposes of this specification the following definitions apply:

- Contractor: Means the same as builder.
- Documented: Documented, as documented and similar terms mean contained in the contract documents.
- Hot-dip galvanized: Zinc coated to AS/NZS 4680 after fabrication with coating thickness and mass to AS/NZS 4680 Table 1.
- Metallic-coated: Steel coated with zinc or aluminium-zinc alloy as follows:
 - . Metallic-coated steel sheet: To AS 1397. Metal thicknesses specified are base metal thicknesses.

- . Ferrous open sections zinc coated an in-line process: To AS/NZS 4791.

- . Ferrous hollow sections zinc coated by a continuous or specialised process: To AS/NZS 4792.

- Northern areas: Sites located north of 27° latitude.

- Principal: Principal has the same meaning as owner, client and proprietor and is the party to whom the contractor is legally bound to construct the works.

- Professional engineer: As defined by the NCC.

- Proprietary: Identifiable by naming the manufacturer, supplier, installer, trade name, brand name, catalogue or reference number.

- Provide: Provide and similar expressions mean supply and install and include development of the design beyond that documented.

- Required: Required by the contract documents, the local or statutory authorities.

- Supply: Supply, furnish and similar expressions mean supply only.

1.5 SUBMISSION**Products and materials**

Safety data sheets (SDS): Submit SDS for products and materials conforming to the *Globally Harmonized System of Classification and Labelling of Chemicals (GHS)*.

2 PRODUCTS**2.1 GENERAL****Manufacturers' or suppliers' recommendations**

General: Provide and select, if no selection is given, transport, deliver, store, handle, protect, finish, adjust and prepare for use the manufactured items to the manufacturers' or suppliers' recommendations.

Proprietary items/systems/assemblies: Assemble, install or fix to substrate to the manufacturers' or suppliers' recommendations.

Product identification

Sealed containers: If materials or products are supplied by the manufacturer in closed or sealed containers or packages, bring the material or products to point of use in the original containers or packages.

Prohibited materials

General: Do not provide the following:

- Materials, exceeding the limits of those listed, in the Safe Work Australia *Hazardous Chemical Information System (HCIS)* Workplace exposure standards.
- Materials that use chlorofluorocarbon (CFC) or hydrochlorofluorocarbon (HCFC) in the manufacturing process.

Substitution

Identified proprietary items: Identification of a proprietary item does not necessarily imply exclusive preference for the identified item, but indicates the necessary properties of the item.

Alternatives: If alternatives to the documented products, methods or systems are proposed, submit sufficient information to permit evaluation of the proposed alternatives.

Non-approved alternatives

Removal: If an alternative material, product or method has been installed/used without the principal’s approval and replacement is required, cover all the costs associated with the removal, replacement and rectification of damage resulting from the substitution.

2.2 TIMBER

Moisture content

General: Make milled products from timbers seasoned as follows:

- To within 3% of the equilibrium moisture content appropriate to the timber and its intended conditions of use.
- With no more than 3% difference between any 2 pieces in any one group.

Acclimatisation

General: Acclimatise timber fitouts by stacking them for two weeks in the in-service conditions with air circulation to all surfaces after the following are complete:

- Air conditioning operational.
- Lighting operational.
- Site drainage and stormwater works are complete.
- Space fully enclosed and secure.
- Wet work complete and dry.

Unseasoned timber

General: If unseasoned timber is provided, or variation in moisture content is likely, make allowance for shrinkage, swelling and differential movement.

Recycled timber

Grit blasted or re-machined: Remove all nails and screws.

Classification: Visually graded.

Durability

General: Provide timbers with natural durability appropriate to the conditions of use or preservative-treated timbers of equivalent durability.

Natural durability class of heartwood: To AS 5604.

Preservative treatment: To the AS 1604 series.

Minimum requirement: To the **Natural and treated timber durability table**.

Natural and treated timber durability table

Exposure	Natural timber	Treated timber	Remarks
	Required durability class to AS 5604	Required hazard class to the AS 1604 series	
Inside, above ground. Completely protected from the weather. Well ventilated	Class 4	H1	Treated timber resistant to lyctids. Untreated timber must be protected from termites
Inside, above ground. Protected from wetting with nil leaching. Well ventilated	Class 3	H2	Treated timber resistant to borers and termites. Untreated timber must be protected with a finish
Above ground, exposed to weather. Periodic moderate wetting and leaching	Class 2	H3	Treated timber resistant to borers, termites and moderate decay. Applicable to weatherboards, fascias, pergolas (above ground), window joinery, framing and decking
In-ground	Class 1	H4 (Severe wetting and leaching)	Treated timber resistant to borers, termites and severe decay. Applicable to fence posts, greenhouses, pergolas (in-ground) and landscaping timbers
		H5 (Extreme wetting and leaching and/or critical uses)	Applicable to retaining walls, piling, house stumps, building poles, cooling tower fill

2.3 STEEL

Durability

General: Provide steel products protected from corrosion to suit the conditions of use.

Internal engineer designed steel members: Remove mill scale, rust, moisture and oil. Coat with a zinc phosphate primer to the manufacturer’s instructions.

Built-in products below damp-proof course: Stainless steel 316 or engineered polymer.

Corrosion resistance

General: Conform to the atmospheric corrosivity category as defined in AS 4312 and the AS/NZS 2312 series.

Light steel framing: To **STANDARDS and COMPONENTS** in 0342 *Light steel framing*.

Fasteners: Conform to the **Corrosion resistance table** or provide proprietary products with metallic and/or organic coatings of equivalent corrosion resistance.

Corrosion resistance table

Atmospheric corrosivity category to AS 4312	Threaded fasteners and anchors		Powder actuated fasteners
	Material	Minimum local metallic coating thickness (µm)	Material
C1 and C2	Electroplated zinc or Hot-dip galvanized	30	Stainless steel 316
C3	Hot-dip galvanized	50	Stainless steel 316
C4 and T	Stainless steel 316	-	Stainless steel 316

Preparation and pre-treatment

Standard: To the AS 1627 series.

Galvanizing

General: Galvanize mild steel components (including fasteners) to AS/NZS 1214, AS 1397 or AS/NZS 4680, as appropriate, and in the following conditions:

- Exposed to weather.
- Embedded in masonry.
- Exposed to or in air spaces behind external leaves of masonry walls.
- In contact with chemically treated timber.

2.4 PROTECTIVE COATINGS

General

Environment: To AS 2312.1 clause 2.3.

Coating designation: To AS 2312.1 Table 6.3.

CCA (copper chrome arsenic) treated timber

Greasing: Before placing bolts or other metal components in contact with CCA-treated timber, paint contact surfaces or coat in grease or a bituminous coating.

Unseasoned timber

General: Do not fix in contact with steel framing without fully painting the contact surfaces of timber and steel.

2.5 FASTENERS

Self-drilling screws

Standard: To AS 3566.1.

3 EXECUTION

3.1 WALL CHASING

Holes and chases

General: Make holes and chases required in masonry walls so that the structural integrity of the wall is maintained. Do not chase walls with a fire-resistance level or an acoustic rating.

Parallel chases or recesses on opposite faces of a wall: Not closer than 600 mm to each other.

Chasing blockwork: Only chase core-filled hollow blocks or solid blocks not documented as structural.

Concrete blockwork chasing table

Block thickness (mm)	Maximum depth of chase (mm)
190	35
140	25
90	20

3.2 FIXING

General

Suitability: If equipment is not suitable for fixing to non-structural building elements, fix directly to structure and trim around penetrations in non-structural elements.

Fasteners

Sufficiency: Use proprietary fasteners capable of transmitting the loads imposed, and sufficient for the rigidity of the assembly.

3.3 FOOTPATH CROSSING

General

Requirement: Provide a footpath and kerb crossing to local authority requirements.

3.4 SERVICES CONNECTIONS

Water Corporation approved sub-meter

Inspection: Once water meter is installed, conform to the following:

- Arrange for inspection by the Water Corporation to verify compliance and acceptance of payment for takeover.
- Complete the *Water Corporation Application and Agreement Form*, selecting Option 1 (3 or more dwelling units) for water meters to each individual unit and a separate water meter for common area landscaping, and pay all application costs. These forms can be obtained from the Water Corporation.

Verification: Submit a copy of the payment receipt for the application and registration of the meters as confirmation that sub-meters have been accepted by the Water Corporation. The fees will be reimbursed to the contractor on receipt of proof of payment.

0184 TERMITE MANAGEMENT SYSTEMS**1 GENERAL****1.1 TERMITE MANAGEMENT SYSTEMS****System requirements**

Standard: To AS 3660.1.

Termite reticulation systems

Type testing: To AS 3660.3 Section 5.

1.2 SUBMISSIONS**Certification**

Requirement: Submit installation certificate to AS 3660.1 Appendix A3.

2 EXECUTION**2.1 INSTALLATION****Soil treatments**

Restrictions on areas of application: To AS 3660.1 clause 7.3.

Application areas: Hand spray chemical treatment to the entire dwelling perimeter and subfloor to AS 3660.1 clause 7.7 including the following:

- Footings.
- Carport subfloors.
- Verandah subfloors.

Soil and environmental condition: Do not treat soil that is water saturated or when it is raining.

Application method

Application: To AS 3660.1 clause 7.5.

Application timing: To AS 3660.1 clause 7.6.

Protection: Protect treated area as follows:

- If a treated area is not scheduled to be covered with a vapour barrier on the same day, protect treated area with a waterproof covering such as polyethylene sheeting. Provide protection until the slab is installed.
- Prevent soil disturbance and keep off treated area until the soil is completely dry.

Reapplication: Reapply soil treatment to areas disturbed by subsequent excavation, grading, landscaping and other construction activities following the application.

Termite management system notice

Requirement: Permanently fix a durable notice in a prominent location to BCA 3.1.4.4.

0201 DEMOLITION**1 GENERAL****1.1 PERMITS, FEES AND CONTRIBUTIONS****Applications and approvals**

Contractor's responsibilities: Cover all authorities application and approval requirements, including fees and contributions.

Demolition Permit: Submit a completed Demolition Permit Application (BA5) to the Permit Authority in conformance with the *Building Act 2011 (WA)*.

1.2 STANDARD**Demolition**

Standard: To AS 2601.

1.3 EXISTING SITE CONDITION**Services**

Redundant/disused septic tanks: Locate and allow for decommissioning and removal.

Existing services: Disconnect, cap off and peg. If removal is required, remove to the junction.

Backfilling to excavations: If required, conform to *0222 Earthwork*.

Removal of existing vegetation

Approval: Do not remove any existing plants without approval.

1.4 ASBESTOS REMOVAL**Discovery of asbestos**

Identification: If suspected asbestos containing material has been identified, conform to the following:

- Isolate the contaminated area and prevent access.
- Do not disturb the material.
- Cease work on site until safe removal can be arranged.

Water supply: Maintain water supply to the contaminated area until all asbestos products have been removed.

Materials containing asbestos

Transport and disposal cost: Pay for all costs of removing the asbestos waste.

Verification: Where asbestos products are found and removal required, submit written evidence of asbestos waste disposal at a waste facility licensed to accept asbestos.

Removal contractor: Carry out removal by a WorkSafe (WA) unrestricted asbestos licence holders listed at:

www.commerce.wa.gov.au/worksafe/finding-and-selecting-asbestos-licence-holder

Asbestos disposal facilities

Metropolitan areas: Use facilities listed by the Waste Authority at: www.wasteauthority.wa.gov.au.

Non-metropolitan areas: For facilities outside the Perth metropolitan areas, use facilities recommended by the local government authority.

State regulations

Disposal: To the *Environmental Protection (Controlled Waste) Regulations 2004 (WA)*.

Form submission: Provide copies of submitted WorkSafe (WA) asbestos removal forms and evidence that all fees have been paid. Forms are available at:

www.commerce.wa.gov.au/publications/notifications-unrestricted-asbestos-removal-work.

1.5 SUBMISSIONS**Execution details**

Requirement: Submit the following, as documented:

- Hazardous Substances Management Plan.
- Investigation and work plan.

Notice of Completion Certificate

Submission: Within 5 days of completing the demolition works, submit a Notice of Completion Certificate (BA7) to the Permit Authority with other required documentation.

Records

Dilapidation record:

- Before demolition: Submit to each owner of each adjacent property, a copy of the part of the record relating to that property and obtain their written agreement to the contents.
- Rectification work: Submit written acceptance of rectification works from the owner of each adjoining property affected.

2 PRODUCTS**2.1 DEMOLISHED MATERIALS****General**

Removal: Except for items to be recovered for re-use in the works, or delivery to the owner and materials to be recycled in the works, take possession of demolished materials and remove them from the site. Do not burn or bury demolished materials on the site. Prevent spillage of demolished materials in transit.

Recycling: If possible, dismantle building components for off-site recycling.

3 EXECUTION**3.1 PROCEDURAL****Work, health and safety**

Requirement: To the Occupational Safety and Health Act 1984 (WA) and the Occupational Safety and Health Regulations 1996 (WA).

Unexpected finds

Requirement: If encountered, give notice and close off affected site area with barrier tapes and warning signs to prevent access. Unexpected finds include hazardous or volatile contaminants, archaeological finds and items of heritage value.

3.2 HAZARDOUS SUBSTANCES**Identified hazardous substances**

Register: Prepared by the principal for hazardous substances identified as present on site.

Availability: Contact the principal.

Asbestos in the workplace: To NOHSC 2018.

Audit

Requirement: Prepare a Hazardous Substances Management Plan to AS 2601 clause 1.6.1. Include the following:

- Asbestos or material containing asbestos.
- Flammable or explosive liquids or gases.
- Toxic, infective or contaminated materials.
- Radiation or radioactive materials.
- Noxious or explosive chemicals.
- Tanks or other containers which have been used for storage of explosive, toxic, infective or contaminated substances.

Removal of hazardous substances

Standard: To AS 2601 clause 1.6.2.

Asbestos removal: To AS 2601 clause 3.3.2 and NOHSC 2002.

3.3 INVESTIGATION AND WORK PLAN**General**

Requirement: Before demolition or stripping work, prepare the work plan to AS 2601 Section 2. Include the check list items appropriate to the project from AS 2601 Appendix A, and the following:

- Method of protection and support for adjacent property.
- Locations and details of service deviations and terminations.
- Sequence of work.
- If the demolition program results in components temporarily cantilevered, provide a certificate from a professional engineer.
- Proposals for the safe use of mobile plant on suspended structural members including provisions for the protection of lower floors in the event of structural failure.
- If implosion methods are proposed, provide a separate report of methods and safeguards.
- Wheel loads of tipping or loading vehicles.

3.4 PREDEMOLITION**Pest management**

Survey of infestation: 6 weeks before starting demolition, survey the site and surrounding areas to identify for signs and extent of infestation.

Infestations: If identified, appropriately treat before starting demolition.

Baiting: Minimum 5 days before starting demolition, bait all rooms/sections in the buildings, including concealed spaces such as the roof space and subfloors. If required, continue baiting until all pests have been eradicated.

Redundant drains and sewers: Cap off to isolate redundant sewers and grub out if required.

Waste storage: Store waste in pest resistant, closable containers in suitable locations and remove regularly.

Fencing removal

Adjacent property owner: Before removing boundary fencing, notify adjoining property owners of commencement and anticipated completion date. Obtain consent before undertaking work.

Notice: Issue a Notice and Request for Consent Form (BA20A) to adjacent property owners and obtain consent for boundary fencing removal in conformance with the *Building Act 2011 (WA)*.

Removal of fences: Remove all wing fences and gates and any fence erected on the lot that will not form, in part or whole, a boundary fence with an existing lot.

Waste storage: Store waste in pest resistant, closable containers in suitable locations and remove regularly.

3.5 SUPPORT

Temporary support

Existing buildings: Until permanent support is provided, provide temporary support for sections of existing buildings which are to be altered and which rely for support on work to be demolished.

3.6 PROTECTION

Encroachment

General: Prevent the encroachment of demolished materials onto adjoining property, including public places.

Weather protection

General: If walls or roofs are opened for alterations and additions, or the surfaces of adjoining buildings are exposed, provide temporary covers to prevent water penetration. Provide covers to protect existing plant equipment and materials intended for re-use.

Dust protection

General: Provide dustproof screens, bulkheads and covers to protect existing finishes and the immediate environment from dust and debris.

Security

General: If walls or roofs are opened for alterations or additions, provide security against unauthorised entry to the building.

Exposed surfaces

General: Where necessary, protect and weatherproof the surfaces of adjacent structures exposed by demolition.

Existing services

Location: Before starting demolition, locate and mark existing underground services in the areas which will be affected by the demolition operations.

Utility services: Contact DIAL BEFORE YOU DIG to identify location of underground utility services pipes and cables.

Excavation: Do not excavate by machine within 1 m of existing underground services.

3.7 DEMOLITION - BUILDING SERVICES

Existing septic tanks

Redundant/disused tanks: Decommission tank as follows:

- Completely empty tanks to the *Environmental Protection (Unauthorised Discharges) Regulations 2004 (WA)*, leach drains and soak wells using a licensed liquid waste contractor.
- After emptying septic tanks, leach drains and soak wells, and fully remove from the project site.
- Hose down and disinfect tank, drains and wells as required.
- Fill up excavations, tank, drains and soak wells with clean fill such as yellow sand and compact.

Local authority approval: After decommissioning, submit certification and documentation to the local government authority health officer's requirements.

3.8 COMPLETION

Notice of completion

General: Minimum 5 working days' notice of completion of demolition so that adjacent structures may be inspected following completion of demolition.

Reinstatement

Assessment of damage: Use the dilapidation record to assess the damage and rectification work arising from the demolition work.

Rectification: Repair damage arising out of demolition work. Obtain written acceptance from the owner of each adjoining property of the completeness and standard of the rectification work.

Temporary support

General: Remove at completion of demolition.

0221 SITE PREPARATION**1 EXECUTION****1.1 CONTROL AND PROTECTION****Erosion control**

General: Plan and carry out the work so as to avoid erosion, contamination, and sedimentation of the site, surrounding areas, and drainage systems.

Dewatering

Requirement: Keep earthworks free of water. Provide and maintain slopes, crowns and drains for excavations and embankments to make sure there is free drainage. Construct, including placing fill, masonry, concrete and services, on ground from where free water has been removed. Prevent water flow over freshly laid work.

Water quality

Wash out: Prevent wash out from entering waterways or stormwater drains.

Cross connection: Make sure there are no cross connections between stormwater and the public sewerage system.

1.2 TREE PROTECTION**Trees to be retained**

Extent: All trees NOT marked for removal.

Tree protection

Tree protection zone (TPZ): To AS 4970 Section 3.

Tree protective measures: To AS 4970 Section 4.

Work near trees

Harmful materials: Keep the area within the dripline free of sheds and paths, construction material and debris.

Work under trees: Do not remove topsoil from, or add topsoil to, the area within the dripline of the trees.

Hand methods: Use hand methods to locate, expose and cleanly remove the roots on the line of excavation.

1.3 SITE CLEARING**Extent**

Requirement: Clear only areas to be occupied by works such as structures, paving, excavation, regrading and landscaping or other areas designated to be cleared.

Clearing and grubbing

Clearing: Remove everything on or above the site surface, including rubbish, scrap, grass, vegetable matter and organic debris, scrub, trees, timber, stumps, boulders and rubble.

Turf: Remove turf to a depth just sufficient to include the root zone.

Grubbing: Grub out stumps and roots over 75 mm diameter to a minimum depth of 500 mm below subgrade under buildings, embankments or paving, and 300 mm below the finished surface in unpaved areas. Backfill holes remaining after grubbing with sand material to prevent ponding of water. Compact

the material to the relative density of the existing adjacent ground material.

Disposal

Spoil: Remove cleared and grubbed material from the site and dispose of legally.

0222 EARTHWORK**1 GENERAL****1.1 STANDARDS****General**

Earthwork: To the recommendations of AS 3798.

1.2 INTERPRETATION**Definitions**

General: For the purposes of this worksection the following definitions apply:

- Bad ground: Ground unsuitable for the works, including fill liable to subsidence, ground containing cavities, faults or fissures, ground contaminated by harmful substances and ground that is, or becomes, soft, wet or unstable.
- Rock: Monolithic material with volume greater than 0.3 m³ that cannot be removed until broken up by rippers or percussion tools.
- Subgrade: The trimmed or prepared earth material on which the pavement, footing or slab is constructed. Generally taken to relate to the upper line of the earth material.
- Zone of influence: A foundation zone bounded by planes extending downward and outward from the bottom edge of a footing, slab or pavement and defining the extent of foundation material having influence on the stability or support of the footings, slab or pavement.

2 PRODUCTS**2.1 FILL MATERIALS****General**

Suitable material: To AS 3798 clause 4.4 including inorganic, non-perishable material suitably graded and capable of compaction to the documented density.

Unsuitable materials: To AS 3798 clause 4.3.

3 EXECUTION**3.1 GEOTECHNICAL****As found site conditions**

General: If the following are encountered, give notice and obtain instructions before carrying out any further work in the affected area:

- Bad ground.
- Rock.

3.2 REMOVAL OF TOPSOIL**General**

Extent: Areas of cut or fill and areas occupied by structures, pavements and embankments.

Maximum depth: 200 mm.

Topsoil stockpiles

General: Stockpile site topsoil intended for re-use.

Stockpile maximum height: 1.5 m.

Protection: Protect the topsoil stockpiles from contamination by other excavated material, weeds and building debris.

3.3 EXCAVATION**Extent**

Clearing and excavation: Clear and excavate 1500 mm clear of the building or to the allotment boundaries, whichever is less.

Site surface: Excavate over the site to give correct levels and profiles required as the basis for structures, paving and landscaping. Make allowance for compaction or settlement or heaving.

Footings: Excavate for footings to the required sizes and depths. Confirm that the foundation conditions meet the design bearing capacity.

Crawl space: Provide a clear space under bearers:

- Minimum clearance: 400 mm.

Rock

General: Do not use explosives.

Existing footings

Requirement: If excavation is required within the zone of influence of an existing footing, provide supports to the footing sufficient to prevent damage arising from the works. Use methods including temporary shoring or underpinning.

Existing services

Utility services: Contact DIAL BEFORE YOU DIG to identify location of underground utility services pipes and cables.

Bearing surfaces

Requirement: Provide even plane bearing surfaces for loadbearing elements including footings. Step to accommodate level changes. If supporting masonry, make the steps appropriate to the courses.

Reinstatement of excavation

Requirement: If excavation exceeds the required depth, or deteriorates, reinstate with fill to the correct depth, level and bearing capacity.

Other buildings/adjoining properties

Requirement: Carry out excavation within 3 m of other buildings and boundaries to BCA 3.1.1 and BCA 3.1.3, and the requirements of a structural engineer.

Grading

External areas: Grade to give falls away from buildings, minimum 1:100.

Subfloor areas: Grade the ground surface under suspended floors to drain ground or surface water away from buildings without ponding.

3.4 PREPARATION FOR FILLING**Preparation**

Stripping: Prepare the ground surface before placing fill (including topsoil fill), ground slabs or load bearing elements to AS 3798 clause 6.1.5. Remove material that inhibits or prevents satisfactory placement of fill layers, loose material, debris and organic matter.

3.5 PLACING FILL

General

Fill: Conform to the NCC and the following requirements:

- Sand fill: Not containing gravel sized particles.
- Achieving a blow count of greater than 7/300 mm to the AS 1289 series.

Compacting fill: Compact as follows:

- Controlled fill (up to 800 mm deep): In layers not more than 300 mm deep using a vibrating plate or roller.
- Rolled fill: (up to 800 mm deep): In layers not more than 300 mm deep using an excavator or similar machine.

Extent: Extend fill 1 m past the building perimeter to a maximum slope of 1(V):2(H) to the natural ground.

Certification: Provide an engineer's signed compaction certificate before construction commences.

Placement: To BCA 3.2.2.

Layers: Place fill in near-horizontal layers of uniform thickness no greater than 150 mm after compaction, deposited systematically across the fill area.

Placing at structures: Place and compact fill in layers simultaneously on both sides of structures, culverts and pipelines to avoid differential loading.

Moisture content: Adjust the moisture content of fill during compaction within the range of 85 to 115% of the optimum moisture content determined by AS 1289.5.1.1 or AS 1289.5.2.1 as appropriate, to achieve the required density.

Compaction

Density: Compact the subgrade and each layer of fill to the required depth and density, as a systematic construction operation. Shape surfaces to provide drainage and prevent ponding.

Excavated and stripped ground surface: After excavation and/or stripping, compact these surfaces to minimum depth of 150 mm.

Minimum relative compaction: To AS 3798 Table 5.1.

3.6 STONE PITCHING

General

Stones: Clean, hard and durable laterite.

- Size: No dimension less than 150 mm or more than 300 mm.

Mortar mix proportion (cement:lime (hydrated or putty):sand): 1:0.1:3.

Bedding layer: Gravel, 30 mm thick.

Laying: Lay stones as follows:

- Lay stone in close fitting pattern rammed into position, spacing in between stones to be 10 mm maximum.
- Fill spaces between the stones with mortar to form an even, sealed surface.
- Keep exposed rock surface free from mortar.

0223 SERVICE TRENCHING

1 PRODUCTS

1.1 FILL MATERIALS

General

Backfill material: To **FILL MATERIALS** in 0222 *Earthwork*, free from stones larger than 100 mm maximum dimension and as follows:

- Next to services: Do not place any particles greater in size than 25 mm within 150 mm of services.
- Under paved areas and within 4 m of structures: Coarse sand, controlled low strength material or fine crushed rock.
- In reactive clay: In sites classified M, M-D, H1, H1-D, H2, H2-D, E or E-D to AS 2870, re-use excavated site material at a moisture content within $\pm 1\%$ of that of the adjoining in situ clay.

2 EXECUTION

2.1 EXISTING SURFACES

Concrete and asphalt pavements

Method: Sawcut trench set-out lines for the full depths of the bound pavement layers except where the set out line is located along expansion joints.

Segmental paving units

Removal: Take up segmental paving units, both full and cut by hand, between the trench set out lines, and neatly stack on wooden pallets at locations as directed.

2.2 EXCAVATING

Excavation

Requirement: Excavate for underground services in conformance with the following:

- To required lines and levels, with uniform grades.
- Straight between access chambers, inspection points and junctions.
- With stable sides.

Trench widths

General: Keep trench widths to the minimum consistent with the laying and bedding of the relevant service and construction of access chambers and pits.

2.3 TRENCH BACKFILL

General

Place fill: To **PLACING FILL** in 0222 *Earthwork*.

Timing: Backfill service trenches as soon as possible after laying and bedding the service, if possible on the same working day.

Layers: Compact all material in layers not exceeding 150 mm compacted thickness. Compact each layer to the relative compaction specified before the next layer is commenced.

2.4 SURFACE RESTORATION

General

Reinstatement: Reinstatement of existing surfaces removed or disturbed by trench excavation to match existing and adjacent work.

0241 LANDSCAPE - WALLING AND EDGING

1 GENERAL

1.1 REQUIREMENTS

General

Requirement: Provide landscape walling and edging, as documented, so that it is firmly fixed in place and does not form a safety hazard.

2 PRODUCTS

2.1 TIMBER

Preservative treatment

Timber type: Provide only timbers with preservative treatment appropriate to the Hazard class.

Cut surfaces: Provide supplementary preservative treatment to all cut and damaged surfaces.

CCA treated timber: If proposed to be used, provide details.

2.2 SLEEPER WALLS

Sleepers

Hardwood: Sound durability class or preservative treated hardwood sleepers to AS 3818.2.

Softwood: Sound preservative treated softwood sleepers.

2.3 GEOTEXTILE

General

Type: Polymeric fabric formed from a plastic yarn composed of at least 85% by weight of propylene, ethylene, amide or vinylidenechloride and containing stabilisers or inhibitors to make the filaments resistant to deterioration due to ultraviolet light.

Identification and marking: To AS 3705.

Protection

General: Provide heavy duty protective covering. Store clear of the ground and out of direct sunlight. During installation do not expose the filter fabric to sunlight for more than 14 days.

2.4 EDGING

Concrete

Standard: To AS 1379 Grade N20.

3 EXECUTION

3.1 GENERAL

Set-out

General: Set out the positions of walls and edging.

Geotextiles and subsurface drainage: Complete subsurface drainage installation and secure geotextile in place before backfilling.

Clearing

Extent: Except trees or shrubs to be retained, clear vegetation within 1 m of the landscape walls. Grub out stumps and roots of removed trees or shrubs

and trim the grass to ground level, but do not remove the topsoil.

Excavation

Extent: Excavate for foundations and footings.

3.2 DRY STONE WALLS

Construction

Generally: Select the stones for their locations and lay in the wall with minimum stonecutting as follows:

- Each stone is stable, non-rocking, and firmly interlocked with adjacent stones without mortar.
- The wall face shows reasonably regular, flat and vertical stone faces.
- Vertical joints or perpends between stones are spanned by the next stone above.
- Stones are laid generally as through stones whenever possible.
- At least 50% of footings, 30% of wall stones, and all coping stones are laid as through stones.

Footings: Select the largest, flattest and most regular stones for footings, and set them one third of their depth into the ground.

Copings: Select stones of reasonably uniform size and finish the top of the wall to a level line.

Retaining walls

Construction: If dry stone walls act as retaining walls, construct the stonework to be free draining through the wall. Secure the top course of the wall with cement mortar bedding. Backfill progressively, with a layer at least 300 mm thick of porous material, such as coarse aggregate or crushed rock in the size range 20 to 40 mm.

Minimum thickness: 300 mm.

Wall face batter: Batter back the wall face 50 mm to 70 mm for every 300 mm in height.

Rip-rap retaining walls

Construction: Construct as dry stone retaining walls with large random sized boulders recovered from excavations, to form gravity walls retaining, and supported by, embankments. Place boulders with large face down and stepped back from boulders below.

3.3 SLEEPER WALLS

Construction

Timber sleeper wall: Erect sleeper posts at 2 m centres, buried one third. Brace wall at half height above ground with sleepers returned into embankment, spiked to posts. Lay sleepers in stretcher bond behind the verticals and securely spike together at joints and at 2 m centres. Back with geotextile and place a 100 mm draining layer of coarse sand or fine gravel between the fabric and backfill.

Backing: Backfill to ground level with compacted fine crushed rock or gravels.

3.4 EDGING

Log edges

Installation: Excavate to lay logs at least half diameter into the ground. Spike through logs with two 13 mm diameter galvanized mild steel rods per log, penetrating a minimum of 500 mm into the

subgrade. Drive the rods flush with the upper surface of the log. Butt the logs together to a close neat fit. Select adjacent logs with similar diameter.

Sawn timber

Installation: Set edgings flush with adjoining surfaces. Drive pegs into the ground at 1200 mm centres on the planting side of the edging and on both sides of joints between boards, with peg tops 15 mm below top of edging. Fix the pegs with galvanized nails, two per fixing.

Curving: Space the pegs to hold edging to a uniform curve. Reduce edging thickness to 15 mm if required for bending.

Sleeper

Installation: Spike through sleepers with two 13 mm diameter galvanized mild steel rods per sleeper, penetrating a minimum of 500 mm into the subgrade. Drive the rods flush with the upper surface of the sleeper. Arris the upper exposed sleeper edges to produce a 15 mm wide face at 45 mm to the edges.

Concrete

Edging strip: Place in a shallow trench between timber forms. Wood float finish flush with the adjacent finished level. Provide control joints, filled with resilient bituminous material, at 3 m maximum centres.

Concrete kerb: Fixed form, extrusion or slip forms to AS 2876.

Spade edge

Edges: Define mass planting beds by cutting through soil with garden spade at approximately 70° to vertical. Remove sods from garden beds and spread throughout grassed areas.

Finish: Free from kinks in alignment with one curve grading evenly into the next, and free of straight sections.

Brick

Setting: On a 1:1:6 (cement:lime:sand) mortar haunch.

Joints: 3 mm struck flush.

Alignment: Even and free from dips, humps and bends.

Cleaning: Wash off mortar progressively.

0242 LANDSCAPE - FENCES AND BARRIERS**1 GENERAL****1.1 RESPONSIBILITIES****General**

Requirement: Provide fences and barrier systems as follows:

- Complete for their function.
- Conforming to the detail and location drawings as documented.
- Firmly fixed in position.

2 PRODUCTS**2.1 TIMBER****Posts and rails**

Hardwood: To AS 2082.

Softwood: To AS 2858.

Pickets and palings

Hardwood: To AS 2796.1, Section 8.

- Grade to AS 2796.2: Select.

Softwood: To AS 4785.1, Section 7.

Seasoned cypress pine: To AS 1810, Section 5.

Preservative treatment

Timber type: Provide only timbers with preservative treatment appropriate to the Hazard class.

Cut surfaces: Provide supplementary preservative treatment to all cut and damaged surfaces.

CCA treated timber: If proposed to be used, provide details.

2.2 STEEL**Steel tubes**

Posts, rails, stays and pickets: To AS/NZS 1163.

- Grade: C350L0.

Post and rail finish: Hot-dip galvanized.

2.3 CONCRETE**General**

Standard: To AS 1379 – N20 or proprietary packaged mix.

2.4 COMPONENTS**Steel panel fencing**

Steel framing: Zinc-coated or aluminium/zinc alloy coated steel to AS 1397.

Steel sheeting: Prepainted to AS/NZS 2728.

Steel posts

Finish: Galvanized.

Timber fencing sizes table

Member	Preservative treated soft wood picket (mm)	Preservative treated soft wood paling/lap and cap (mm)	Hardwood or cypress pine paling/lap and cap (mm)
Maximum height	1200	1800	1800
End/corner gate posts	90 x 90	100 x 100	125 x 125 or 100 x 100
Intermediate posts	90 x 90	140 x 45 or 100 x 75	125 x 50 or 100 x 75
Maximum post spacing	2400	2400/2700*	2700*
Rails	70 x 40	75 x 50 or 100x 38	75 x 50 or 100x 38
Picket/paling size	70 x 19	75, 100 or 150* x 15	100 or 150* x 13
Capping	-	125 x 35	100 x 50
Footing type	Earth	Earth	Earth
Footing size (diameter x depth)	200 x 600	250 x 600	250 x 600

* Three rail fences only

Fencing for swimming pools

Design, construction and performance: To AS 1926.1.

Location of fencing for private swimming pools: To AS 1926.2.

3 EXECUTION**3.1 CONSTRUCTION GENERALLY****Set-out**

General: Set out the fence line and mark the positions of posts, gates and bracing panels.

Property boundaries: Confirm by survey.

Excavation

Posts: Excavate post holes so that they have vertical sides and a firm base. Spread surplus material on the principal's side of the fence.

Erection

Line and level: Erect posts vertically. Set heights to follow the contours of natural ground.

Earth footings

Base: Place 100 mm of gravel in the footing base under posts.

Compaction: Backfill with earth around posts, compacting firmly by hand or machine in 150 mm deep layers.

Concrete footings

In ground: Place mass concrete around posts to protect posts from waterlogged conditions and finish with a weathered top falling 25 mm from the post to ground level.

3.2 FENCING

Steel panel fencing

Protection: Make sure bottom rails have drain holes and are at least 50 mm clear of the ground.

Timber fencing

General: Mortice posts, taper splice rails and nail twice in mortices. Set pickets and palings clear of the ground.

Picket fence: Nail twice to each rail.

Plain paling fence: Provide 2 rails for fences up to 1800 mm high, and locate 200 mm from the bottoms of the palings. Close butt palings and nail twice to each rail.

Lap and cap paling fence: Provide 2 rails for fences up to 1800 mm high, and locate 200 mm from the tops and bottoms of the palings and abutting the tops of palings. Close butt larger palings and nail twice to each rail. Fix smaller palings over joints and nail twice to each rail. Nail capping to the top rail.

Gates

Construction: Construct gates as follows:

- Ledges and braces: Match fence rails.
- Pickets or palings: Match fencing.

Hardware: Provide the following:

- Drop bolt and ferrule to each leaf of double gates.
- Latch to one leaf of double gates.
- Provision for locking by padlock.
- Hinges with smooth operation and adjustment for future sagging.

Hand access: Where required, provide hand openings to give access from outside to reach locking provision.

0250 LANDSCAPE - GARDENING

1 GENERAL

1.1 STANDARDS

Soils

Site and imported topsoil: To AS 4419.

Potting mixes: To AS 3743.

Composts, soil conditioners and mulches: To AS 4454.

1.2 SUBMISSIONS

Execution details

Irrigation plan: Before installation, submit an irrigation plan in pdf format and hard copy.

1.3 LANDSCAPE MAINTENANCE

Maintenance

Requirement: Maintain landscaping works from plant establishment to practical completion.

Dead or unhealthy plants: Replace before practical completion with plants of the same size, quality and species.

Plant protection: Protect plant damage from landscape operations and the operations of other trades. Maintain protection during the installation and maintenance periods. Treat, repair, or replace damaged plantings.

2 PRODUCTS

2.1 MATERIAL

Topsoil

Requirement: Topsoil containing organic matter, able to support plant life and free from stones, contaminants and weeds.

Source: If the topsoil cannot be provided from material recovered from site, provide imported topsoil.

Mix proportion (loam:sand): 1:1.

Turf

Supplier: Obtain turf from a specialist grower of cultivated turf.

Quality: Provide turf of even thickness, free from weeds, pests, disease and other foreign matter.

Turf properties: Provide turf with the following properties:

- Consisting of 25 mm deep dense, well-rooted, vigorous grass growth in 25 mm deep topsoil.
- Species: Couch grass (*Cynodon dactylon*), including the Wintergreen variety.

Turf dimension:

- Roll width: Minimum 300 mm, in sound unbroken condition.
- Length: Minimum 1.5 m.

Certification: Provide certification verifying turf is pest free.

Inorganic mulch types

Washed river pebble: Uniform size or graded material in the size range 6 to 10 mm.

Decomposed granite gravel: Uniform size or graded material in the size range 5 to 20 mm, of uniform colour and low plasticity.

Crushed quartz: Uniform size or graded material in the size range 5 to 20 mm, of uniform colour.

Marble chip gravel: Uniform size or graded material in the size range 5 to 20 mm, of uniform colour.

Slate: Plum slate slivers in the size range 5 to 25 mm.

Shale: Uniform size or graded material, no particles smaller than 0.1 mm diameter.

Scoria: Uniform size or graded material.

Grass reinforcing

Description: Lightweight interlocking plastic cellular paving system suitable for pedestrian and occasional vehicular traffic including emergency vehicles.

Fertiliser

Description: Proprietary fertilisers, delivered to the site in sealed bags marked to show manufacturer or supplier, weight, fertiliser type, N:P:K ratio, recommended uses and application rates.

Plants

Supply and delivery: Supply plants from a nursery with Nursery Industry Accreditation Scheme Australia (NIASA) accreditation and deliver to site with a label displaying the botanical name.

Health: Foliage size, texture and colour at time of delivery consistent with the size, texture and colour shown in healthy specimens of the nominated species.

Vigour: Extension growth consistent with that exhibited in vigorous specimens of the species nominated.

Damage: Free from damage and from restricted habit due to growth in nursery rows.

Pests and disease: Foliage free from attack by pests or disease.

Irrigation

Micro-irrigation systems: Polyethylene micro-irrigation pipe tubing with dripper emitters.

Integrated drip line systems: Tubing with integral drippers inserted into the tube during manufacture.

Irrigation controllers: Programmable automatic controllers.

Underground piping and PVC-U fittings

PVC-U pipes: To AS/NZS 1477.

Mainline piping: Minimum Class 12 PVC-U.

Lateral piping: Minimum Class 9 PVC-U.

PVC-U fittings: Minimum Class 18 PVC-U.

Low density polyethylene pipes: Minimum 19 mm when used with drippers.

3 EXECUTION**3.1 PREPARATION****Site clearing**

Requirement: Clear entire site except where trees are documented to be retained. Clear rear and front yards, including front verges, rake and machine to an even gradient before handover.

Weed eradication

Herbicide: Eradicate weeds with a herbicide conforming to the *Health (Pesticides) Regulations 2011 (WA)*, at the recommended maximum rate.

Earth mounds

Placing: Place clean fill in layers approximately 150 mm thick compacted to 85% of the dry density ratio of the surrounding soil tested to AS 1289.5.4.1. Minimise slumping and further compaction.

Edges: Construct changes in grade over a minimum width of 500 mm to smooth, gradual and rounded profiles with no distinct joint.

Existing trees: Maintain the natural ground level under the canopy.

Drainage: Construct mounds to allow free drainage of surface water and to eliminate ponding.

Planting beds

Excavated: Excavate to reduce the subsoil level to at least 300 mm below finished design levels.

Shape the subsoil to fall to subsoil drains, if required. Break up the subsoil to a further depth of 100 mm.

Unexcavated: Remove weeds, roots, rubbish and other debris. Reduce the planting bed level to 75 mm below finished design levels.

Services and roots: Do not disturb services or tree roots; if necessary cultivate these areas by hand.

Preparation for turfing

Requirement: Keep free of rubbish, rubble stones and roots.

Watering: Keep moist to 100 mm deep before planting.

Planting area preparation: Prepare planting area for turfing as follows:

- Rotary hoe: To a minimum depth of 150 mm and provide runners with minimum 50 mm soil cover.
- Light rolling: Lightly roll to form an even, levelled surface without wheel ruts.

Placing topsoil

Spreading: Spread the topsoil on the prepared subsoil and grade evenly, making the allowances, if appropriate, for the following:

- Required finished levels and contours after light compaction.
- Grassed areas finished flush with adjacent hard surfaces such as kerbs, paths and mowing strips.

Topsoil depths

Requirement: Minimum 100 mm thick garden soil over the entire site, excluding areas covered by buildings and paving.

Front and common areas finished soil level: 75 mm below finished height of paths and driveways, ready for planting by others.

Shrub planting areas

Ground level: Level planting areas to the following levels:

- 100 mm below grassed area.
- Minimum 1 brick course below the damp-proof course of buildings.
- Levelled with concrete driveways.

3.2 TURFING

Installation

Supply: Deliver the turf within 24 hours of cutting, and lay within 36 hours of cutting. Prevent turf from drying out between cutting and laying. If not laid within 36 hours of cutting, roll out on a flat surface with the grass up, and water as required to maintain a good condition.

Laying: Lay the turf as follows:

- Stretcher bond pattern with the joints staggered and close butted.
- Parallel with the long sides of level areas, and with contours on slopes.
- Finish flush, after tamping, with adjacent finished surfaces of ground, paving edging, or grass seeded areas.

Tamping: Lightly tamp to an even surface immediately after laying. Do not use a roller.

Fertilising: Mix the fertiliser thoroughly into the topsoil before placing the turf. Apply lawn fertiliser at the completion of the first and last mowings, and at other times as required to maintain healthy grass cover.

Watering: Water immediately after laying until the topsoil is moistened to its full depth. Maintain moisture to this depth.

Levels: If levels have deviated from the design levels after placing and watering, lift turf and regrade topsoil to achieve design levels.

3.3 GRASS REINFORCING

Installation

Preparation: Excavate to the required levels and compact subgrade.

Base course: Place and compact either of the following:

- Non-calcareous, free draining washed sand, comprising 80% 0.1 to 1.0 mm diameter.
- 1.0 to 5.0 mm gravel aggregate.

Base course depth:

- Pedestrian walkways: 100 mm.
- Passenger vehicles: 150 mm.
- Heavy vehicles: 250 mm.

Growing media: Place and interlock grass pavers, and spread an 80:20 (sand:organic sandy soil) mix.

Height of growing media over the pavers:

- Turf: 5 mm.
- Hydroseeded: 15 mm.

Protection: Exclude traffic until the root system becomes established and anchored to the base course.

3.4 PLANTING

Installation

Individual plantings in grassed areas: Prepare for planting as follows:

- Excavate a hole twice the diameter of the rootball and at least 100 mm deeper than the rootball.
- Break up the base of the hole to a further depth of 100 mm.
- Loosen compacted sides of the hole to prevent confinement of root growth.

Watering: Thoroughly water the plants before planting, immediately after planting, and as required to maintain growth rates free of stress.

Placing: Place plants as follows:

- Remove the plant from the container with minimum disturbance to the rootball. Make sure that the rootball is moist.
- Place the plant in its final position, in the centre of the hole and plumb, and with the topsoil level of the plant root ball level with the finished surface of the surrounding soil.

Fertilising: In planting beds and individual plantings, place fertiliser pellets around the plants at the time of planting.

Backfilling: Backfill with topsoil mixture. Tamp lightly and water to eliminate air pockets.

3.5 IRRIGATION

General

Requirement: Comply with local water restrictions.

Performance

Irrigation systems: Provide systems as follows:

- That achieve the documented flow rates over the irrigated area.
- Meet statutory requirements for backflow prevention.

Performance and efficiency of the system: Conduct a flow and pressure test and rectify system if inadequate.

Precipitation: Allow for minimum 40 mm precipitation per week throughout all sections of the irrigation system.

Reticulation

Extent: To all landscaped areas.

Type: Provide as follows:

- Lawn areas: Pop-up sprinklers.
- Individual plants: Drippers.

Prevention of overspray: Position sprinklers so that:

- Those in verge areas do not overspray onto roads.
- There is no overspraying onto buildings.
- Those in garden beds do not overspray onto driveways.

Sprinkler spacing: As recommended by the manufacturer for the pressure and water volume.

Water supply: From a separate cut in within 2 m of the master mains water meter, with a 25 mm tested

gate valve fitted with an approved backflow prevention device.

Reticulation sleeves: Provide as follows:

- 100 mm PVC-U sleeve 300 mm below driveways, as documented. If not documented, provide sleeve at the junction of driveway and carport floor.
- Provide a 90° elbow to each end, 300 mm out from the ground, visible for the landscaper.
- Fit sleeves in one straight length under the driveway to allow draw wires to be easily drawn through the sleeve.

Solenoid conduit: Provide 15 mm diameter PVC conduit with draw wire from the garden reticulation cabinet, adjacent paths, hardstands and driveways to the nearest garden bed.

Garden reticulation cabinet: Provide cabinet if documented. Install a 10 amp 250 volt socket outlet in the cabinet.

- Supply conduit and draw wire to the reticulation cabinet.
- Position labelled socket outlet at the bottom right hand corner of cabinet and connect to common services power circuit.
- Label socket outlet: SUPPLIED BY COMMON SERVICES POWER CIRCUIT.

Underground piping and PVC-U fittings

PVC-U pipe system installation: To AS/NZS 2032.

PVC-U fittings: Allow for changes in pipework direction using fittings. Do not install pipes with excessive bending.

Drip systems

Discrete drippers: Connect directly into piping or provide appropriately sized micro-tubes.

Piping: Lay polyethylene micro-irrigation pipe on finished ground surface under planting bed mulch and anchor at 1.5 m maximum intervals with U-shaped stakes.

Air release valves: Provide at the highest point in each section to drain the system when flow stops.

Sprinkler head protection

Sprinklers along kerbs: For those installed along roads, driveways or parking areas, set sprinkler head in 90 mm thick concrete, extending minimum 300 mm diameter around the head.

Sprinklers in lawn/grassed area: Set sprinkler head in 80 mm thick concrete, extending minimum 200 mm diameter around the head.

3.6 MULCHING

Placing mulch

General: Place mulch to the required depth, and clear of plant stems, and rake to an even surface flush with the surrounding finished levels. Spread and roll mulch so that after settling, or after rolling, it is

- Smooth and evenly graded between design surface levels.
- Flush with the surrounding finished levels.
- Sloped towards the base of plant stems in plantation beds.

- For gravel mulches: Not closer to the stem than 50 mm.

Depths:

- Organic mulch: 75 mm.
- Gravel mulch: 50 mm.

Extent of mulch

Requirement: 750 mm diameter around the plants placed in grassed areas and areas with drip lines.

3.7 STAKES AND TIES

Stakes

Material: Hardwood, straight, free from knots or twists, pointed at one end.

Installation: Drive stakes into the ground at least one third of their length, avoiding damage to the root system.

Ties

General: Provide 50 mm hessian webbing ties fixed securely to the stakes, one tie at half the height of the main stem, others as necessary to stabilise the plant. Attach ties loosely so as not to restrict plant growth.

3.8 VERGES AND STREET TREES

Dimension and level

Level and grade: Do not alter from existing levels.

Setback: Set verge 1.5 m from the road frontage, including for verges without footpaths.

Planting

Turf species: Use a species approved by the local government authority for verge treatments.

Plant dimensions: Select plant varieties that meet the following requirements:

- Maximum height: 0.75 m.
- Impact on the public: The plant does not pose a hazard to (such as is toxic or an irritant) or obstruct pedestrians.

Irrigation: Install as follows:

- Water source: From a point beyond the water meter and inside the site boundary, passing through a backflow prevention device.
- Reticulation pipes: Provide piping installed at minimum 300 mm below the surface ground level and pop-up sprinkler system with conduits installed under footpaths.

3.9 COMPLETION

Cleaning

Stakes and ties: Remove those no longer required at the end of the planting establishment period.

Temporary fences: Remove temporary protective fences at the end of the planting establishment period.

0271 PAVEMENT BASE AND SUBBASE**1 PRODUCTS****1.1 BASE AND SUBBASE MATERIAL****Granular material**

Requirement: Provide unbound granular materials, including blends of two or more different materials which when compacted develop structural stability and are uniform in grading and physical characteristics.

Crushed rock

Requirement: Provide crushed rock as follows:

- Base: 20 mm nominal.
- Subbase: 40 mm nominal.

Natural gravel

Requirement: Provide unbound natural gravel materials as follows:

- Base: 20 mm nominal.
- Subbase: 40 mm nominal.

Base and subbase material properties and test methods

Particle size distribution or grading: To AS 1289.3.6.1.

CBR (98% modified compaction): To AS 1289.6.1.1.

Unconfined compressive strength to AS 5101.4: Maximum 1.0 MPa.

2 EXECUTION**2.1 SUBGRADE PREPARATION****General**

Requirement: Prepare the subgrade to 0222 *Earthwork*.

2.2 PLACING BASE AND SUBBASE**General**

Weak surfaces: Do not place material on a surface that is weakened by moisture and is unable to support, without damage, the construction plant required to perform the works.

Spreading: Spread material in uniform layers without segregation.

Moisture content: Maintain wet mixed materials at the required moisture content before and during spreading. Add water to dry mixed materials through fine sprays to the entire surface of the layer after spreading, to bring the material to the required moisture content.

Compacted layer thickness: 200 mm maximum and 100 mm minimum. Provide layers of equal thickness in multilayer courses.

2.3 TOLERANCES**Surface level**

General: Provide a finished surface level which is free draining and evenly graded between level points.

2.4 BASE AND SUBBASE COMPACTION**General**

Construction operation: Compact each layer of fill to the required depth and density, as a systematic construction operation.

Minimum relative compaction table

Item description	Minimum dry density ratio (modified compaction) to AS 1289.5.2.1
Subbase	95%
Base	98%

Compaction requirements

General: Apply uniform compactive effort, over the whole area to be compacted, until the required density is achieved or until failure is acknowledged.

Equipment: Use rollers appropriate to the materials and compaction requirements documented.

0274 CONCRETE PAVEMENT**1 GENERAL****1.1 STANDARDS****General**

Specification and supply: To AS 1379.

Materials and construction: To AS 3600.

Residential pavements: To AS 3727.1.

Vapour barrier

Requirement: To AS 2870 clause 5.3.3.

2 EXECUTION**2.1 GENERAL****Preparation**

General: Trim the ground to suit the required thickness of concrete and compact to a firm, even surface.

Prepared subgrade: Blind with sufficient sand to create a smooth surface free from hard projections. Wet the sand just before laying the underlay.

Paving

General: Place and compact concrete paving over a vapour barrier placed over the prepared ground surface.

Grading

General: Grade paving to even falls to drain away from buildings to drainage outlets without ponding.

Minimum fall for drainage:

- Vehicle traffic pavements: 1:40.
- Other pavements: 1:100.

Thickness

Minimum:

- Foot and bicycle traffic: 75 mm.
- Light vehicle traffic occasionally up to 3 tonne gross: 100 mm.

Condenser plinths

Requirement: If future split air conditioning systems are required for bedrooms and dining/living areas, provide 1200 x 1000 (wide) x 100 mm (thick) concrete plinths for air conditioning condensers at each isolator location.

Locations where plinths are not required: If possible, mount condensers on the concrete verandah slab.

Plinths located in pathways: Increase pathway width to maintain the required uninterrupted pathway width.

Curing

General: Protect fresh concrete from premature drying and from excessively hot or cold weather. Maintain the concrete at a reasonably constant temperature with minimum moisture loss for the curing period of 7 days.

2.2 JOINTS**Contraction joints**

General: Construct joints by saw cutting, tooling or placing insert.

Spacing:

- Unreinforced pavement: Maximum 1500 mm.
- Reinforced pavement: Maximum 2000 mm.

Expansion joints

General: Cast-in 10 mm thick compressible filler material at maximum 6 m spacing.

Abutment with building

General: Where concrete paving more than 1500 mm wide abuts the wall of a building, cast-in 10 mm thick compressible filler material between the paving and the wall. Otherwise, turn up the vapour barrier.

2.3 SURFACE FINISHES**Unformed surfaces**

General: Strike off, screed and level slab surfaces to finished levels and documented finish.

Finishing

Commencement: Immediately after placement, spreading and compaction of the concrete, start initial finishing procedures to achieve the documented finish.

Final finishing: Do not commence final finishing until all bleed water has evaporated from the surface after initial finishing procedures.

Surface sealer

Application: Apply surface sealer after the curing period and when concrete has dried to allow the sealer to penetrate into the concrete surface.

2.4 DRIVEWAY, GARAGE OR CARPORT FLOORS**General**

Compact base: To AS 1289.5.2.1.

Finish: Granolithic finish.

0276 PAVING – SAND BED**1 GENERAL****1.1 STANDARDS****General**

Concrete and clay pavers: To AS/NZS 4455.2.

1.2 PAVER THICKNESS**General**

Requirement: Minimum thickness:

- Foot and bicycle traffic: 40 mm.
- Light domestic traffic occasionally up to 3 tonne gross: 50 mm.

2 PRODUCTS**2.1 MATERIALS****Sand**

Bedding and joint filling: Well-graded and free of deleterious materials such as soluble salts which may cause efflorescence.

Cement

Standard: To AS 3972, type GP.

Mortar

Mix proportions (cement:sand): 1:3.

2.2 COMPONENTS**Masonry units and pavers**

General: Provide pavers of clay, natural stone or concrete masonry, purpose-made for use as paving, or units made for bonded masonry construction but suitable for paving.

3 EXECUTION**3.1 GENERAL****Preparation**

General: Trim the subgrade to the required profile and to suit the thickness of pavers and sand bed. Compact to a firm, even surface.

Base course

General: Conform to *0271 Pavement base and subbase*.

Edge restraint

Perimeter: If not provided by other structures, provide edge restraints to bedding and units.

Type: Bed units in mortar at least 40 mm thick.

Drainage: Position the edge restraint and pavers so that the top of the pavers is slightly above the front edge of the edge restraint.

Bedding course

Preparation: Remove all loose material from the prepared base.

Geotextile: Place fabric between the base course and the bedding sand.

Bedding sand: Screed uncompacted sand over prepared base uniformly to achieve a 30 mm thick

layer. Maintain sand at a uniform loose density and moisture content.

Grading

General: Grade paving to even falls to drain away from buildings to drainage outlets without ponding.

Minimum fall for drainage: 1:100.

Cutting

Cutting units: Cut paving units to maintain sharp edges and accurate joints and margins.

Laying

General: Lay paving units on the screeded sand bedding to the nominated pattern, as documented.

Joints: 2 to 5 mm gap.

Cut courses: 50 mm minimum plan dimension. On footpaths and other linear elements, use at least two cut courses and maintain symmetry.

Compaction: Compact the sand bedding after laying paving units using a vibrating plate compactor and appropriate hand methods, and continue until lipping between adjoining units is eliminated.

Joint filling: Spread dry sand over the paving units and fill the joints by brooming. Carry out one or more passes with the vibrating plate compactor and refill the joints with sand. Repeat the process until the joints are completely filled.

0277 PAVEMENT ANCILLARIES**1 GENERAL****1.1 INTERPRETATION****Definitions**

General: For the purposes of this worksection the following definitions apply:

- Absolute level tolerance: Maximum deviation from design levels.
- Relative level tolerance: Maximum deviation from a 3 m straightedge laid on the surface.

1.2 TOLERANCES**Channels and kerbs**

Absolute level tolerance: ± 10 mm at any point on the finished surface.

Relative level tolerance: 5 mm to the top or face of kerbs, and to the surface of channels.

Plan position deviation: 25 mm.

Exception: Kerb laybacks, grade changes or curves, or at gully pits requiring channel depression.

Linemarking

Longitudinal line lengths: ± 20 mm from the lengths documented in AS 1742.2.

Longitudinal line widths: ± 10 mm from the widths documented in AS 1742.2

Transverse line lengths and widths: ± 10 mm from the lengths and widths documented in AS 1742.2.

Other markings: ± 50 mm from the dimensions documented or in AS 1742.2 for arrows, chevrons, painted medians, painted left turn islands and speed markings. Place arrows and speed markings square with the centreline of the traffic lane.

Vehicle barriers

Plan position deviation: 50 mm.

Length: ± 20 mm.

Bollard plumb: H/100.

2 PRODUCTS**2.1 CHANNELS AND/OR KERBS****Concrete**

Precast: Proprietary precast units as documented.

In situ: To AS 2876.

Grade: N20.

2.2 LINEMARKING**Pavement marking paint**

Requirement: Conform to the following:

- Solvent-borne paint: To AS 4049.1.
- Waterborne paint: To AS 4049.3.
- High performance: To AS 4049.4.

2.3 VEHICLE BARRIERS**Timber log barriers**

Hardwood: To AS 2082.

Softwood: To AS 2858 and AS 1720.2, Grade 5.

Timber preservative for softwood: Minimum hazard class H4 to AS 1604.1.

Size: Diameter range 125 to 150 mm for both posts and rails.

Precast concrete wheel stops

Material: Precast concrete units with pre-drilled holes located 300 mm from each end for fixing to ground surface.

Size: 2000 x 150 x 100 mm high.

Steel tube bollards

Type: Bollards fabricated from heavy steel tube, to AS 1074.

Minimum nominal size: DN 100.

Finish: Galvanized after fabrication.

3 EXECUTION**3.1 CHANNELS AND/OR KERBS****General**

Precast: Install to manufacturer's instructions.

In situ: Construct channels and/or kerbs in fixed forms, by extrusion or by slip forming to AS 2876.

Preparation

Requirement: To AS 2876 Section 8.

Subgrade or subbase material: Shape and compact to form a firm base before placing channels and/or kerbs.

Backfill

Timing: Not earlier than three days after placing channels and/or kerbs, backfill and reinstate the spaces on both sides of the channels and/or kerbs.

Material: Granular, free of organic material, clay and rock in excess of 50 mm diameter.

Compaction: Compact backfill in maximum 150 mm thick layers, to a relative compaction of 95% tested to AS 1289.5.4.1, for standard compactive effort.

Pavement: Backfill pavement material adjacent to new channels and/or kerbs to the documented requirements of the pavement material.

3.2 LINEMARKING**Preparation**

Surface: Clean, dry and free of any deposit which may impair adhesion of the linemarking.

Wet weather: Do not apply linemarking during wet weather or if rain is likely to fall during application or paint drying time.

Provision for traffic: Allow for traffic during application and protect linemarkings until the material has dried sufficiently to carry traffic without being damaged.

Mixing of paint: Before use, mix all paint in its original container to produce a smooth uniform product consistent with the freshly manufactured product.

Application of linemarking

Longitudinal lines: Spray all longitudinal lines with a self-propelled machine. For a one-way or two-way

barrier line pattern, concurrently spray the two sets of lines.

Hand spraying: Hand spray transverse lines, symbols, letters, arrows and chevrons using templates.

Paint thickness: Uniform wet film thickness: 0.35 mm to 0.40 mm.

Linemarking alignment: Straight or with smooth, even curves as documented.

Edges: Form clean, sharp edges. Remove any paint applied beyond the defined edge of the linemarking and leave a neat and smooth marking on the wearing surface of the pavement.

Removal of existing pavement markings

General: Remove existing linemarking, as documented, from the wearing surface of pavements without causing significant damage to the surface.

3.3 VEHICLE BARRIERS

Timber log barriers

Installation: Check out the posts to receive the rails. Set each post 600 mm below the finished surface level and surround with compacted fine crushed rock, gravel or cement stabilised rammed earth. Bolt rails to posts with M12 diameter galvanized bolts and washers, with bolt heads and nuts recessed.

Precast concrete wheel stops

Installation: Drive 12 mm diameter galvanized steel rods a minimum of 600 mm below finished surface level and stop the top of the rod 25 mm below the top of the wheel stop.

Concrete pavement/slab: Bolt the wheel stop to the pavement using galvanized steel masonry anchors, installed to manufacturer's recommendations. Top of bolt to stop 25 mm below the top of the wheel stop.

Completion: Grout fill the holes flush to match the concrete finish.

Steel tube bollards

Installation: Encase buried end of bollard in concrete footing, minimum 600 mm deep x 250 mm diameter. Finish top of footing minimum 100 mm below finished surface level.

On concrete slabs: Weld on a 10 mm thick baseplate drilled for 4 bolts, and bolt to concrete slab using galvanized steel masonry anchors installed to manufacturer's recommendations.

Filling: Fill the tube with 15 MPa concrete.

Open ends: Seal with matching fabricated end caps, spot welded and ground smooth.

0310 CONCRETE

1 GENERAL

1.1 STANDARDS

General

Formwork design and construction: To AS 3610.1.

Plywood formwork: To AS 6669.

Reinforced concrete construction: To AS 3600.

Specification and supply of concrete: To AS 1379.

Residential ground slabs and footings: To AS 2870.

1.2 INTERPRETATION

Definitions

General: For the purposes of this worksection the following definitions apply:

- Ambient temperature: The air temperature at the time of mixing and placing of concrete.
- Average ambient temperature: Average value of the daily maximum and minimum ambient temperatures over the defined period at a site.
- Weather – cold: Ambient shade temperature less than 10°C.
- Weather – hot: Ambient shade temperature greater than 30°C.

1.3 TOLERANCES

Finishes

Formed surface finish quality: To AS 3610.1 Table 3.3.3.1 and the following:

- Visible: Class 3.
- Not visible: Class 5.

Unformed surfaces flatness: To the **Flatness tolerance class table**, for the documented class of finish, using a straightedge placed anywhere on the surface in any direction.

Flatness tolerance class table

Class	Measurement	Maximum deviation (mm)
A	2 m straightedge	4
B	3 m straightedge	6
C	600 mm straightedge	6

2 PRODUCTS

2.1 MATERIALS

Cement

Standard: To AS 3972.

Age: Less than 6 months old.

Storage: Store cement bags under cover and above ground.

Pre-mixed concrete supply

Standard: To AS 1379 by the batch production process.

Maximum slump: 100 mm.

Reinforcement

Standard: To AS/NZS 4671.

Polymeric film underlay

Vapour barriers and damp-proofing membranes: To AS 2870 clause 5.3.3.

Minimum thickness: 0.2 mm.

Curing compounds

Standard: To AS 3799.

2.2 FORMWORK**General**

Trapped forms: Free of timber or chlorides and not to impair the structural performance of the concrete members.

Design

Formwork: The design of the formwork is the contractor's responsibility.

Plywood forms

Material: To AS 6669.

Grade: Use appropriate grade for the documented design dimensions, loading and surface quality.

Joints: Seal the joints consistent with the documented surface finish class.

Tolerances: To AS 3610.1 Section 3.

3 EXECUTION**3.1 POLYMERIC FILM UNDERLAY****Location**

Requirement: Under slabs on ground including integral ground beams and footings, provide a vapour barrier or, in areas prone to rising damp or salt attack, a damp-proofing membrane.

3.2 FORMWORK**Substrates**

Cleaning: Before placing concrete, remove free water, dust, debris and stains from the formwork and the formed space.

Corners

Work above ground: Chamfer at re-entrant angles, and fillet at corners.

Face of bevel: 25 mm.

Void formers

Protection: Keep void formers dry until use, install on a firm level surface and place reinforcement and concrete with minimum delay.

3.3 REINFORCEMENT**Supports**

Concrete, metal or plastic supports: Provide as follows:

- Able to withstand construction and traffic loads.
- With a protective coating if they are ferrous metal, located within the concrete cover zone, or are used with galvanized or zinc-coated reinforcement.

Spacing:

- Bars: ≤ 60 diameters.
- Mesh: ≤ 600 mm.

Supports over membranes: Prevent damage to waterproofing membranes or vapour barriers. If appropriate, place a metal or plastic plate under each support.

Projecting reinforcement

Protection: If starter or other bars extend beyond reinforcement mats or cages, through formwork or from cast concrete, provide a plastic protective cap to each bar until it is cast into later work.

Tying

Requirement: Secure the reinforcement against displacement at intersections with either wire ties, or clips. Bend the ends of wire ties away from nearby faces of formwork or unformed faces to prevent the ties projecting into the concrete cover.

Bar lapping

Requirement: Minimum lap as follows:

- Mesh sheets: Overlap by a minimum of 2 cross bars.
- Trench mesh: 500 mm.
- Bars: Greater of either 500 mm or 25 x bar diameter.
- Strip footing intersections and corners: Full width of intersecting reinforcement.

3.4 CONCRETE**Placing**

Method: Avoid segregation and loss of concrete, and minimise plastic settlement. Maintain a nominally vertical and plastic concrete edge during placement.

Horizontal elements: Place concrete in layers not more than 300 mm thick. Compact the following layer into previous layer before previous layer has taken initial set.

Compaction

Methods: Use immersion and screed vibrators accompanied by hand methods as appropriate to remove entrapped air and to fully compact the mix.

Vibrators: Do not allow vibrators to contact set concrete, reinforcement or items including pipes and conduits embedded in concrete. Do not use vibrators to move concrete along the formwork. Avoid causing segregation by over-vibration.

Rain

Protection: During placement and before setting, protect the surface from damage.

Placing in cold weather

Temperature limits: Maintain the following:

- Freshly mixed concrete: $\geq 5^{\circ}\text{C}$.
- Forms and reinforcement before and during placing: $\geq 5^{\circ}\text{C}$.
- Water: Maximum 60°C when placed in mixer.

Temperature control: Heat the concrete materials, other than cement, to the minimum temperature necessary so that the temperature of the placed concrete is $\geq 5^{\circ}\text{C}$.

Placing in hot weather

Temperature limits: Maintain the following:

- Freshly mixed concrete $\leq 35^{\circ}\text{C}$.

- Forms and reinforcement before and during placing: $\leq 35^{\circ}\text{C}$.

Temperature control: Select one or more of the following methods of maintaining the temperature of the placed concrete at 35°C or less:

- Cover the horizontal transport containers.
- Spray the coarse aggregate using cold water prior to mixing.
- Use chilled mixing water or ice.

Evaporation control barriers: Erect barriers to protect freshly placed concrete from drying winds.

3.5 CURING

General

Requirements: Taking into account the average ambient temperature at site over the relevant period affecting the curing, adopt procedures to make sure of the following:

- Curing: Cure continuously from completion of finishing, when the concrete has set sufficiently not to be damaged by the curing process, until the minimum total cumulative number of days or fractions of days, during which the air temperature in contact with the concrete is above 10°C , conforms to the following:
 - . Fully enclosed internal surfaces: 3 days.
 - . Other concrete surfaces: 7 days.
- End of curing period: Prevent rapid drying out at the end of the curing period.
- Protection: Maintain at a reasonably constant temperature with minimum moisture loss, during the curing period.

Curing compounds

Liquid membrane forming compounds: Provide a uniform continuous flexible coating without visible breaks or pinholes, which remains unbroken for at least the required curing period after application.

Substrates: Do not use wax-based or chlorinated rubber-based curing compounds on surfaces forming substrates to applied finishes, concrete toppings and cement-based render.

Cold weather curing

Temperature: Maintain concrete surface temperature above 5°C for the duration of the curing period.

Hot weather curing

Requirement: If the concrete temperature exceeds 25°C , or the ambient shade temperature exceeds 30°C , protect from drying winds and sun by using an evaporative retarder until curing is commenced.

Water curing

Method: Select a method of ponding or continuously sprinkling water to prevent damage to the concrete surface during the required curing period.

3.6 JOINTS

Construction joints

Location: Do not relocate or eliminate construction joints, or form undocumented construction joints. If emergency construction joints are made necessary by unforeseen interruptions to the concrete pour, submit a report on the action taken.

Preparation: Roughen and clean the hardened concrete joint surface. Remove loose or soft material, free water, foreign matter and laitance. Dampen the surface just before placing the fresh concrete and coat with a neat cement slurry.

Slip joints

Requirement: If concrete slabs are supported on masonry, provide proprietary slip joints.

3.7 FORMED SURFACES

Surface repairs

Method: If surface repairs are required, submit proposals.

3.8 UNFORMED SURFACES

Surface finishes

General: As documented.

Surface repairs

Method: If surface repairs are required, submit proposals.

3.9 COMPLETION

Formwork removal

Extent: Remove formwork, other than trapped forms, including formwork in concealed locations.

Timing: Do not disturb formwork until concrete has reached sufficient hardness to withstand formwork movements and removal without damage.

Stripping times: Leave formwork for suspended structures in place after pouring concrete for the following periods:

- Vertical surfaces: To AS 3610.1 Appendix C Table C2.
- Horizontal surfaces: To AS 3600 clause 17.6.2.

Curing

General: If formwork is stripped before the minimum curing period for the concrete has elapsed, continue curing the exposed faces as soon as the stripping is completed.

Protection

General: Protect the concrete from damage due to construction loads, physical and thermal shocks and excessive vibrations, particularly during the curing period.

Surface protection: Protect finished concrete surfaces and applied finishes from damage.

0331 BRICK AND BLOCK CONSTRUCTION**1 GENERAL****1.1 STANDARD****General**

Materials and construction: To AS 4773.1 and AS 4773.2.

2 PRODUCTS**2.1 DURABILITY****General**

Exposure locations: To AS 4773.1 clause 4.4.

2.2 MATERIALS**Bricks and blocks**

Standard: To AS/NZS 4455.1 and AS/NZS 4455.3.

Minimum age of clay bricks: 7 days.

Salt attack resistance grade: To AS 4773.2 Table 2.1.

Mortar materials

Sand: Fine aggregate with a low clay content and free from efflorescing salts, selected for colour and grading.

Mortar mixes: To AS 4773.1 Table 3.1.

2.3 BUILT-IN COMPONENTS**General**

Durability class of built-in components: To AS 4773.1 Table 4.1.

Steel lintels

Angles and flats: Sizes to AS 4773.1 Table 12.2.

Cold-formed lintels: Designed to AS/NZS 4600.

Corrosion protection: To AS/NZS 2699.3.

Galvanizing: Do not cut after galvanizing.

Reinforcement

Standard: To AS/NZS 4671.

Wall ties

Standard: To AS/NZS 2699.1.

Type: A.

Corrosion protection: To AS/NZS 2699.1.

Connectors and accessories

Standard: To AS/NZS 2699.2.

Corrosion protection: To AS/NZS 2699.2.

Flashings and damp-proof courses

Standard: To AS/NZS 2904.

Weepholes

Type: Moulded plastic weephole formers with a vermin proof gate.

3 EXECUTION**3.1 GENERAL****Mortar mixing**

General: Measure volumes accurately to the documented proportions. Machine mix for at least six minutes.

Protection

Masonry materials and components: Protect from ground moisture and contamination.

During construction: Cover top surface of brickwork and blockwork to prevent the entry of rainwater and contaminants.

Bond

Type: Stretcher bond.

Building in

Embedded items: Build in wall ties and accessories as the construction proceeds. If not practicable to obtain the required embedment within the mortar joint in hollow masonry units, fill appropriate cores with grout or mortar.

Clearance for timber frame shrinkage

General: In timber frame brick veneer construction, leave clearances between window frames and brick sill and between roof frames and the brick veneer as follows:

- Single storey frames and ground floor windows (not for slab on ground): 10 mm.
- Two storey frames and upper floor windows: 20 mm.
- Additional clearance: Accommodate additional shrinkage of unseasoned floor timbers.

Joining to existing

General: Provide a control joint where joining to existing structures. Do not tooth new masonry into existing work unless approved by a professional engineer.

Mortar joints

General: Set out masonry with joints of uniform width and the minimum of cutting of masonry units.

Solid and cored units: Lay on a full bed of mortar. Fill perpend solid. Cut mortar flush.

Face-shell bedded hollow units: Fill perpend solid. Cut mortar flush.

Joint thickness: 10 mm.

Finish: Conform to the following:

- Externally: Tool to give a dense water-shedding finish.
- Internally: If wall is to be plastered, do not rake more than 10 mm to give a key.

Rate of construction

General: Regulate the rate of construction to eliminate joint deformation, slumping or instability.

Rods

Set-out: Construct masonry to the following rods:

- 75 mm high units: 7 courses to 600 mm.
- 90 mm high units: 6 courses to 600 mm.
- 190 mm high units: 3 courses to 600 mm.

Piers

Isolated piers in carport, veranda or similar:
Construct as follows:

- Size: Not less than 290 x 290 mm and not more than 2.7 m high.
- Spacing: Not more than 3.0 m centres.
- Reinforced to BCA 3.3.2 or a professional engineer's requirements.

Meter box

Location: As documented on drawings.

Storerooms

Requirement: Apply 3 coats of waterproofing clear or transparent sealer to the external walls of storerooms.

3.2 FACEWORK**Cleaning**

General: Clean progressively as the work proceeds to remove mortar smears, stains and discolouration. Do not erode joints if using pressure spraying.

Acid solution: Do not use.

Colour mixing

Distribution: In facework, distribute the colour range of units evenly to prevent colour concentrations and banding.

Sills and thresholds

General: Solidly bed sills and thresholds and lay them with the top surfaces drain away from the building.

Minimum size of unit: Three quarters full width.

3.3 SUBFLOOR WORK**Bearer piers**

Provide engaged or free standing unreinforced masonry piers to support bearers at 1800 mm maximum centres and to the **Bearer pier table**.

Bearer pier table

Type	Minimum size (mm)
Engaged	230 x 110 bonded or tied to walls
Freestanding up to 1500 mm high	230 x 230
Freestanding 1500 to 2700 mm high	350 x 350

Access openings

General: In internal walls, leave door-width openings beneath doorways to give access to underfloor areas.

Air vent location

General: Provide air vents to give adequate cross ventilation to the space under suspended ground floors.

Cavity walls: Provide matching vents in the internal leaves located as near as practicable to the air vents in the external leaves.

Location: Below damp-proof course to internal and external walls.

Minimum provision: 6000 mm² net ventilation area per linear metre of wall.

Underpinning

Requirement: Install underpinning while maintaining the building undamaged.

Grouting: Pack dry mix M4 mortar between underpinning and existing structure within 24 and 48 hours of completion of each panel of underpinning.

3.4 CAVITY WORK**Cavity clearance**

General: Keep cavities clear at all times.

Cavity fill

General: Fill the cavity with mortar to 1 course above adjacent finished (ground) level. Fall the top surface towards the outer leaf.

Cavity width

General: Construct minimum cavity widths in conformance with the following:

- Masonry walls: 50 mm.
- Masonry veneer walls: 40 mm between the masonry leaf and the loadbearing frame and 25 mm minimum between the masonry leaf and sheet bracing.

Openings

Jambs of external openings: Do not close the cavity.

Wall ties connectors and accessories

Protection: Install to prevent water passing across the cavity.

3.5 DAMP-PROOF COURSES**Location**

General: Locate damp-proof courses as follows:

- Timber floors: In the first course below the level of the underside of ground floor timbers in internal walls and inner leaves of cavity walls.
- Cavity walls built off slabs on ground: In the bottom course of the outer leaf, continuous horizontally across the cavity and up the inner face bedded in mortar, turned 30 mm into the inner leaf 1 course above.
- Masonry veneer construction: In the bottom course of the outer leaf, continuous horizontally across the cavity. Fastened to the inner frame 75 mm above floor level.
- Walls adjoining infill floor slabs on membranes: In the course above the underside of the slab in internal walls and inner leaves of cavity walls. Project 40 mm and dress down over the membrane turned up against the wall.

Height: Not less than:

- 150 mm above the adjacent finished ground level.
- 75 mm above the finished paved or concrete area.
- 50 mm above the finished paved or concreted area and protected from the direct effect of the weather.

Installation

General: Lay in long lengths. Lap the full width of angles and intersections and 150 mm at joints. Step as necessary, but not more than 2 courses per step for brickwork and 1 course per step for blockwork. Sandwich damp-proof courses between mortar.

Junctions: Preserve continuity of damp-proofing at junctions of damp-proof courses and waterproof membranes.

3.6 FLASHINGS

Location

General: Locate flashings as follows:

- Floors: Full width of outer leaf immediately above slab, continuous across cavity and up the inner face bedded in mortar, turned 30 mm into the inner leaf 2 courses above for brick and 1 course for block. If the slab supports the outer skin and is not rebated, bed the flashing in a suitable sealant.
- Under sills: 30 mm into the outer leaf bed joint 1 course below the sill, extending up across the cavity and under the sill in the inner leaf or the frame for masonry veneer. Extend at least 150 mm beyond the reveals on each side of the opening.
- Over lintels to openings: Full width of outer leaf immediately above the lintel, continuous across cavity, turned 30 mm into the inner leaf 2 courses above for brick and 1 course for block or turned up against the frame and fastened to it. Extend at least 150 mm beyond the ends of the lintels.
- At abutments with structural frames or supports: Vertical flash in the cavity from 150 mm wide material, wedged and grouted into a groove in the frame opposite the cavity.
- At jambs: Vertically flash jamb extending 75 mm into the cavity, interleaved with the sill and head flashing at each end. Fix to jambs.
- At roof abutments with cavity walls: Cavity flash immediately above the roof and over-flash the roof apron flashing.
- Cavity masonry walls: Provide where interrupted by structural element (e.g. roof, wall), opening or similar.

Installation

General: Sandwich flashings between mortar except where on lintels.

Pointing: Point up joints around flashings to fill voids.

Weepholes

Standard: To AS 3700.

Location: Provide weepholes to external leaves of:

- Cavity walls in the course immediately above flashings, and cavity fill, and at the bottoms of unfilled cavities.
- Above suspended floors interrupting cavities.

Form: Open perpend.

Maximum spacing: 1200 mm.

Weephole guards: Provide access barrier.

Installation: To the manufacturer's recommendations.

3.7 WALL TIES

Location

Spacing: To AS 4773.2 clause 9.7 and clause 10.6.

Installation

Embedment: At least 50 mm into mortar ensuring that mortar cover is 15 mm minimum to the outside face of the mortar.

3.8 CONTROL JOINTS

General

Location and spacing: Provide contraction joints, expansion joints and articulation joints to AS 4773.2 Section 7.

Control joint filling

Installation: Clean the joints thoroughly and insert an easily compressible backing material before sealing.

Sealant depth: Fill the joints with a gun-applied flexible sealant for a depth of at least two-thirds the joint width.

Sealant type: External: UV stable.

Flexible masonry ties

Requirement: Provide stabilising ties at control joints and abutting structural elements, including columns, beams and slab soffits.

3.9 REINFORCED AND GROUTED BLOCKWORK

Cleaning core holes

General: Provide purpose-made cleanout blocks or machine cut a cleaning hole at the base of each grouted core.

Location: Locate on the side of the wall which is to be rendered or otherwise concealed.

Cleaning: Rod cores to dislodge mortar fins protruding from the blocks and mortar droppings from reinforcement. Remove through the clean-out blocks.

Grouting

Commencement: Do not commence until grout spaces have been cleaned out and the mortar joints have attained sufficient strength to resist blow-outs.

Height of lift: Limit the height of individual lifts in any pour to make sure that the grout can be thoroughly compacted to fill all voids.

Compaction: Compact by vibration or by rodding.

Topping up: On the completion of the last lift, top up the grout after 10 min to 30 min, and vibrate or rod to mix with the previous pour.

3.10 LINTELS

Installation

General: Do not cut on site. Keep lintels 10 mm clear of heads of frames.

Steel lintels: Pack mortar between any vertical component and supported masonry units. For angles install with the long leg vertical.

Propping: Provide temporary props to lintels to prevent deflection or rotation.

Concrete beam lintels

Requirement: To AS 3600 or a professional engineer's requirements.

3.11 BUILT-IN COMPONENTS

Wall ties fixing straps and tie-down systems

Installation: To AS 3700 or the AS 4773 series.

Corrosion protection: To AS 3700 clause 5.7 for coastal and industrial areas.

Tie-down straps

Type and size: 32 x 0.8 mm or 25 x 1.0 mm galvanized straps.

Spacing: Not more than 1.2 m centres, corresponding with truss/rafter positions to AS 1684.2 and AS/NZS 2699.2 or to the engineer's requirements.

3.12 BAGGING

Preparation

General: Cut joints flush before bagging.

Dry bagging

Application: Apply laying mortar to the surface using a hessian bag or similar. Flush up irregularities, but leave a minimum amount of mortar on the surface.

0342 LIGHT STEEL FRAMING

1 GENERAL

1.1 STANDARDS

General

Design, materials and protection: To AS/NZS 4600.

Residential and low-rise steel framing: To NASH-1 (National Association of Steel Housing) and NASH-2 Standard.

1.2 TOLERANCES

General

Manufacturing, assembly and installation tolerances: To NASH-1 Appendix D and NASH-2 Appendix A.

1.3 SUBMISSIONS

Design

General: Where the structural drawings define performance criteria, submit independent design, documentation and certification from a professional engineer, including for the erected work.

Reactions: Provide location and magnitude of reactions to be accommodated by the support structure.

Design compliance: Submit evidence that the framing design complies with the following:

- Wind Regions C or D to AS/NZS 1170.2 as nominated in Schedules/drawings.
- Terrain Category 2 to AS/NZS 1170.2 unless otherwise nominated on Schedules/drawings.
- Maximum truss spacing: 1200 mm.
- Dead and live loads to AS/NZS 1170.1.
- Wall and roof framing connections: Certification from a professional engineer that it complies with the wind ratings for the site location for both welded and screw fixed connections.

Shop drawings

General: Submit shop drawings, to a scale that best describes the detail, or product design guide certified by a professional engineer stating that the design has been carried out to AS/NZS 4600 or NASH-1 and NASH-2 requirements for the documented configurations and loadings.

Prefabricated roof trusses: Include the following:

- Plan: Truss layout.
- Elevations: Arrangement of members, allowing for the accommodation of in-roof services and the size and section type of each member.
- Holding down and bracing: Details demonstrating capability to resist lateral and uplift forces.
- Method of assembly and connection details.

Prefabricated wall frames: Include the following:

- Plan: Wall layout.
- Elevation: Arrangement of members, and size and section type of each member.

- Method of assembly, connection, holding down and bracing.

2 PRODUCTS

2.1 GENERAL

Storage and handling

Requirement: Transport all components to site and store if required in a manner so as not to damage or distort the components.

2.2 COMPONENTS

Cold-formed steel framing

Cold-form sections from metallic-coated steel: To AS 1397.

Corrosion protection: To NASH-2 Section 8.

Framing members

Cold-formed steel framing for proprietary systems: To NASH-1 and NASH-2.

3 EXECUTION

3.1 GENERAL

Fabrication

Length: Cut members accurately to length so that they fit firmly against abutting members.

Service holes: Form holes by drilling or punching.

Bushes: Provide plastic bushes or grommets to site cut holes.

Swarf: Immediately remove swarf and other debris from cold-formed steel framing.

Fastening

Type: Select from the following:

- Bolting.
- Self-drilling, self-tapping screws.
- Blind rivets.
- Proprietary clinching system.
- Structural adhesives.
- Welding. On-site welded connections are not permitted.

Welding

Burning: Avoid procedures that result in greater than localised burning of the sheets or framing members.

Prefabricated frames

General: Protect frames from damage or distortion during erection. Provide temporary protection for members until permanent covering is in place.

Metal separation

General: Install lagging to separate non-ferrous service pipes and accessories from the framing.

Unseasoned or CCA treated timber

General: Do not fix in contact with framing without fully painting the timber and/or the steel.

Earthing

Permanent earthing: Required.

Temporary earthing: Provide temporary earthing during erection until the permanent earthing is installed.

Protection

General: Restore coatings which have been damaged by welding or other causes. Thoroughly clean affected areas back to base metal and coat with a zinc rich organic primer.

Grommets: Provide grommets to isolate piping and wiring from cold-formed steel framing.

3.2 FLOOR FRAMING

General

Protection: If floor framing is for ground floor construction, make sure that it is protected from moisture.

Construction loads: If construction loading exceeds design loading, provide additional support so as to avoid overstressing of members.

Decks and balconies

Attachment to external walls: To BCA 3.10.6.

3.3 WALL FRAMING

Wall studs

General: Provide studs in single lengths without splices. Place a stud under each structural load point from the roof or ceiling (except at openings). Provide multiple studs at points of concentrated load.

Maximum stud spacing: 600 mm.

Heads to openings

Requirement: Provide lintels appropriate to load and span.

Additional support

General: Provide additional support in the form of noggings, trimmers and studs for support and fixing of lining, cladding, hardware, accessories, fixtures and fittings.

Vermin barriers

Requirement: Provide vermin barriers as follows:

- Brick veneer barrier: Fix 10 mm steel galvanized wire mesh to the underside of the bottom plate of external stud walls, extending across the cavity for building into brickwork.

Damp-proof course

Requirement: Provide damp-proof courses under the bottom plate of stud walls built off slabs or masonry dwarf walls, as documented or as follows:

- External walls (not masonry veneer): Turn up a minimum of 75 mm on the inside and tack to stud. Project 10 mm beyond the external slab edge or dwarf wall and turn down at 45°.
- Walls of bathrooms, shower rooms and laundries: Turn up a minimum of 150 mm on the wet side and tack to studs.

Installation: Lay in long lengths. Lap full width at angles and intersections and at least 150 mm at joints.

Junctions: Preserve continuity of damp-proofing at junctions of sarking, damp-proof courses and waterproof membranes.

Flashings

Location: Provide flashings to external openings sufficient to prevent the entry of moisture. Form trays at the ends of sill flashings.

Masonry veneer construction: Extend across cavities and build into brickwork.

Prefabricated walling

Assembly: Factory assemble wall frames.

Bracing: Provide details of bracing.

Certification: Obtain certification from a professional engineer for the erected frames.

3.4 ROOF FRAMING

Beam framing

General: Construct framing for flat or pitched roofs where the ceiling follows the roof line, consisting of rafters or purlins supporting both ceiling and roof covering.

Supports for in roof services

Water tank or heater: Where a water tank or heater is located in the roof space, provide a support platform to AS/NZS 3500.4 clause 5.5.1 and make sure trusses have been designed to carry the loads.

Additional support

General: Provide additional frame members at fibre cement or plasterboard sheeting or lining joint locations.

Battens

Requirement: Supply and fix battens suitable for span, spacing and proposed roofing material.

Anti-ponding boards

Standard: To AS 4200.2.

3.5 TRUSSES

Fabrication

Assembly: Factory assemble trusses.

Marking

General: Permanently mark each truss to show:

- Project identification.
- Manufacturer.
- Tag or number.
- Location.
- Support points.

Installation

Support: Support trusses on the bottom chord at two points only, unless designed for additional support.

Vertical movement: Over internal walls provide at least 10 mm vertical clearance and use bracing methods which allow for vertical movements.

Holding down and bracing: Provide details demonstrating capability to resist lateral and uplift forces.

3.6 ROOF TRIM

Fascia, valley and barge boards

Requirement: Fix fascia, valley gutter boards and barge boards in conformance with the manufacturer's recommendations.

3.7 COMPLETION

Cleaning

General: On completion of framing remove debris from any gaps between members and make sure void between bottom chord of roof trusses and top of any non-supporting internal wall is clear.

0382 LIGHT TIMBER FRAMING

1 GENERAL

1.1 STANDARDS

General

Framing: To AS 1684.2, AS 1684.3 or AS 1684.4, as appropriate.

Design: To AS 1720.3.

Mechanically graded timber: To AS/NZS 1748.1.

Laminated veneer lumber (LVL): To AS/NZS 4357.0.

Glulam beams: To AS/NZS 1328.1 and AS/NZS 1328.2.

Nailplated roof trusses: To AS 1720.5.

1.2 SUBMISSIONS

Design

General: Where the structural drawings define performance criteria, submit independent design, documentation and certification from a professional engineer, including for the erected work.

Reactions: Provide location and magnitude of reactions to be accommodated by the support structure.

Floor and wall frame member sizes: Submit a schedule of proposed member sizes, certified as meeting stated project, AS 1684 series and AS 1720.3 requirements for span, spacings, loadings and deflections.

Preservative treatment

CCA treated timber: If proposed to be used, submit details.

Shop drawings

Requirement: Submit shop drawings, to a scale that best describes the detail, or product design guide certified by a professional engineer stating that the design has been carried out to AS 1684 series and AS 1720.3 requirements for the documented configurations and loadings.

Prefabricated roof trusses: Include the following:

- Plan: Truss layout.
- Elevations: Arrangement of members allowing for the accommodation of in-roof services and the size and section type of each member.
- Camber of bottom chord.
- Method of assembly, connection, lifting, holding down and bracing.

Prefabricated wall frames: Include the following:

- Plan: Wall layout.
- Elevations: Arrangement of members, and the size and section type of each member.
- Method of assembly, connection, lifting, holding down and bracing.

2 PRODUCTS

2.1 GENERAL

Storage and handling

General: Do not distort or damage timber or timber products.

Moisture content: Maintain the equilibrium moisture content of seasoned timber.

Protection from weather: Provide temporary protection for members until permanent covering is in place.

2.2 SHEET PRODUCTS

Structural plywood

Standard: To AS/NZS 2269.0.

Bond: Type A to AS/NZS 2754.1.

Wet process fibreboard (including hardboard)

Standard: To AS/NZS 1859.4.

2.3 COMPONENTS

Mild steel post bases

Minimum dimensions:

- Stirrup: 75 mm wide x 6 mm thick.
- Dowel: 20 mm diameter heavy tube.

Location: To timber posts supported off concrete slabs or footings.

Finish: Galvanize after fabrication.

Fasteners

Installation: Do not split or otherwise damage the timber.

Coating: Before placing bolts in contact with CCA treated timber, coat the shank of the bolt in a grease or bituminous coating.

Damp-proof course

Material: To AS/NZS 2904.

Flashings

Material: To AS/NZS 2904.

3 EXECUTION

3.1 GENERAL

Prefabricated frames

General: Protect frames from damage or distortion during erection. Provide temporary protection for members until permanent covering is in place.

3.2 FLOOR FRAMING

Bearers and joists

Levelling: Level bearers and joists by checking or by packing for the full width of the member with dense corrosion resistant material which is secured in place.

Maximum thickness of packing: 3 mm.

Spring: Lay bearers and joists to allow for straightening under loading.

Joints

Requirement: Locate joints only over supports:

- Minimum bearing of bearers: 50 mm.
- Minimum bearing of joists: 30 mm.

Fixing and restraint

Fixing: Secure bearers and joists to supports to provide restraint against lateral movement.

Deep joists: To AS 1684.2 clause 4.8.2.3.

Trimmers or blocking dimensions:

- Depth: Joist depth less 25 mm.
- Width: ≥ 25 mm.

Engineered timber joists 200 mm deep or greater: Provide lateral restraint using blocking or seasonal rim board.

Decks and balconies

Attachment to external walls: To BCA 3.10.6.

3.3 WALL FRAMING

Additional support

Requirement: Provide additional support in the form of noggings, trimmers and studs for fixing lining, cladding, hardware, accessories, fixtures and fittings as required.

Spacing of noggings: Maximum 1350 mm centres.

Vermin barriers

Requirement: Provide vermin barriers as follows:

- Brick veneer barrier: Close nail 10 mm galvanized steel wire mesh to the underside of the bottom plate of external stud walls, extending across the cavity for building into brickwork.

Damp-proof course

Requirement: Provide damp-proof courses under the bottom plate of stud walls built off slabs or masonry dwarf walls, as documented or as follows:

- External walls (not masonry veneer): Turn up at least 75 mm on the inside and tack. Project 10 mm beyond the external slab edge or dwarf wall and turn down at 45°.
- Walls of bathrooms, shower rooms and laundries: Turn up at least 150 mm on the wet side and tack to studs.

Installation: Lay in long lengths. Lap full width at angles and intersections and at least 150 mm at joints.

Junctions: Preserve continuity at junctions of damp-proof courses, sarking and waterproof membranes.

Flashings

Location: Provide flashings to external openings sufficient to prevent the entry of moisture. Form trays at the ends of sill flashings.

Masonry veneer construction: Extend flashing across cavities and build into brickwork.

Prefabricated walling

Assembly: Factory assemble wall frames.

Bracing: Provide details of bracing.

Certification: Obtain certification from a professional engineer for the erected frames.

3.4 ROOF AND CEILING FRAMING

Wall plates

Fixing: Fix timber wall plates to masonry, with either straps, bolts or both.

Fixing plates

General: Provide 45 mm minimum thick timber fixing plates to transfer the design loads where timber joists, rafters or purlins bear on or into steel members. Bolt to the steel member at maximum 500 mm centres and maximum 100 mm from the end of the fixing plate.

Beam framing

Ridge straps: Butt ends of rafters together at ridge, and strap each pair together with 900 mm long steel strap passing over the ridge, triple nail to each rafter.

Supports for water containers

General: If a water container or heater is located in the roof space, provide a support platform to AS/NZS 3500.4 clause 5.5.1.

Additional support

General: Provide a frame member behind every joint in fibre cement sheeting or lining.

Anti-ponding boards

Standard: To AS 4200.2.

3.5 TRUSSES**Marking**

General: Permanently mark each truss to show:

- Project identification.
- Manufacturer.
- Tag or number.
- Location.
- Support points.

Installation

Nailplated prefabricated roof trusses: To AS 4440.

Support: Support trusses on bottom chord at two points only, unless designed for additional support.

Plumb: The lessor of H/50 or 50 mm, where H is the height of the truss at the point where plumb is being measured.

Vertical movement: Provide at least 10 mm vertical clearance plus ceiling batten depth over internal non-load bearing walls. Use bracing methods that accommodate the design vertical movements.

3.6 ROOF TRIM**Fascia, valley and barge boards**

Requirement: Fix fascia, valley gutter boards and barge boards.

3.7 COMPLETION**Fasteners**

Requirement: Make sure all bolts, screws and other fixings have been tightened so that joints and anchorages are secure at practical completion.

Cleaning

General: On completion of framing remove debris from any gaps between members and make sure void between bottom chord of trusses and top of any non-supporting internal walls is clear.

0383 SHEET FLOORING AND DECKING**1 GENERAL****1.1 STANDARDS****General**

Flooring and decking: To AS 1684.2, AS 1684.3 or AS 1684.4, as appropriate.

2 PRODUCTS**2.1 DECKING****New timber decking**

Standard:

- Treated softwood to AS 4785.1 Section 4.
- Hardwood to AS 2796.1 Section 4.

2.2 SHEET FLOORING**Plywood**

Standard: To AS/NZS 2269.0.

Plywood certified formaldehyde emission level to AS/NZS 2269.0: Class E₁.

Grading:

- Surface grade: CD.
- Bond: Type A to AS/NZS 2754.1.

Durability: Preservative treatment to AS 1604.1 Table D1.

Particleboard

Particleboard: To AS 1860.1, Class 1.

Particleboard certified formaldehyde emission level to AS/NZS 2098.11: Class E₁.

Compressed fibre cement sheeting

Standard: To AS/NZS 2908.2.

Category: Minimum 4.

Classification:

- External: Type A.
- Internal: Type B.

3 EXECUTION**3.1 GENERAL****Decking on steel joists**

General: Screw fix seasoned timber battens to the steel joists so that their top surfaces are aligned.

3.2 FIXING SHEET FLOORING**Particleboard flooring**

Installation: To AS 1860.2.

Plywood flooring

Installation: To AS 1684.2, AS 1684.3 or AS 1684.4, as appropriate.

Compressed fibre cement flooring

Installation: Lay the length of the sheets at right angles to the joists. Stagger the end joints and locate centrally over joists. Apply adhesive to edges of sheets and firmly butt join together.

Minimum number of spans across support: 2.

Fixing: Pre-drill screw holes with 1 mm clearance over screw diameter and countersink. Fix with corrosion resistant countersunk screws.

Spacing of fasteners:

- Sheet edge and intermediate: Less than 450 mm.
- Corners and sheet edges: At least 12 mm from sheet edges and 50 mm from corners.

Wet area flooring: Stop screw heads with sealant.

3.3 FIXING DECKING

Timber decking

Installation: Lay in long lengths with the ends of each board firmly butted to the next and firmly in contact with the joists. Stagger joints and make over joists.

Gap between edges of seasoned boards: 4 mm.

Minimum number of spans across support: 3.

Nailing:

- General: Make sure the boards are in contact with the joists at the time of nailing, particularly where boards are machine nailed. If nails are to be less than 10 mm from ends of boards, pre-drill nail holes 0 to 1 mm undersize.
- Top nailing: Double nail at each bearing with nails driven flush. Offset nails at intermediate fixings or skew nail 10° in opposite directions.

Sealing: Apply 1 coat of water repellent preservative and 1 coat of finish coat to top surface of joists and all surfaces of boards before fixing.

Composite decking

Installation: Lay to the manufacturer's recommendations.

0411 WATERPROOFING - EXTERNAL AND TANKING

1 GENERAL

1.1 STANDARDS

External waterproofing

Membrane materials: To AS 4654.1.

Membrane design and installation: To AS 4654.2.

1.2 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Substrate preparation completed.
- Secondary layers preparation completed.
- Before membranes are covered up or concealed.
- Underflashings complete prior to installation of overflashings.
- After flood testing.

2 PRODUCTS

2.1 MEMBRANES

Membrane systems

Requirement: Provide a proprietary membrane system suitable for the intended external waterproofing.

Tanking systems

Requirement: Provide a proprietary membrane system suitable for the intended below ground tanking.

2.2 ACCESSORIES

Internal roof outlets

General: Proprietary funnel shaped sump cast into the roof slab, set flush with membrane, with a flat removable grating and provision for sealing the membrane into the base of the outlet.

Flashings

General: Proprietary or custom made flashings and materials for sealing membranes at junctions and terminations.

2.3 THERMAL INSULATION

Insulation boards

General: Proprietary insulation boards.

2.4 PROTECTION

Protection board

General: Proprietary rigid or semi-rigid protection board.

2.5 SLIP SHEETS

Sheet material

General: A sheet to isolate the membrane system from the supporting substrate or from the topping or mortar bed.

2.6 DRAINAGE CELL PANELS

Walls and planter bases

General: Lightweight, high strength modular drainage cell for below ground or subsoil drainage.

Filter fabric: An open weave geotextile fabric to reduce soil and fines ingress into drainage system.

3 EXECUTION

3.1 PREPARATION

Substrates

General: Prepare substrates as follows:

- Fill all cracks in substrates wider than 1.5 mm with a filler compatible with the membrane system.
- Fill voids and hollows in concrete substrates with a concrete mix not stronger than the substrate.
- Remove projections.
- Remove deleterious and loose material.
- Remove all traces of a concrete curing compound if used.
- Leave the surface free of contaminants, clean and dust free.

Concrete substrates: Cure for more than 28 days.

Moisture content

Requirement: Verify that the moisture content of the substrate is compatible with the water vapour transmission rate of the membrane system by testing to AS 1884 Appendix A.

Falls

General: Verify that falls in substrates are greater than 1 in 80.

Joints and fillets

Internal corners: Provide 45° fillets 50 x 50 mm or a double detail joint as documented. Do not use sand/cement fillets.

External corners: Round or arris edges.

Control joints: Prepare all substrate joints to suit the membrane system.

Priming

Compatibility: If required, prime the substrates with compatible primers for adhesion of the membrane system.

3.2 APPLICATION

Protection during installation

General: Protect membrane from damage during installation and for the period after installation until the membrane achieves its service characteristics that resist damage.

Drains

General: Prevent moisture from tracking under the membranes at drainage locations.

Drains and cages: Provide removable grates or cages to prevent blockage from debris. If the finished surface is above the level of the membrane, provide a slotted extension piece to bring the grate up to the level of the finished surface.

Overflows: Apply a bond breaker to the perimeter of the overflow outlet at its junction with the surface to which the membrane will be fixed. Turn the

membranes into the overflow to prevent moisture from tracking behind the membrane.

Sheet membrane joints

Orientation of laps: Lap sheets on the upslope side of the roof fall over sheets on the downslope side.

End laps generally: Stagger end lap joints.

Bituminous sheet membranes:

- Side laps: 75 mm.
- End laps: 100 mm.
- Method: Heat welded.

Synthetic rubber membranes:

- Factory-vulcanized laps: More than 40 mm.
- Field side laps: More than 50 mm for side laps.
- Field end-laps: More than 100 mm for end laps.

Plasticised PVC (Polyvinyl chloride) membranes:

- Factory welded laps: More than 30 mm.
- Field-welded laps:
 - . If used over insulation boards: More than 100 mm.
 - . Other instances: More than 75 mm overlaps.

Curing of liquid applied systems

General: To the manufacturers' instructions.

Control of movement

General: Provide control joints located over control joints in the substructure.

Fillets and bond breakers: Size to allow the membrane to accommodate movement.

Bonded membranes: Carry control joints in the substrate through to and into the surface finish.

Membrane terminations

Membrane upturns: Provide upturns above the maximum water level expected from the exposure conditions of rainfall intensity and wind.

- Height: > 150 mm.
 - Anchoring: Secure sheet membranes along the top edge.
 - Edge protection: Protect edges of the membrane.
- Vertical upward terminations: As documented.

Waterproofing above vertical terminations:

Waterproof the structure above the termination to prevent moisture entry behind the membrane using cavity flashings, capping, waterproof membranes or waterproof coatings.

Horizontal terminations: Do not provide. Use vertical terminations.

Membrane vertical penetrations

Pipes, balustrades, ducts, and vents: Provide separate sleeves for all pipes, ducts, and vents and fix to the substrate.

Membrane horizontal penetrations

Sleeves: Protect PVC-U conduits and pipes with a sleeve of bitumen in order to seal to the membrane without burning the PVC-U. Do not use high density polyethylene (HDPE), polypropylene (PP) pipes or flexible PVC conduit.

Membrane at balcony doors and windows

Requirement: Install membrane prior to the fixing of door or window frames.

Hobless and flush thresholds: Install membrane prior to the fixing of door or window frames with a continuous grated drain abutting the external face of the door or window sill.

Membrane around skylights and access openings

Requirement: Install membranes to upstands prior to the installation of the skylight or access openings.

Membrane to below ground structures

Membrane: Externally apply membrane to all walls and return to horizontal surfaces to prevent water tracking around structure at joints and corners.

Protection board: Provide protection board to the full extent of the membrane.

Drainage cell: Provide geo-filter fabric wrapped drainage cell to vertical surfaces of the structure.

Reinforcement: Provide reinforcement to the membrane at junctions, corners and over joints to the manufacturer's recommendations.

Overlaying finishes on membranes

Compatibility: If a membrane is to be overlaid with another system such as tiles, pavers, ballast, insulation or soil, provide an overlaying system that is compatible with and not cause damage to the membrane.

Bonded or partially bonded systems: If the topping or bedding mortar requires to be bonded to the membrane, provide sufficient control joints in the topping or bedding mortar to reduce the movement over the membrane.

Slip sheet: If the topping or bedding mortar is structurally sufficient not to require bonding to the substrate, lay a double slip sheet over the membrane to separate it from the topping or bedding mortar.

Paint coatings: If maintenance pathways are indicated by a paving paint, use a paving paint which is compatible with the membrane.

Membrane protection boards: If the membrane is overlaid, topped or backfilled against, provide a protection board to protect the membrane from hydrostatic pressure, wear and puncture.

3.3 COMPLETION

Protection

General: Keep traffic off membrane surfaces until bonding has set or for 24 hours after laying, whichever period is the longer.

Reinstatement: Repair or replace faulty or damaged work. If the work cannot be repaired satisfactorily, replace the whole area affected.

Warranties

Waterproofing: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the supplier and the applicator.

- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the supplier.

0421 ROOFING

1 PRODUCTS

1.1 COMPONENTS

Fasteners

Prefinished exposed fasteners: Finish with an oven baked polymer coating to match the roofing material.

Insulation spacers

Description: Proprietary spacer system to prevent excessive compression of insulation between roof sheeting and framing.

1.2 MATERIALS

Sheet metal roofing

Material: Prefinished/coated steel sheeting.

Standard: To AS 1562.1.

Corrosion protection: To BCA Table 3.5.1.1a.

Prepainted and organic film/metal laminate finish: To AS/NZS 2728.

Roof tiling

Standard: To AS 2049.

Accessories: Compatible with the tiles and necessary to complete the tiling.

Glazed roofing

Description: Sloped overhead glazing fixed to glazing bars or directly to the roof framing with the required trim, flashings and sealants.

Glass selection: To AS 1288.

- Certification: Required.

- Certification provider: An organisation accredited by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ).

Plastic sheet roofing

Unplasticised polyvinyl chloride (PVC-U) sheet: To AS 4256.2.

Glass fibre reinforced polyester (GRP) sheet: To AS 4256.3.

Polycarbonate: To AS 4256.5.

Skylights

Standard: To AS 4285.

Skylights (roof lights) in bushfire prone areas: To AS 3959.

Roof ventilators

General: A proprietary roof ventilator system, including framing, fixing, trim, seals, accessories and flashings.

Finish: Match adjacent roofing.

1.3 ROOF PLUMBING

General

Description: Flashings, cappings, gutters, rainwater heads, outlets, downpipes and accessories necessary to complete the roof system.

Flashing and capping: Notched to match profile of roof sheeting.

Standards

Roof drainage: To AS/NZS 3500.3.

Metal rainwater goods: To AS/NZS 2179.1.

PVC-U rainwater goods and accessories: To AS/NZS 3500.3.

Flashings and cappings: To AS/NZS 2904.

Gutters and fascias

Material: Prefinished/coated steel sheeting.

2 EXECUTION**2.1 INSTALLATION****Protection**

General: Keep the roofing and rainwater system free of debris and loose material during construction.

Thermal movement

Requirement: Provide for thermal movement in the roof installation and the structure, including movement in joints and fastenings.

Metal separation

Requirement: Prevent direct contact between incompatible metals, and between green hardwood or chemically treated timber and aluminium or coated steel, by either of the following methods:

- Applying an anti-corrosion, low moisture transmission coating to contact surfaces.
- Inserting a separation layer.

Reinstatement

Extent: Repair or replace damage to the roofing and rainwater system. Touch up minor damage to prepainted metal roofing.

Cleaning

General: Remove debris, metal swarf, solder, sealant and used materials. Clean out gutters and downpipes.

2.2 SHEET METAL ROOFING**Installation**

Metal sheet roofing: To AS 1562.1 and BCA 3.5.1.

Ridges and eaves: Treat sheet ends as follows:

- Project sheets 50 mm into gutters.
- Close off ribs at bottom of sheets using mechanical means or with purpose-made fillers or end caps.
- Turn pans of sheets up at tops and down into gutters by mechanical means.
- Provide pre-cut notched eaves flashing and bird proofing if required.
- Close off ridges with purpose-made ridge fillers of closed cell polyethylene foam.

Swarf: Remove swarf and other debris as soon as deposited.

Accessories: Provide accessories with the same finish as roofing sheets to complete the roof installation.

2.3 TILING**Installation**

Roof tiling: To AS 2050 and BCA 3.5.1.2.

Setting out: Set out the roof to give an even tile gauge in each course, with full or saw cut tiles at verges.

Bedding and pointing: Bed and point ancillary tiles, including ridges, hips and verges, in coloured mortar to match the tiles.

Pointed verge: Bed and point tiles on 100 x 5 mm fibre cement pointing strip.

2.4 PLASTIC SHEET ROOFING**Installation**

Standard: To AS 1562.3.

2.5 GLAZED ROOFING**Installation**

Standard: To AS 1288.

2.6 ROOF PLUMBING**Jointing sheet metal rainwater goods**

Sealing: Seal fasteners and mechanically fastened joints. Fill the holes of blind rivets with silicone sealant.

Flashings and cappings

Upstands: Flash projections above or through the roof with two part flashings consisting of an apron flashing and an over-flashing, with at least 100 mm vertical overlap. Provide for independent movement between the roof and the projection.

Wall abutments: Provide overflashings where roofs abut walls, stepped to the roof slope in masonry and planked cladding, otherwise raking and as follows:

- In masonry: Build into the full width of the outer leaf. Turn up within cavity, sloping inward across the cavity and fixed to or built in to the inner leaf at least 75 mm above.

Gutters

Fastening: Fix gutters with galvanized straps to rafters or fascia.

Minimum slope of eaves gutters: 1:200.

Minimum width overall of valley gutters: 400 mm.

Eaves gutter overflow measures: To BCA 3.5.3.4.

Downpipes

General: Prefabricate downpipes to the required section and shape where possible. Connect heads to gutter outlets and, if applicable, connect feet to rainwater drains.

Downpipe support: Provide supports and fixings for downpipes.

Strapping: Secure downpipes to walls with not less than two metal straps.

- Strap material and finish: Prefinished/coated steel.

0431 CLADDING**1 PRODUCTS****1.1 MATERIALS****AAC panels**

Requirement: Proprietary aerated autoclaved cement (AAC) panels.

Standard: To AS 5146.1.

Joint adhesive: Proprietary adhesive to manufacturer's recommendations.

Control joints: At all external and internal corners, adjacent to all openings and at maximum 6 m centres.

Exterior insulation and finish system (EIFS)

Requirement: Proprietary system comprising rigid insulation panels, fixed to a subframe and finished with a cementitious base coat and finish coat.

Fibre cement planks

Requirement: Proprietary system of single faced fibre cement building planks.

Standard: To AS/NZS 2908.2. Type A Category 3.

Plank thickness: 7.5 mm.

Joints and edges: PVC-U extrusion.

Corners: Preformed metal joining pieces.

Timber weatherboards

Hardwood: To AS 2796.1.

Softwood: To AS 4785.1.

Profiled sheet metal

Standard: To AS 1562.1.

Fibre cement sheet

Standard: To AS/NZS 2908.2.

Cladding, eaves and soffit linings: Type A Category 3.

Compressed cladding: Type A Category 5.

Sheet cladding: A proprietary system of single faced fibre cement sheets:

- Arrangement: Set out in even panels with joints coinciding with framing.
- Sheet thickness: 6 mm.
- Joints, corners and edges: PVC-U extrusion.

Eaves lining: Single faced fibre cement:

- Material and fixing: To BCA 3.5.4.5.
- Minimum sheet thickness: 6 mm.
- Joints: PVC-U extrusion.

1.2 COMPONENTS**Flashing material**

Standard: To AS/NZS 2904.

2 EXECUTION**2.1 CONSTRUCTION GENERALLY****Substrates or framing**

Requirement: Before fixing cladding check the alignment of substrates or framing and adjust if necessary.

Fixing

Method: Nail to timber framing, screw to steel framing.

Accessories and trim

Requirement: Provide accessories and trim required to complete the installation.

Fixing eaves and soffit lining

Nailing: 150 mm centres to bearers at maximum 450 mm centres.

Metal separation

Requirement: Prevent direct contact between incompatible metals, and between green hardwood or chemically treated timber and aluminium or coated steel, by either of the following methods:

- Applying an anti-corrosion, low moisture transmission coating to contact surfaces.
- Inserting a separation layer.

Incompatible metal fixings: Do not use.

2.2 PROPRIETARY SYSTEMS OR PRODUCTS**Fixing**

Product fixing: Fix proprietary systems to manufacturer's recommendations.

Joints

Compressed fibre cement sheets: Expressed joints.

2.3 AAC PANELS**General**

Installation: To AS 5146.3.

2.4 TIMBER WEATHERBOARD**Preparation**

Preservative treatment: For cladding with a natural or stained finish, prefinish the boards by dipping or brushing with water repellent preservative.

Compatibility: Make sure preservative is compatible with a documented pigmented stain finish.

Cut surfaces: Treat freshly cut surfaces with water repellent preservative before fixing.

Installation

Fixing: To BCA 3.5.4.2.

Single lengths: If installed vertically, use single lengths. If installed horizontally, use single lengths whenever possible.

Fixing at supports:

- Seasoned milled weatherboards: 2 fixings.
- Unseasoned hardwood, sawn weatherboards, or secret nailed profiles: 1 fixing.

Nailheads: Treat visible nailheads as follows:

- Stained or clear finishes: Drive flush with weatherboard surface.

- Opaque finishes: Punch below the weatherboard surface and fill flush with putty after the surface has been primed.

Joists

End grain joints: Install boards so that butt joints are in compression.

Internal and external corners: Butt against a stop bead that projects at least the thickness of the cladding.

2.5 PROFILED SHEET METAL CLADDING

Installation

Standard: To AS 1562.1.

Swarf: Remove swarf and other debris as soon as it is deposited.

Accessories: Provide material with the same finish as cladding sheets.

Corner flashing

Requirement: Finish off at corners with purpose-made folded flashing strips.

0451 WINDOWS AND GLAZED DOORS

1 GENERAL

1.1 STANDARDS

General

Selection and installation: To AS 2047.

Glazing

Glass type and thickness: To AS 1288, if no glass type or thickness is nominated.

Quality requirements for cut-to-size and processed glass: To AS/NZS 4667.

2 PRODUCTS

2.1 GENERAL

Protection of openable windows

Fall prevention: To BCA 3.9.2.6 and BCA 3.9.2.7.

Testing: To AS 5203.

Glass

Safety glass: To AS/NZS 2208.

Aluminium frame finishes

Powder coating: To AS 3715.

Anodising: To AS 1231:

- Thickness: ≥ 15 to 20 microns.

Bathroom windows

Obscure glazing: To WC, bathroom and ensuite windows.

Flashings

Standard: To AS/NZS 2904.

Window labelling and certification

Requirement: To AS 2047 Section 8.

2.2 COMPONENTS

Louvre window assemblies

Requirement: Louvre blades mounted in a metal surround frame or subframe and able to withstand the permissible-stress-design wind pressure for that location without failure or permanent distortion of members, and without blade flutter.

Adjustable louvres: Louvre blades clipped into blade holders pivoted to stiles or coupling mullions, linked together in banks, each bank operated by an operating handle incorporating a latching device, or by a locking bar.

Insect screens

Requirement: Provide insect mesh screens fitted to all opening window sashes, short glazed windows and sliding doors.

Fixed screens: Provide fixed screens to the window frames with a clipping device which permits removal for cleaning.

Hinged screens: Hinge at the top to give access to opening sash.

Retractable screens: Provide a proprietary retractable insect screen comprising aluminium frame and fibreglass mesh fitted between guide channels incorporated in the frame, and a retraction

system including tension spring, nylon bearings, positive self-locking device, and plastic sealing strip at sill.

Sliding screens: Provide a matching aluminium head guide, sill runner, and frame stile sections for screens not part of the window frame.

- Hardware: Nylon slide runners and finger pull handle. Provide pile strip closers against sash where necessary to close gaps.

Aluminium framed insect screens: Provide aluminium extruded or folded box frame sections with mesh fixing channel, mitred, staked and screwed at corners. Provide an extended frame section where necessary to adapt to window opening gear.

- Mesh: Bead the mesh into the frame channel with a continuous resilient gasket, so that the mesh is taut and free of distortion.

Bushfire screens and seals

Protection: Protect glazed windows and doors from the ingress of embers.

Standard: AS 3959.

Security screens

Security grilles and screen doors: To AS 5039.

Screen infill material: Type III to AS 5039.

2.3 HARDWARE

Hardware documented generically

General: Provide hardware of sufficient strength and quality to perform its function, appropriate to the intended conditions of use, compatible with associated hardware, and fabricated with fixed parts firmly joined.

3 EXECUTION

3.1 INSTALLATION

Preglazing

Window assemblies and glazed doors: Supply inclusive of glazing, shop preglazed.

Windows and glazed doors

General: Install windows and glazed doors frames as follows:

- Plumb, level, straight and true within acceptable building tolerances.
- Fixed or anchored to the building structure in conformance with the wind action loading requirements.
- Isolated from any building loads, including loads caused by structural deflection or shortening.
- Allow for thermal movement.

Weatherproofing

Flashings and weatherings: Install flashings, weather bars, drips, storm moulds, joint sealant and pointing to prevent water from penetrating the building between frames and the building structure under prevailing service conditions, including normal structural movement of the building.

Fixing

Packing: Pack behind fixing points with durable full width packing.

Prepared masonry openings: If fixing of timber windows to prepared anchorages is by fastening from the frame face, conceal the fasteners by sinking the heads below the surface and filling the sinking flush with a material compatible with the surface finish.

Trim

General: Provide mouldings, architraves, reveal linings, and other internal trim using materials and finishes matching the window frames. Install to make neat and clean junctions between frames and the adjoining building surfaces.

Security screens

Installation: To AS 5040 by a Police Licensed security installer.

0453 DOORS AND ACCESS PANELS**1 GENERAL****1.1 STANDARDS****General**

Timber and composite doors: To AS 2688.

1.2 INTERPRETATION**Definition**

General: For the purposes of this worksection the following definition applies:

- Doorset: An assembly comprising a door or doors and supporting frame, guides and tracks including the hardware and accessories necessary for satisfactory operation.

2 PRODUCTS**2.1 DOOR FRAMES****External doors**

Requirement: Double rebated with weather gaskets and seals.

Aluminium frames

Construction: Assembled from aluminium sections, including accessories such as buffers, pile strips, strike plates, fixing ties or brackets and cavity flashing, with provision for fixing documented hardware.

Timber frames

Hardwood: To AS 2796.1.

- Grade: Select.

Softwood: To AS 4785.1.

- Grade: Select.

Joints:

- Morticed head and through tenons.
- Trenched head:
 - . Bare faced tenons on jambs.
 - . Full let-in jambs.

2.2 DOORS**General**

Doors: Proprietary products manufactured for interior or exterior applications and for the finish required.

Flush panel doors

General: Provide flush panel doors of balanced construction.

Construction

Door thickness:

- General: 35 mm.
- External doors and doors over 900 mm wide: 40 mm.

Door width minimum: 870 mm.

Edge strips: Minimum thickness 10 mm. Increase overall thickness to greater than 15 mm to accommodate the full depth of the rebate in rebated

doors. Apply to the external edges of door after the facings are bonded to the door framing/core and finish flush with outside surface of the facings.

Door facing:

- Internal doors: Standard Redicote finish.
- External doors: Solid core, Duracote finish.
- Doors to wet areas (internal): Duracote finish.

Door edges: Painted, including top and bottom edges.

Tolerances

Standard: To AS 2688 clauses 4.1 and 5.3.

Security screen doors

Standard: To AS 5039.

Screen infill material: Type III to AS 5039.

Mesh type: Type 304 stainless steel mesh with minimum 0.9 mm diameter wires.

Screen construction: Provide screens conforming to the following:

- Framing: Extruded aluminium frame.
- Mesh attachment: Fix mesh to frame with screw-clamps and anti-tamper screws. Provide screw-clamps which transfers forces around the frame so that the mesh remains intact after heavy impact.
- Finish: Powder coated. Colour of screen frame to match adjoining door frame colour.

Screen arrangement: Hinged or sliding conforming to the following:

- Allow cleaning of any fixed lights from the outside.
- Allow egress from the inside.
- Held open position: Allow for mechanisms for holding in position.
- Make sure screens are compatible with door/window system and do not interfere with its operation.

Operation and latching: From the inside with a keyless one touch locking system.

Bushfire screens and seals

Protection: Protect glazed windows and doors from the ingress of embers.

Standard: AS 3959.

2.3 SLIDING INTERNAL DOORS**Face mounted**

General: Provide overhead track supports and head and jamb linings appropriate to the arrangement of the door, and removable pelmets at the head to allow access to the wheel carriages for adjustment.

Wheel carriages: Fully adjustable precision ball race type providing smooth, quiet operation.

Cavity sliding

Door assemblies: Proprietary product comprising steel and timber frame construction with rigid steel top, base and rear supporting members and incorporating the overhead door track, ball race type wheel carriages, guides, stops, split jamb linings and removable pelmet.

2.4 ANCILLARY MATERIALS**Flashings**

Standard: To AS/NZS 2904.

Weather bars

General: Provide a weather bar under hinged external doors, locate under the centres of closed doors.

Extruded gaskets and seals

General: Provide weather seals and gaskets to all external doors.

Materials: Non-cellular (solid) elastopressive seals as follows:

- Flexible polyvinyl chloride (PVC): To BS 2571, 100% solids with high consistency, ultraviolet stabilised.
- Rubber products (neoprene, ethylene propylene diene monomer (EPDM) or silicone rubber): To BS 4255-1.

3 EXECUTION**3.1 GENERAL****Security doors**

Installation: To AS 5040 by a Police Licensed security installer.

Door type and location: Provide hinged and sliding security screen doors to the external face of entry door to each dwelling as follows:

- Hinged security screen doors: To the external face of each entry door to the dwelling, excluding store room.
- Sliding security screen: To glazed sliding doors.

Ceiling access

General: Trim an opening and provide a loose access panel of minimum size 600 x 400 mm.

Under floor access

Requirements: Provide a frame and a door, minimum size 620 mm wide x 600 mm high, complete with padbolt.

Priming

General: Prime timber door leaves on top and bottom edges before installation.

3.2 FRAMES**General**

Frames: Install the frames as follows:

- Plumb, level, straight and true.
- Fixed or anchored to the building structure.
- Isolated from any building loads, including loads caused by structural deflection or shortening.

Aluminium frames

Building into masonry: Screw galvanized steel brackets twice to jambs and build in.

Fixing to masonry openings: Build in seasoned timber plugs to masonry joints or use proprietary expansion anchors and screw twice through jambs at each fixing.

Fixing to stud frame openings: Screw once to studs at each fixing.

Timber frames

Building into masonry: Screw galvanized steel brackets twice to jambs and build in.

Fixing to masonry openings: Build in seasoned timber plugs to masonry joints or use proprietary expansion anchors and screw twice through jambs at each fixing.

Fixing to stud frame openings: Back screw twice to jambs at each fixing.

Heads of fasteners: Conceal where possible, otherwise sink the head below the surface and fill the sinking flush with a material compatible with the surface finish.

Finishing

Trim: Provide mouldings, architraves, reveal linings, and other internal trim using materials and finishes matching the door frames. Install to make neat and clean junctions between the frame and the adjoining building surfaces.

Weatherproofing

Flashings and weatherings: Install flashings, weather bars, drips, storm moulds, caulking and pointing to prevent water from penetrating the building between the door frame and the building structure under the prevailing service conditions, including normal structural movement of the building.

0454 OVERHEAD DOORS**1 GENERAL****1.1 STANDARD****General**

Garage doors: To AS/NZS 4505.

2 EXECUTION**2.1 INSTALLATION****Frames, guides and tracks**

Requirement: Install frames as follows:

- Plumb, level, straight, true, and within tolerances and clearances recommended by the manufacturer.
- Fixed or anchored to the building structure using mechanical fixings suitable for the substrate and the imposed loads.
- Isolated from any building loads, including loads caused by structural deflection or shortening.

0455 DOOR HARDWARE**1 PRODUCTS****1.1 COMPONENTS****Hinges**

Requirement: Provide 3 hinges for external doors and door leaves over 2040 mm in height and 600 mm in width. Conform to the **Hinges table**.

Hinges table

Size of door (mm x mm)	Number of hinges (per door leaf)	Size of hinges (steel)
2040 x 920	3	100 x 75 x 2.5 mm
2040/2400 x 1020	4	100 x 100 x 2.5 mm

Locksets

External doors: Fit standard range door locks, lever handles and latches with entrance sets to front and other external timber doors. Provide deadlocks with inside snib.

Internal doors:

- Generally: Passage sets.
- Bathrooms, showers and toilets: Privacy sets.
- Sliding patio doors and windows: Key-lockable surface mounted bolts.

Keying

In each dwelling: Key doors including external security screen doors (excluding garage doors) alike and key windows alike.

Multiple dwellings: Key external door keys of each dwelling unit to differ for the site.

Door buffers and stops

Location and type: Provide floor mounted door buffers to all internal doors.

2 EXECUTION**2.1 INSTALLATION****Supply**

Delivery: Deliver door hardware items, ready for installation, in individual complete sets for each door, as follows:

- Clearly labelled to show the intended location.
- In a separate dust and moisture proof package.
- Including the necessary templates, accessories, fixings and fixing instructions.

Mounting height

Door lockset mounting heights: 1000 mm above finished floor to centreline of spindle.

Locks

Cylinders: Install so that keyhole is vertical and consistent for all doors.

Door buffers and stops

Fixing: Fix buffer/stop on the floor so that the door or door furniture does not strike the wall or other surface.

Fasteners

Materials: Provide materials compatible with the item being fixed, and of sufficient strength, size and quality to perform their function.

- Concealed fixings: Provide a corrosion resistant finish to concealed fixings.
- Exposed fixings: Match exposed fixings to the material being fixed.

Security: Locate exposed fixings to lock furniture on the inside faces of external doors.

Support: Provide appropriate back support (for example lock stiles, blocking, wall noggings and backing plates) for hardware fixings.

Hinges

Metal frames: Fix hinges using metal thread screws.

Timber doorsets: Install butt hinges in housings equal in depth to the thickness of the hinge leaf (except for hinges designed for mounting without housing), and fix with countersunk screws.

Security doors

Hinges: 3 hinges with anti-tamper or steel fixed pin hinges.

- Fixing to door frame: Welded to the frame or provide hinges concealed when the door is closed.

Locksets and furniture: Provide as follows:

- Latch set with lever handles.
- Minimum 37 x 6 mm thick aluminium push bar, installed at 800 mm above the finished floor level.
- A triple action cylinder deadbolt mortice fitting lock with 2 keys.
- Restraining chain.

Closers: Provide heavy duty pneumatic door closers.

Keying: Locks keyed alike where multiple doors are fitted.

Seals: Mohair door seal to the bottom of the doors.

Marking: Mark the manufacturer's name to the top of the door, on the inside face.

0467 GLASS COMPONENTS**1 GENERAL****1.1 STANDARDS****General**

Materials and installation: To AS 1288.

Safety glass: To AS/NZS 2208.

1.2 SUBMISSIONS**Certification**

Balustrade design: Submit a professional engineers' certificate confirming conformance with AS/NZS 1170.1 clause 3.6.

Sealant compatibility: Submit statements from all parties to the installation certifying the compatibility of sealants and glazing systems to all substrates.

2 PRODUCTS**2.1 MIRRORS****Reflective surface**

Type: Silver layer deposited on the glass or glazing plastic.

Protective coatings: Electrolytic copper coating at least 5 microns thick, and 2 coats of mirror backing and edge sealing paint having a total dry film thickness of at least 50 microns.

Safety mirror

Type: Vinyl backed Grade A safety mirror.

Safety compliance: To AS/NZS 2208.

Solid backed annealed glass mirrors

Backing: 9 mm waterproof plywood.

Adhesive fixing to backing: Non-acidic silicone adhesive at the rate recommended by the manufacturer.

2.2 SHOWER SCREENS**Type**

General: Proprietary system comprising frames of extruded aluminium, stainless steel, or PVC-U, assembled around safety glass to form fixed panels and sliding, hinged or pivoted doors.

Glass: To AS 1288 clause 5.8.

3 EXECUTION**3.1 FIXING MIRRORS****Vinyl backed Grade A safety mirrors and solid backed annealed glass mirrors**

Solid backed annealed glass mirrors:

- Installation to backing: Clean the back of the glass panel and apply walnuts of adhesive together with double sided adhesive tape for temporary support and affix directly to the backing.

Screw fixing: Fix direct to wall plugs with dome-headed chromium-plated screws in each corner and at 900 mm maximum centres around perimeter.

Provide polyethylene sleeves and washers or prevent contact between screw and glass. Do not over-tension the screws.

Frame fixing: Proprietary aluminium frames to mirror perimeter, corners mitred. If unbacked, bed glass edges in a continuous resilient gasket. Attach the frame to the substrate with concealed screw fixings. Seal the frame to the substrate with paintable sealant which will not react with the mirror coating. Do not allow the sealant to contact the mirror back.

Bead fixing: Rebated timber beads to mirror perimeter, corners mitred. If unbacked, bed glass edges in a continuous resilient gasket. Screw fix the beads to the substrate.

Clip fixing: Fix direct to wall plugs with chromium-plated fixed clip and spring clip fixings at 900 mm maximum centres around perimeter. If unbacked, provide polyethylene or cork washers to prevent contact between clips and mirror back.

3.2 GLAZED SHOWER SCREENS

Water shedding

General: Provide an assembly which sheds water to the inside without retaining it on the frame surfaces. Seal the edge of the frame to adjoining surfaces with a resilient strip.

Sliding assemblies

Hanging: Hang the sliding sash on stainless steel or nylon sheaves on overhead channel track formed in the frame head, and fit nylon or equivalent bottom guides.

Hardware: Pull handles on both sides of sash, or of leading sash in multiple sash arrangements.

Fixing

Proprietary shower screens: To the manufacturer's recommendations.

0471 THERMAL INSULATION AND PLIABLE MEMBRANES

1 GENERAL

1.1 INTERPRETATION

Definition

General: For the purposes of this worksection the following definition applies:

- Pliable building membrane: To AS/NZS 4200.1 and equivalent to sarking-type material in the NCC.

2 PRODUCTS

2.1 MATERIALS

Fire hazard properties

Insulation materials: Tested to AS/NZS 1530.3. Fire hazard indices as follows:

- Spread-of-Flame Index: ≤ 9 .
- Smoke-Developed Index: ≤ 8 if Spread-of-Flame Index > 5 .

Materials with reflective facing: Test to AS/NZS 1530.3 and the recommendations of Appendix A6.

Pliable membranes: Tested to AS 1530.2: Flammability Index ≤ 5 .

Insulation

Cellulosic fibre (loose fill): To AS/NZS 4859.1 Section 4.

Mineral wool blankets and cut pieces (compressible): To AS/NZS 4859.1 Section 7.

Polyester (compressible): To AS/NZS 4859.1 Section 6.

Polyisocyanurate (rigid cellular RC/PIR): To AS 1366.2.

Polystyrene (extruded rigid cellular RC/PS-E): To AS 1366.4.

Polystyrene (moulded rigid cellular RC/PS-M): To AS 1366.3.

Polyurethane (rigid cellular RC/PUR): To AS 1366.1.

IR reflective (formed shapes and compressible with one or more external IR reflective surfaces): To AS/NZS 4859.1, Section 9.

Wool: To AS/NZS 4859.1, Section 5.

Pliable building membrane

Standard: To AS 4200.1 and BCA 3.12.1.1.

3 EXECUTION

3.1 GENERAL

Bulk insulation

Standard: To AS 3999 and BCA 3.12.1.1.

Installation: Firmly butt together fibre batts or blankets, with no gaps except as follows:

- Access openings and vents: Do not obstruct.

- Light fittings: To AS/NZS 3000 clause 4.5.
- Electrical cables: To AS 3999 clause 2.6.

Pliable building membrane

Standard: To AS 4200.2 and BCA 3.12.1.1.

3.2 FLOORS

Under suspended framed floors - bulk insulation

Product type: Fibre batts.

Installation: Fit tightly between framing members. If other support is not provided, staple nylon twine to the framing and stretch tight.

Below concrete slab on ground

Product type: Rigid cellular extruded sheets.

Laying pattern: Stretcher bond, with edges tightly butted.

Damp-proof membrane: Lay over insulation.

3.3 WALLS

Framed walls – thermal break strips

Product type: Proprietary item.

Application: To steel or timber framing with lightweight external cladding.

R-Value: ≥ 0.2 .

Screw fixing: Button head screws at 1 m centres.

Adhesive fixing: Wallboard adhesive walnuts at 1 m centres.

Framed walls – bulk insulation

Product type: Fibre batts.

Installation: Friction fit between framing members. If other support is not provided, staple nylon twine to the framing and stretch tight.

Full masonry cavity walls - inside cavity

Product: Rigid cellular insulation board.

Application: To the external face of the inner masonry leaf.

Fixing: Proprietary plastic clips on pre-installed wall ties.

Installation: Horizontally with the tongue to the top edge and firmly against the inner brick skin. Keep boards clean and dry and free from mortar and grout. Do not bridge the cavity.

Flashings: Install flashings before installing insulation panels. Prevent entry of water behind the insulation boards.

Vapour permeable (breathable) membrane

Application: Provide a vapour permeable membrane behind the external facing material which does not provide permanent weatherproofing or may be subject to condensation forming on the internal face, including the following:

- Boards or planks fixed vertically or diagonally.
- Boards or planks fixed in exposed locations where wind driven rain can penetrate the joints.
- Unpainted or unsealed cladding.
- Masonry veneer.

Installation: Run the vapour permeable membrane horizontally on the outer face of external wall framing, over the flashing, from the bottom plate up. Pull taut over the framing and fix to framing members. Seal across the wall cavity at the top.

Horizontal laps: At least 150 mm wide, lapped to make sure water is shed to the outer face of the membrane.

3.4 ROOFS

Pliable building membranes

Sarking membrane:

- Location: Provide sarking under tile and shingle roofing.

Vapour barrier:

- Installation: Lay over the roof framing with sufficient sag to allow the bulk insulation to achieve its full thickness. Overlap all edges 150 mm and seal all joints with pressure sensitive adhesive tape.

Metal roofs - thermal break strips

Product type: Proprietary item.

Application: To steel framing supporting sheet metal roofing.

R-Value: ≥ 0.2 .

Metal roofs – bulk insulation

Product type: Fibre blankets or batts.

Installation:

- Batts: Fit tightly between framing members.
- Blanket for sound insulation: Install over the roof framing, reflective thermal insulation (if any), and mesh support, so that the blanket is in continuous contact with the underside of the metal roofing sheets.

Ceiling insulation – bulk insulation

Product type: Fibre batts.

Installation: Fit tightly between framing members.

0511 LINING**1 PRODUCTS****1.1 MATERIALS AND COMPONENTS****Plasterboard**

Standard: To AS/NZS 2588.

Minimum thickness: 10 mm.

Fibre cement

Standard: To AS/NZS 2908.2.

Wall and ceiling linings: Type B, Category 2.

Minimum thickness: Conform to the following:

- Wall: 9 mm.
- Ceiling: 6 mm.

2 EXECUTION**2.1 CONSTRUCTION GENERALLY****Substrates**

Requirement: Plumb, level, in true alignment and to the lining manufacturer's recommendations.

Timber, steel framing and battened masonry: To AS/NZS 2589 clause 4.2.

Preparation: Before fixing linings check and, if necessary, adjust the alignment of substrates or framing.

Ceiling linings

General: Do not install until at least 14 days after the timber roof structure is fully loaded.

Plasterboard cornices

Fixing: Mitre at corners and adhesive fix with cornice cement. Pin in place at cornice edges until adhesive sets, remove pins and fill holes.

Access panels

Finish: Match the access panels to the ceiling in appearance and performance.

Accessories and trim

General: Provide accessories and trim as required to complete the installation.

2.2 PLASTERBOARD LINING**Installation**

Gypsum plasterboard: To AS/NZS 2589.

Supports

General: Install timber battens or proprietary cold-formed galvanized steel furring channels as follows:

- Where framing member spacing exceeds the recommended spacing.
- Where direct fixing of the plasterboard is not possible due to the arrangement or alignment of the framing or substrate.
- Where the lining is the substrate for tiled finishes.
- If required to support fixtures.

Joints

Flush joints: Provide recessed edge sheets and finish flush using perforated paper reinforcing tape.

External corner joints: Make joints over metallic-coated steel corner beads.

Control joints: Provide purpose-made metallic-coated control joint beads at not more than 12 m centres in plasterboard linings or 7.2 m centres in fibre cement lining in walls and ceilings and to coincide with structural control joints.

Wet areas: Install additional supports, flashings, trim and sealants as required.

Joints in tiled areas: Do not apply a topping coat after bedding perforated paper tape in bedding compound.

2.3 FIBRE CEMENT LINING**Installation**

General: Run sheets across the framing members. In flush jointed applications, stagger end joints in a brick pattern and locate them on framing members, away from the corners of large openings. Provide supports at edges and joints.

Timber framed construction: Nail only or combined with adhesive.

Steel framed construction: Screw only or combined with adhesive.

Wall framing: Conform to the following:

- Do not fix to top and bottom plates or noggings.
- In tiled areas: Provide an extra row of noggings immediately above wall-to-floor flashings. Fix sheet at 150 mm centres to each stud and around the perimeter of the sheet.

Ceilings: Fix using screws and/or adhesive to ceiling furring members. Do not fix sheets to the bottom chords of trusses.

Wet areas: Do not use adhesive fixing alone.

Supports

General: Install timber battens or proprietary cold-formed galvanized steel furring channels as follows:

- Where framing member spacing exceeds the recommended spacing.
- Where direct fixing of the fibre cement is not possible due to the arrangement or alignment of the framing or substrate.
- Where the lining is the substrate for tiled finishes.
- If required to support fixtures.

Joints

Flush joints: Provide recessed edge sheets and finish flush using perforated paper reinforcing tape.

External corner joints: Make joints over metallic-coated steel corner beads.

Dry joints: Provide square edged sheet and finish with a PVC-U joining section.

Control joints: Provide purpose-made metallic-coated control joint beads at not more than 7.2 m centres in walls and ceilings and to coincide with structural control joints.

Wet areas: Provide additional supports, flashings, trim and sealants as required.

Joints in tiled areas: Bed perforated paper tape in bedding compound. Do not apply a topping coat.

- Control joints: Not more than 4.2 m centres and space to suit joints required in tiling.

- Internal corners: Reinforce with metallic-coated steel angles. In corners subject to continuous moisture, flash over the angle and under the sheeting with continuous bitumen coated aluminium flashing.

0551 JOINERY

1 PRODUCTS

1.1 JOINERY MATERIALS AND COMPONENTS

Joinery timber

Hardwood for trim: To AS 2796.1.

Hardwood for furniture: To AS 2796.3.

Seasoned cypress pine: To AS 1810.

Softwood for trim: To AS 4785.1.

Softwood for furniture: To AS 4785.3.

Finished sizes for milled timber: Not less than the documented dimension unless qualified by a term such as nominal, out of or ex, to which industry standards for finished sizes apply.

Plywood

Interior use generally: To AS/NZS 2270.

Interior use, exposed to moisture: To AS/NZS 2271.

Wet process fibreboard (including hardboard)

Standard: To AS/NZS 1859.4.

Particleboard

Standard: To AS/NZS 1859.1.

Dry process fibreboard (including medium density fibreboard)

Standard: To AS/NZS 1859.2.

Decorative overlaid wood panels

Standard: To AS/NZS 1859.3.

Certification

General: Brand panels under the authority of a recognised certification scheme applicable to the product. Locate the brand on faces or edges which will be concealed in the works.

High-pressure decorative laminate (HPDL) sheets

Standard: To AS/NZS 2924.1.

Minimum thickness: Conform to the following:

- For horizontal surfaces fixed to a continuous substrate: 1.2 mm.
- For vertical surfaces fixed to a continuous substrate: 0.8 mm.
- For post formed laminate fixed to a continuous substrate: 0.8 mm.
- For vertical surfaces fixed intermittently (e.g. to studs): 3.0 mm.
- For edge strips: 0.4 mm.

High-pressure decorative laminate sheet application table

Class to AS/NZS 2924.1	Application
HGS or HGP	Kitchen work-tops
VGS or VGP	Kitchen front panels
VLS	Other vertical locations

Stone facings

General: Provide stone or engineered stone slabs within the visual range of the approved samples.

Repair mud veins or lines of separation that are integral to the selected pattern with resin fillers and back lining.

Splashbacks

Glass: 6 mm toughened colourback glass to AS/NZS 2208.

Stainless steel: Type 304, No. 4 finish.

1.2 JOINERY ASSEMBLIES

General

Standard: To AS 4386.

1.3 WARDROBE, CUPBOARD AND DRAWER UNITS

Plinths, carcasses, drawer fronts, shelves and doors

Material: Select from the following:

- Overlaid high moisture resistant particleboard.
- Overlaid high moisture resistant medium density fibreboard.

Thickness: 16 mm.

Wardrobe doors and frames: Provide aluminium framed, anodised, powder coated, sliding or hinged.

Wardrobe door panels: Provide mirrors, paint, melamine surfaced, vinyl or stain clear.

Adjustable shelves: Support on proprietary pins in holes bored at equal centres vertically.

- Spacing: 32 mm.

Fasteners: Conceal with finish.

Drawer fronts: Rout for drawer bottoms.

Drawer backs and sides:

- Material: PVC film wrapped particleboard.
- Thickness: 12 mm.
- Installation: Mitre corners leaving outer skin of foil intact, finish with butt joints, glue to form carcass and screw to drawer front. Rout for drawer bottoms.

Drawer bottoms:

- Material: PVC film laminated hardboard.
- Thickness: 3 mm.

Drawer and door hardware

Hinge types: Concealed metal hinges with the following features:

- Nickel plated.
- Adjustable for height, side and depth location of door.
- Integrated soft and self-closing action.
- Hold-open function.

Slides: Metal runners and plastic rollers with the following features:

- 30 kg loading capacity.
- Integrated soft and self-closing action.
- Closure retention.
- White thermoset powder coating or nickel plated.

1.4 WORKING SURFACES

Laminated benchtops

Material: High moisture-resistant particleboard or medium density fibreboard.

Finish: High pressure decorative laminate sheet.

Exposed edges: Extend laminate over shaped nosing, finishing more than 50 mm back on underside. Splay outside corners at 45°.

Minimum thickness: 32 mm.

Balance underside: Extend laminate to the undersides of benchtops if subject to excessive moisture from equipment such as dishwashers.

2 EXECUTION

2.1 JOINERY

General

Joints: Provide materials in single lengths whenever possible. If joints are necessary, make them over supports.

Framing: Frame and trim where necessary for openings, including those required by other trades.

Accessories and trim

General: Provide accessories and trim necessary to complete the installation.

Fasteners

Installation: Secure plinths and carcasses to floors, walls, or both at not more than 600 mm centres.

Visibility: Do not provide visible fasteners except in the following locations:

- Inside cupboards and drawer units.
- Inside open units, in which case provide proprietary caps to conceal fixings.

Fix joinery units to substrate as follows:

- Floor mounted units: 600 mm centres maximum.
- Wall mounted units: To each nogging and/or stud stiffener.

Fasteners: Screws with washers into timber or steel framing, or masonry anchors.

Adhesives

General: Provide adhesives to transmit the loads imposed and for the rigidity of the assembly, without causing discolouration of finished surfaces.

Finishing

Junctions with structure: Scribe plinths, benchtops, splashbacks, ends of cupboards, kickboards and returns to follow the line of structure.

Edge strips: Finish exposed edges of sheets with edge strips which match sheet faces.

Benchtops

Installation: Fix to carcass at least twice per 600 mm length of benchtop.

Joint sealing: Fill joints with sealant matching the finish colour and clamp with proprietary mechanical connectors.

Edge sealing: Seal to walls and carcasses with a sealant, which matches the finish colour.

Splashbacks

Glass: Fix with non-acidic silicone adhesive. Apply at the rate recommended by the manufacturer.

Installation: Clean the back of the glass panel and apply walnuts of adhesive together with double sided adhesive tape for temporary support, and affix directly to the substrate.

2.2 TIMBER STAIRS**Set-out**

General: Set out stair rod to give uniform risers and uniform treads respectively in each flight.

Fabrication

Closed strings: Trench for treads and risers.

Cut strings: Profile for treads and risers. Mitre riser ends.

Treads: Arris nosings to a pencil-round. Return nosings at cut strings. Groove for riser tongue in closed riser stair. Set riser 19 mm back from nosing.

Top tread: Flush with finished floor, otherwise to match stair treads. Provide similar tread section as nosing to floor edges around stairwell.

Risers: Tongue to tread. Mitre to string in cut-string stairs.

Installation

General: Glue joints in internal work. In closed riser stairs, wedge treads and risers to strings. Plant 2 glue-blocks behind each tread to riser junction. Trim floors to carry ends of stairs and around stairwell.

Stair bolts (to open rise close string stairs): 8 mm diameter mild steel, one at each end and one at centre of flight, transversely between strings. Draw strings tight against ends of treads.

Fascia: Of depth sufficient to overlap 19 mm below ceiling, and fixed to floor joists hard up under nosing.

Trim: Provide beads and mouldings as necessary, including a scotia or similar planted under the tread nosing against the risers and cut strings, a bead between wall strings and wall, and a bead behind the fascia over the ceiling finish.

Soffit lining

Requirement: Fix to 38 x 38 mm nailing battens notched and nailed to the underside of treads and risers of closed riser stairs at the centre of flights and at each side.

2.3 TIMBER BALUSTRADES**General**

Requirement: Provide a balustrade to the stair and landing, consisting of newels, handrail, balusters, and associated mouldings.

Newels

General: Halve and bolt to strings. Turn tops to detail.

Handrails

General: On edge. Bullnose arrises 13 mm radius. Stub tenon to newels.

Balusters

General: At 100 mm centres. Stub tenon to handrail at top and to tread or floor at bottom.

2.4 TRIM**General**

Requirement: Provide timber or medium density fibreboard trim, such as beads, skirtings, architraves, mouldings and stops to make neat junctions to openings and between components, finishes and adjacent surfaces.

Proprietary items: Provide complete with installation accessories.

Fixing

To masonry walls: Wall plugs at 600 mm centres, maximum.

To stud walls: Nail to plate or framing at 600 mm centres, maximum.

0572 MISCELLANEOUS FIXTURES AND APPLIANCES

1 PRODUCTS

1.1 APPLIANCES

Cooking appliances

Oven: Stainless steel, fan-forced, under bench or wall oven, as documented on drawings.

- Dimension: 600 mm wide.

Cooktop: Provide one of the following:

- Gas cooktop: Where reticulated gas is available, provide minimum 4 burners, stainless steel, gas cooktop.
- Electric cooktop: Where reticulated gas is not available, provide minimum 4 zone, ceramic glass, electric cooktop.

Rangehoods: Provide fixed rangehood, flued to the outside, and with removable filters.

Exhaust fans

Kitchen and bathroom: 200 mm diameter.

2 EXECUTION

2.1 APPLIANCES

Rangehood and exhaust fan

Requirement: Provide as follows:

- Habitable rooms: Fit with self-closing damper or filter to BCA 3.12.3.4.
- Exhaust fans: Operated by a separate wall switch.
- Ducting to the outside as follows:
 - . Northern areas: Side exhaust with PVC-U cover painted to match exterior colour scheme. Ducting not permitted through the roof.
 - . Southern areas: Steel ducting projecting through the roof. Provide roof cowl to pipe as documented.

Installation: To the manufacturer's recommendations.

2.2 PROPRIETARY STAIR SYSTEM

General

Materials, design and construction: To BCA 3.9.1.

Straight flight stair assembly: A proprietary system, pre-assembled and fixed in place, comprising the following:

- Stair flights with treads and risers.
- Top landing.
- Balustrade to stair flight and landing.

2.3 EXTERNAL FIXTURES

Clothes drying facilities

Single dwellings: Provide individual clothesline for each dwelling.

- Type: Height adjustable fold down rotary clothes hoist.

Grouped and multiple dwellings: Provide a wall or post mounted fold down framed clothesline or wall mounted extendable clothesline to private external areas.

Letterboxes

Requirement: Provide letterboxes to dwellings where Australia Post provides a postal service.

Generally: Provide one numbered and lockable letterbox for each dwelling unit in conformance with Australia Post requirements.

Grouped and multiple dwellings: Provide a bank or banks of letterboxes located in conformance with the requirements of Australia Post.

Type: Steel, masonry or precast letterboxes, as required.

0574 WINDOW COVERINGS**1 GENERAL****1.1 SUBMISSIONS****Fire performance**

Fire hazard properties: Submit evidence of conformity to PRODUCTS, **FIRE PERFORMANCE, Fire hazard properties.**

1.2 INSPECTION**Notice**

Inspection: Give notice so that inspection may be made of the following:

- Building locations or substrates prepared to receive window coverings before installation.

2 PRODUCTS**2.1 MATERIALS****Fabrics**

Uncoated woven and knitted fabrics: To AS 2663.1.

Coated woven and knitted fabrics: To AS 2663.2.

- Performance classification (minimum): 2.

Vertical blind fabrics: To AS 2663.3.

2.2 FIRE PERFORMANCE**Fire hazard properties**

Windows coverings: Tested to AS/NZS 1530.3.

2.3 COVERING TYPES**Vertical blinds**

Requirement: Provide chainless weighted vertical blinds to all windows except in wet areas.

Type: 5 inch slats (127 mm), sunblock grade with fire retardant.

Warranty: Submit warranty for materials and mechanical components.

3 EXECUTION**3.1 INSTALLATION****General**

Requirement: Install window coverings using the manufacturer's fabricated mounting brackets, clips or tracks and other hardware. Install coverings plumb, level and true to line.

Fixing: Match exposed mounting hardware with colour and finish of adjacent track and/or wall architrave finish.

Safety: Install child safety devices on all control cords and chains in conformance with *ACCC SSCompetition and Consumer (Corded Internal Window Coverings) Safety Standard.*

0611 RENDERING AND PLASTERING**1 GENERAL****1.1 INTERPRETATION****Abbreviations**

General: For the purpose to this worksection the following abbreviations apply:

- CRF: Cement render – finish.
- CRM: Cement render – medium.
- CRS: Cement render – stronger.
- CRW: Cement render – weaker.
- GPF: Gypsum plaster – finish.

2 PRODUCTS**2.1 MATERIALS AND COMPONENTS****Accessories**

Beads: Provide metal proprietary sections manufactured for fixing to substrates and/or embedding in the plaster to form and protect plaster edges and junctions.

Admixtures

Plasticisers or workability agents: Do not use in cement plasters.

Aggregates

Sand: Fine, sharp, well-graded sand with a clay content between 1% and 5% and free from efflorescing salts.

Plaster for autoclaved aerated concrete

General: Proprietary product manufactured for use with the wall system.

Bonding products

General: Proprietary products manufactured for bonding cement-based plaster to solid substrates.

Cement

Standard: To AS 3972.

Type: GP.

Colouring products

General: Provide proprietary products manufactured for colouring cement plaster.

Integral pigment proportion: 5% maximum by weight of cement.

Cornice cement

General: Provide a proprietary product manufactured for use with the cornice.

Cornices

Cast plaster: Proprietary item.

Gypsum plaster

General: Provide a proprietary product containing calcium sulfate hemihydrate with additives to modify setting.

Lime

Limes for building: To AS 1672.1.

Lime putty

General: Prepare lime putty as follows:

- Stand dry hydrate of lime to AS 1672.1 and water for 24 hours or more without drying out.
- Stand quicklime and water for 14 days or more without drying out.

Lath

General: Provide a proprietary product for use with plaster.

Internal: Expanded metal to AS 1397 coating class Z350, minimum.

External: Stainless steel or PVC-U.

Beads

General: Provide a proprietary product for use with plaster.

Internal: Metallic-coated sheet AZ 150, minimum.

External: Stainless steel or PVC-U.

Mixes

General: Select a mix proportion to suit the conditions of application.

Measurement: Measure binders and sand by volume using buckets or boxes. Do not allow sand to bulk by absorption of water.

Plaster mixing: Machine mix for 3 to 6 minutes.

Strength of successive coats: Make sure successive coats are no richer in binder than the coat to which they are applied.

Mix proportion table - Cement render, by volume

Mix type	Substrate		Upper and lower limits of proportions by volume		
			Cement	Lime	Sand
- Single or multi-coat systems with integral finishing treatments - Base coats in multi-coat systems with cement or gypsum finishes	CRS	Dense and smooth concrete and masonry	1 1	0 0.5	3 4.5
	CRM	Regular clay or concrete masonry	1 1	0.5 1	4.5 6
	CRW	Lightweight concrete masonry and other weak substrates	1 1	1 2	6 9
Second coat - internal	CRF	Cement render base coats	1 1	1 2	6 9
Second coat - external	CRF	Cement render base coats	1 1	1 2	5 6

Mix proportion table – Gypsum finish coat, by volume

Mix type	Substrate	Upper and lower limits of proportions by volume			
		Gypsum	Cement	Lime putty	Sand
Gypsum finish coats	GPF Cement render base coats	1 1	- -	1.5 2	- -

Control joint products

General: Provide proprietary products manufactured for use with the plastering system and to accommodate the anticipated movement of the substrates and/or the plaster.

Water

General: Clean and free from any deleterious matter.

3 EXECUTION

3.1 PREPARATION

Substrates

General: Provide substrates as follows:

- Clean and free from any deposit or finish which may impair adhesion of plaster.
- If framed or discontinuous, support members in full lengths without splicing.
- If solid or continuous, remove excessive projections and fill voids and hollows with plaster stronger than the first coat and not weaker than the substrate.

Absorbent substrates: If suction is excessive, control it by dampening but avoid over-wetting and do not plaster substrates showing surface moisture.

Dense concrete: If not sufficiently rough to provide a mechanical key, roughen by scabbling or the like to remove 2 mm of the laitance and expose the aggregate then apply a bonding treatment.

Painted surfaces: Remove paint and hack the surface at close intervals.

Untrue substrates: If the substrate is not sufficiently true for conformity with the thickness limits for the plaster system, or has excessively uneven suction resulting from variations in the composition of the substrate, apply additional coats without exceeding the thickness limits for the substrate or system.

Beads

Location: Fix beads as follows:

- Angle beads: At all external corners.
- Drip beads: At all lower terminations of external plaster.
- Beads for control of movement: At all control joints.
- Stop beads: At all terminations of plaster and junctions with other materials or plaster systems.

Joints in beads: Provide dowels to maintain alignment.

Mechanical fixing to substrate: ≤ 300 mm centres.

Bonding treatment

General: If bonding treatment is required, throw a wet mix onto the background. Mix proportions to the following:

- Cement plaster (cement:sand): 1:2.
- Gypsum plaster (gypsum:sand): 1:2.

Curing: Keep continuously moist for 5 days or more and allow to dry before applying plaster coats.

Thickness: ≥ 3 < 6 mm.

Embedded items

General: If there are water pipes and other embedded items, sheath them to permit thermal movement.

Lath

Location: Provide lath as follows:

- Chases: If chases or recesses are 50 mm wide or greater, fix metal lath extending 75 mm or more beyond each side of the chase or recess.
- Metal and other non-porous backgrounds: Fix metal lath to provide a key.

Weepholes

Requirement: Keep opening free of plaster. Maintain consistent opening size.

3.2 APPLICATION

Plastering

Base coats: Scratch-comb each base coat in two directions when it has stiffened.

Metal lath: Press the plaster through the apertures of expanded metal lath and wings of beads.

Incidental work

General: Return plaster into reveals, beads, sills, recesses and niches. Plaster faces, ends, and soffits of projections in the substrate, such as string courses, sills, pilasters and corbels. Run neatly finished throating on soffits of external projections. Trim around openings. Plaster exposed internal surfaces of built-in cupboards.

Joining up

General: If joining up is required, make sure joints are imperceptible in the finished work after decoration.

Control joints

General: Provide joints in the finish to coincide with control joints in the substrate. Make sure that the joint in the substrate is not bridged during plastering.

Size:

- Depth: Extend the joint right through the plaster and reinforcement to the substrate.
- Width: 3 mm, or the same width as the substrate joint, whichever is greater.

Damp-proof courses: Do not continue plaster across damp-proof courses.

Plastering on metal lath: Provide control joints to divide the plastering area into rectangular panels 10 m² or less.

V-joints: Provide V-joints, cut right through the plaster to the substrate, at the following locations:

- Abutments with metal door frames.
- Abutments with other finishes.
- Junctions between different substrates.

Cornices

General: Accurately cut and mitre corners. Match and align ornament. Do not make butt joints in the length of a cornice unless required, or full lengths are not available.

Installation: Butter edges, mitres and joins for full length of the cornice with adhesive.

Mechanical fixing: If cornice projects across a ceiling 400 mm or more, provide additional mechanical fixing:

- Fixing centres: ≤ 600 mm.

Decorative joints

General: Apply decorative joints in the second coat of two coat work as required.

Plaster thickness table

Substrate	Cement render, total thickness of single or multi-coat work (mm)
Brickwork and blockwork	12 min
Lightweight concrete and blocks	12 min
Metal lath measured from the face of the lath.	18 min

Temperature

General: If the ambient temperature is 10°C or less or 30°C or more make sure that the temperature of mixes, substrates and reinforcement at the time of application are between 5°C and 35°C.

Tolerances

General: Finish plane surfaces within a tolerance of 6 mm in 2400 mm, determined using a 2400 mm straightedge placed anywhere in any direction. Finish corners, angles, edges and curved surfaces within equivalent tolerances.

Finishing treatments

Plain even surfaces: Work the hardening plaster as follows:

- Bag: Rub the finish coat when set firm with a hessian pad or similar.
- Carborundum stone: Rub the finish coat when set hard with a carborundum stone to achieve a finish free from sand.
- Foam float: Float finish coat on application with a wood or plastic float to an even surface and finish with a foam float to achieve a fine sand textured finish.
- Steel trowel: Steel trowel finish coat to a smooth dense surface which is not glass-like and is free from shrinkage cracks and crazing.
- Wood or plastic float: Float the finish coat on application with a wood or plastic float to an even surface.

Specialist plaster finishes

Polymer modified render:

- Basecoat render: Proprietary polymer modified cementitious render supplied as a complete plastering system.
- Finish coats: Proprietary trowelled on coloured and textured polymer modified finish coats.

3.3 COMPLETION**Curing**

General: Prevent premature or uneven drying out and protect from the sun and wind.

Keeping moist: If a proprietary curing agent is not used, keep the plaster moist as follows:

- Base coats and single coat systems: Keep continuously moist for 2 days and allow to dry for 5 days before applying further plaster coats.
- Finish coats: Keep continuously moist for 2 days.

0612 CEMENTITIOUS TOPPINGS**1 PRODUCTS****1.1 MATERIALS****Admixtures**

Standard: To AS 1478.1.

Aggregates

Standard: To AS 2758.1.

Coarse aggregate: Nominal single size less than or equal to 1/3 topping thickness.

Fine aggregate: Fine, sharp, well-graded sand with a low clay content and free from efflorescing salts.

Bonding products

General: Provide proprietary products manufactured for bonding cement-based toppings to concrete substrates.

Cement

Standard: To AS 3972.

- Type: GP.

Reinforcement

Standard: To AS/NZS 4671.

Water

General: Clean and free from any deleterious matter.

2 EXECUTION**2.1 PREPARATION****Substrates**

General: Provide substrates as follows:

- Clean and free from any deposit which may impair adhesion of monolithic or bonded toppings.
- Remove excessive projections and fill voids and hollows with a mix not stronger than the substrate or weaker than the topping.

Bonded toppings

Hardened concrete: Roughen by scabbling or the like to remove 2 mm of the laitance and expose the aggregate.

Bonding product: Before laying topping wash the substrate with water and provide a bonding product or treat as follows:

- Keep wet for 2 hours or more.
- Remove surplus water and brush on neat cement or a clean slurry of cement and water.
- Place the topping while the slurry is wet.

2.2 APPLICATION**Installation**

General: Spread the mix and compact. Strike off, consolidate and level surfaces to finished levels.

Monolithic toppings: Lay while concrete subfloor is plastic and the surface water is no longer visible.

Toppings over 50 mm thick:

- Lay in two layers of equal thickness.

- Place a layer of reinforcement between the layers of toppings. Lap reinforcement 200 mm and tie. Do not create four way laps.

0612 CEMENTITIOUS TOPPINGS

1 PRODUCTS

1.1 MATERIALS

Admixtures

Standard: To AS 1478.1.

Aggregates

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General: Clean and free from any deleterious matter.

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2.1 PREPARATION

Substrates

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- Remove surplus water and brush on neat cement or a clean slurry of cement and water.
- Place the topping while the slurry is wet.

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Installation

General: Spread the mix and compact. Strike off, consolidate and level surfaces to finished levels.

Monolithic toppings: Lay while concrete subfloor is plastic and the surface water is no longer visible.

Toppings over 50 mm thick:

- Lay in two layers of equal thickness.

- Place a layer of reinforcement between the topping layers. Lap reinforcement 200 mm and tie. Do not create four way laps.

Curing

General: Prevent premature or uneven drying out and protect from the sun and wind.

Curing: Use a curing product or, as soon as it has set sufficiently, keep the toppings moist by covering with polyethylene film for at least seven days.

2.3 SURFACE FINISHES

Unformed surfaces

General: Strike off, screed and level topping surfaces to finished levels, flatness tolerance class and documented finish.

Slip-resistant treatment

Surface treatment: Apply silicon carbide granules after floating and before the topping surface has set, and trowel into the surface so that the granules remain exposed.

Application rate: 1 kg/m² evenly distributed.

Surface colouring

General: After machine floating, apply a proprietary liquid or dry shake material to the manufacturer's recommendations and trowel to achieve the required appearance.

Surface treatment

General: Apply the surface treatment after floating and before the topping surface has set.

Temperature

General: Make sure that the temperature of mixes, substrates and reinforcement are not less than 5°C or greater than 35°C, at the time of application.

Severe temperature: If the ambient shade temperature is greater than 38°C, do not mix topping.

2.4 CONTROL OF MOVEMENT

General

Requirement: Provide control joints as follows:

- Over structural control joints.
- To divide complex room plans into rectangles.
- Around the perimeter of the floor.
- At junctions between different substrates.
- To divide large topping finished areas into bays.

Depth of joint: Right through to the substrate.

Sealant width: 6 to 25 mm.

Depth of sealant: One half the joint width, or 6 mm, whichever is the greater.

2.5 JOINT ACCESSORIES

Floor finish dividers

General: Provide a corrosion resistant metal dividing strip suitably fixed to the substrate, at junctions with differing floor finishes and with the top edge flush to the finished floor. If changes of floor finish occur at doorways, make the junction directly below the centre of the closed door.

0621 WATERPROOFING - WET AREAS.

1 GENERAL

1.1 STANDARDS

Waterproofing wet areas

Standard: To AS 3740.

2 PRODUCTS

2.1 MEMBRANES

Membranes

Standard: To AS/NZS 4858.

Membrane systems

Requirement: Provide a proprietary membrane system suitable for the intended internal waterproofing.

Shower tray

General: Purpose-made jointless shower tray, with wall upstands at least 50 mm higher than the hob upstands. Set hob masonry on the inside of the tray upstands.

Bond breakers

Requirement: Compatible with the extensibility class of the membrane to be used.

Material: Purpose made bond breakers tapes and closed cell foam backing rods or fillets of sealant.

Sealants

Requirement: Waterproof, flexible, mould-resistant and compatible with host materials.

3 EXECUTION

3.1 PREPARATION

Substrates

General: Provide substrates as follows:

- Clean and free of any deposit or finish which may impair adhesion of membranes.
- If walls are plastered, remove loose sand.
- If walls or floors are framed or discontinuous, support members in full lengths without splicing.
- If floors are solid or continuous:
 - . Remove excessive projections.
 - . Fill voids and hollows greater than 10 mm with abrupt edges with a cement:sand mix not stronger than the substrate nor weaker than the bedding.
 - . Fill depressions less than 10 mm with a latex modified cementitious product with feathering eliminated by scabbling the edges.
 - . Fill cracks in substrates wider than 1.5 mm with a filler compatible with the membrane system.

Concrete substrates: Cure for at least 28 days.

External corners: Round or arris edges.

Moisture content

Requirement: Verify that the moisture content of the substrate is compatible with the water vapour

transmission rate of the membrane system by testing to AS 1884 Appendix A.

Falls

Membrane directly under the floor finish: Make sure the fall in the substrate conforms to the fall documented for the finish.

Minimum falls in wet areas: Conform to the following:

- Shower floors: To AS 3740 clause 3.4.
- Floors in other areas: To AS 3740 Appendix B clause B1.

Water stop angles

Requirement: Provide water stop angles at door thresholds and shower enclosures to support the waterproof membrane at junctions between waterproofed and non-waterproofed areas.

Sizing: Size the vertical leg of the water stop angle to conform to the requirements of AS 3740.

Corners: Cut the horizontal leg and bend the vertical leg at corners instead of forming vertical joints between separate lengths of angle.

Fixing: Fix water stop angles to the substrate with compatible sealant or adhesive and corrosion-resistant countersunk or wafer head screws.

Bond breakers

Requirement: After the priming of surfaces, provide bond breakers at all wall/floor, hob/wall junctions and at control joints where the membrane is bonded to the substrate.

Sealant fillet bond breakers:

- Application: Form a triangular fillet or cove of sealant to internal corners within the period recommended by the membrane manufacturer after the application of the primer.
- Widths: 5 x 5 mm to vertical corners. 6 x 6 mm to 9 x 9 mm to horizontal corners.

Backing rod bond breakers: Retain in position with continuous length of tape pressed firmly in place against the surfaces on each side of the rod.

3.2 APPLICATION

Protection

Damage: Protect membrane from damage during installation and for the period after installation until the membrane achieves its service characteristics that resist damage.

Extent of waterproofing

Waterproof or water resistant surfaces: To requirements of BCA 3.8.1.2.

Vertical membrane terminations

Upstands: At least 150 mm above the finished tile level of the floor or 25 mm above the maximum retained water level, whichever is the greater.

Anchoring: Secure sheet membranes along the top edge.

Edge protection: Protect edges of the membrane.

Waterproofing above terminations: Waterproof the structure above the termination to prevent moisture entry behind the membrane using tiler's angle and finish overlaps.

Door jambs and architraves

Requirement: If the bottom of doorjambs and architraves do not finish above the floor tiling, waterproof their surfaces below tile level to provide a continuous seal between the perimeter flashing to the wall/floor junction and the water stop angle.

Drainage connections

Floor wastes: Turn membrane down 50 mm minimum into the floor waste drainage flanges and adhere to form a waterproof connection.

Enclosed showers with hobs

Internal membranes: Extend membrane over the hob and into the room at least 50 mm.

Unenclosed showers

Requirement: Extend membrane at least 1500 mm into the room from the shower rose outlet on the walls and floor.

Curing of liquid applied systems

General: To the manufacturer's instructions.

Curing: Allow membrane to fully cure before tiling.

Overlying finishes on membranes

Requirement: Protect waterproof membranes with compatible water-resistant surface materials that do not cause damage to the membrane.

Bonded or partially bonded systems: If the topping or bedding mortar is required to be bonded to the membrane, provide sufficient control joints in the topping or bedding mortar to reduce the movement over the membrane.

3.3 COMPLETION

Protection

General: Keep traffic off membrane surfaces until bonding has set or for 24 hours after laying, whichever period is the longer.

Reinstatement: Repair or replace faulty or damaged work.

Warranties

Requirement: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the supplier and the applicator.

- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the supplier.

0631 CERAMIC TILING**1 GENERAL****1.1 STANDARDS****Tiling**

General: Conform to the recommendations of AS 3958.1.

Slip resistance

Classification: To AS 4586.

2 PRODUCTS**2.1 TILES AND ACCESSORIES****Tiles**

Standard: To AS ISO 13006.

Coves, nosings and skirtings: Provide matching stop-end and internal and external angle tiles moulded for that purpose.

Exposed edges: Purpose-made border tiles with the exposed edge (whether round, square or cushion) glazed to match the tile face. If such tiles are not available, mitre tiles on external corners.

Accessories

General: If available, provide tile accessories such as round edge ceramic tiles, cove tiles, step treads and nosings to stairs, landings, and thresholds, skirtings, sills, copings and bath vents, which match the surrounding tiles, composition, colour and finish.

2.2 MATERIALS**Adhesives**

Standard: To AS ISO 13007.1.

PVA (polyvinyl acetate)-based adhesives: Do not use in wet areas or externally.

Mortar materials

Cement type to AS 3972: GP.

Sand: Fine aggregate with a low clay content selected for grading, sharp and free from efflorescing salts.

Bedding mortar

Mix proportion (cement:sand), by volume: Select proportions from the range 1:3 to 1:4 for satisfactory adhesion. Provide minimum water.

Water

General: Clean and free from any deleterious matter.

Grout

Cement-based proprietary grout: Mix with water. Fine sand may be added as a filler in wider joints.

Terracotta tiles: Provide proprietary polymer modified grout.

General purpose cement based grout: Mix with fine sand. Provide minimum water consistent with workability.

Pigments for coloured grout: Colourfast fillers compatible with the grout material. For cement-

based grouts, provide lime-proof natural or synthetic metallic oxides compatible with cement.

3 EXECUTION**3.1 SUBSTRATES****Drying and shrinkage**

General: Before tiling, allow at least the following times to elapse (for initial drying out and shrinkage) for these substrates:

- Concrete slabs: 42 days.
- Concrete blockwork: 28 days.
- Toppings on slabs and rendering on brick or blockwork: A further 21 days.
- Rendering on swimming pool shells: A further 21 days minimum.

3.2 PREPARATION**Substrates without wet area membranes**

General: Conform to the following:

- Clean off any deposit or finish which may impair adhesion or location of tiles.
- If framed or discontinuous, support members are in full lengths without splicing.
- If solid or continuous:
 - . Remove excessive projections.
 - . Fill voids and hollows greater than 10 mm with abrupt edges with a cement:sand mix not stronger than the substrate or weaker than the bedding.
 - . Fill depressions less than 10 mm with a latex modified cementitious product and eliminate feathering by scabbling the edges.

Absorbent substrates: If suction is excessive, control it by dampening but avoid over-wetting and do not apply mortar bedding to substrates showing surface moisture.

Dense concrete: If not sufficiently rough to provide a mechanical key, roughen by scabbling or the like to remove 3 mm of the surface and expose the aggregate; then apply a bonding treatment.

Substrates with wet area membranes

General: Make sure substrates are as follows:

- Clean and free of any deposit or finish which may impair adhesion or location of tiles.
- Compatible with all components of the floor system.

3.3 TILING GENERALLY**Cutting and laying**

Cutting: Cut tiles neatly to fit around fixtures and fitting and at margins where necessary. Drill holes without damaging tile faces. Cut recesses for fittings such as soap holders. Rub edges smooth without chipping.

Laying: Return tiles into sills, reveals and openings. Butt up to returns, frames, fittings, and other finishes. Strike and point up beds where exposed. Remove tile spaces before grouting.

Variations

General: Distribute variations in hue, colour, or pattern uniformly, by mixing tiles or tile batches before laying.

Protection

Floor tiles: Keep traffic off floors until the bedding has set and attained its working strength.

Floor finish dividers

General: Finish tiled floors at junctions with differing floor finishes with a corrosion-resistant metal dividing strip fixed to the substrate. If changes of floor finish occur at doorways, make the junction directly below the closed door.

Bath ventilation

General: Ventilate the space below fully enclosed baths with at least 2 vermin proofed ventilating tiles.

3.4 SETTING OUT**Tile joints**

Joint widths: Set out tiles to give uniform joint widths within the following limits:

- Floors:
 - . Dry pressed tiles: 3 mm.
 - . Extruded tiles: 6 mm.
 - . Vitrified: 3 to 5 mm.
 - . Quarry tiles: 6 to 12 mm.
- Mounted mosaics: To match mounting pattern.
- Walls:
 - . Dry pressed tile: 1.5 mm.
 - . Extruded tile: 6 mm.

Joint alignment: Set out tiling with joints accurately aligned in both directions and wall tiling joints level and plumb.

Joint position: Set out tiles from the centre of the floor or wall to be tiled and, if possible, make sure cut tiles are a half tile or larger.

Fixtures: If possible, position tiles so that holes for fixtures and other penetrations occur at the intersection of horizontal and vertical joints or in the centre of tiles.

Falls and levels

General: Grade floor tiling to even and correct falls generally and to floor wastes and elsewhere as required. Make level junctions with walls. If falls are not required, lay level.

Fall, general: 1:100 minimum.

Fall, in shower areas: 1:60 minimum.

Change of finish: Maintain finished floor level across changes of floor finish including carpet.

3.5 BEDDING**Preparation of tiles**

Adhesive bedding: Fix tiles dry; do not soak.

Mortar bedding: Soak porous tiles in water for half an hour and then drain until the surface water has disappeared.

Terracotta tiles: Use pre-sealed tiles or apply a breathable sealer and lay dry. If a final sealed finish is selected, use a compatible laying sealer.

Bedding

General: Use bedding methods and materials which are appropriate to the tile, the substrate, the conditions of service, and which leave the tile firmly and solidly bedded in the bedding material and adhered to the substrate. Form falls integral with the substrate.

3.6 GROUTED AND SEALANT JOINTS**Grouted joints**

General: Commence grouting as soon as practicable after bedding has set. Clean out joints as necessary before grouting.

Face grouting: Fill the joints solid and tool flush.

Clean off surplus grout. Wash down when the grout has set. When grout is dry, polish the tiled surface with a grout film remover and clean cloth.

Sealant joints

General: Provide sealant joints filled with sealant and finished flush with the tile surface as follows:

- Where tiling is cut around sanitary fixtures.
- At corners of walls in showers.
- Around fixtures interrupting the tile surface, for example pipes, brackets, bolts and nibs.
- At junctions with elements such as window and door frames and built-in cupboards.

Material: Anti-fungal modified silicone.

Width: 5 mm.

Depth: Equal to the tile thickness.

Cupboards and fixtures: Seal gap between wall surface and top of cupboards of sanitary fixtures with silicone sealant. Make sure fixture is watertight before commencing wall tiling.

- Interfaces: Use a colour coded flexible filler in lieu of grout at cabinet/tile interfacing and bath/tile interfacing.

0651 RESILIENT FINISHES**1 GENERAL****1.1 STANDARDS****General**

Installation: To AS 1884.

2 PRODUCTS**2.1 MATERIALS****Wet process fibreboard (hardboard) underlay**

Standard: To AS/NZS 1859.4.

Classification: General purpose medium board, manufactured specifically as flooring underlay.

Thickness: 5.5 mm.

Luxury vinyl tiles (LVT)

Type: Loose laid wood design vinyl planks.

Total thickness: Minimum 5 mm.

Wear layer thickness: Minimum 0.55 mm.

Surface treatment: PUR treatment.

3 EXECUTION**3.1 PREPARATION****Substrates**

General: To AS 1884 Section 3.

Concrete substrates

Moisture content: Do not start installation of the resilient finishes until the concrete substrate conforms to AS 1884 clause 3.1 and the adhesive and resilient finish manufacturer's recommendations.

Concrete substrate rectification: Conform to the following:

- Surface treatments: Mechanically remove any incompatible surface treatments, including the following:
 - . Sealers and hardeners.
 - . Curing compounds.
 - . Waterproofing additives.
 - . Surface coatings and contamination.
- Planeness, smoothness, projections: Remove projections and fill voids and hollows with a self-smoothing self-levelling compound compatible with the adhesive. Allow filling or levelling compound to dry to manufacturer's recommendations.

Cleaning: Remove loose materials or dust.

Timber, plywood and particleboard substrates

Requirement: Do not start installation of the resilient finishes until the timber, plywood, or particleboard substrate conforms to AS 1884 clause 3.2.

Timber, plywood and particleboard substrate rectification:

Remove projections. If conformance to a planeness tolerance of 4 mm in 2 m determined using a 2 m straightedge cannot be achieved, provide an underlay in brick pattern with joints avoiding substrate joints.

Working environment

General: Do not start work before the building is enclosed, wet work is complete and dry, overhead work is complete and good lighting is available. Protect adjoining surfaces.

3.2 SHEET AND TILE INSTALLATION**Acclimatisation**

Before installation: Remove flooring from the packaging and store not more than 5 boxes high in the laying area for at least 24 hours.

Sheet set-out

General: Set out sheets to give the minimum number of joints. Position joints away from areas of high stress. Run sheet joints parallel with the long sides of floor areas, vertically on non-horizontal surfaces.

Tile set-out

General: Set out tiles from centre of room. If possible cut tiles at margins only, to give a cut dimension of at least 100 mm x full tile width. Match edges and align patterns. Arrange the cut tiles so that any variation in appearance is minimised.

Joints

Non-welded: Butt edges together to form tight neat joints showing no visible open seams.

Chemical welding: Apply seaming compound 100 mm wide to the substrate centrally under the seam. Roll the seam until the compound is forced up into the joint. Clean off flush using a damp cloth.

Junctions

General: Scribe neatly up to returns, edges, fixtures and fittings. Finish flush with adjoining surfaces.

Luxury vinyl tiles (LVT)

Installation: Install using pressure sensitive adhesive to the manufacturer's recommendations. Make sure tiles are fully tacked up in a 1000 mm grid in both directions and the perimeter, or reinforced with double sided acrylic reinforced tape.

3.3 COMPLETION**Protection of sheet materials**

Finished floor surface: Keep traffic off floors for minimum 24 hours after laying or until bonding has set, whichever period is the longer. Avoid contact with water for minimum 7 days.

Reinstatement

Extent: Repair or replace faulty or damaged work. If the work cannot be repaired satisfactorily, replace the whole area affected.

Cleaning

General: Clean the finished surface. Buff and polish. Before the date for practical completion, mop and leave the finished surface clean and undamaged on completion.

0652 CARPETS**1 PRODUCTS****1.1 MATERIALS****Carpet**

Minimum grade: Residential Medium Duty under the Australian Carpet Classification Scheme.

Total VOC emission tested to ISO 10580:
< 0.5 mg/m²/h.

Wet process fibreboard (hardboard) hard underlay

Standard: To AS/NZS 1859.4.

Classification: General purpose medium board, manufactured specifically as flooring underlay.

Thickness: 5.5 mm.

Soft underlay

Standard: To AS 4288.

Hot-melt adhesive tapes

General: Glass fibre and cotton thermoplastic adhesive-coated tape 60 mm wide on a 90 mm wide metal foil base and backed with silicon-coated release paper.

Preformed carpet grippers

General: Architectural plywood carpet gripper stripgrippers with 3 rows of corrosion-resistant angled pins of length appropriate to the carpet type to AS 2455.1 clause 1.5.4.

Edge strips

Location: At exposed edges of the carpet, and at junctions with different floor finishes or finishes of a different thickness. Where edge strips occur at doorways, locate the junctions directly below the closed door.

2 EXECUTION**2.1 PREPARATION****Application**

Floor coverings: As documented on drawings.

Substrates

Cleaning concrete surfaces: Mechanically remove the following surface treatments:

- Sealers and hardeners.
- Curing compounds.

Cleaning timber surfaces: Remove oil, grease and traces of applied finishes.

Concrete substrate rectification: Remove projections and fill voids and hollows with a levelling compound compatible with the adhesive.

Timber substrate rectification: Remove projections. If conformance to a flatness tolerance of 6 mm in 3000 mm, determined using a 3000 mm straightedge placed anywhere in any direction cannot be achieved, fix a hardboard underlay in brick pattern with joints avoiding substrate joints.

Fixtures: Remove door stops and other fixtures, and refix in position undamaged on completion of the installation.

Moisture content

General: Do not start installation unless:

- Concrete substrate: The moisture content of the concrete has been tested to AS 2455.1 Appendix B and values in AS 2455.1 Appendix B have been obtained.
- Timber, plywood or particleboard substrates: The moisture content of the substrate has been tested to AS/NZS 1080.1 for timber and particleboard or AS/NZS 2098.1 for plywood and values obtained as follows:
 - . Air conditioned buildings: 8 to 10%.
 - . Intermittently heated buildings: 10 to 12.5%.
 - . Unheated buildings: 12 to 15%.

2.2 LAYING CARPET**Standard**

General: To AS 2455.1.

Setting out

Joints in underlay: Make sure joints in underlay do not coincide with carpet joints. Do not carry underlay over carpet grippers or edge strips.

Seaming methods

Woven carpet: Machine or hand sew.

Tufted carpet: Seam with hot-melt adhesive tapes.

0654 ENGINEERED PANEL FLOORS**1 PRODUCTS****1.1 MATERIALS****Flooring panels**

General: Provide proprietary flooring system, as documented.

Floating floor underlay

Requirement: Proprietary closed cell foam sheeting, integral to the flooring system.

Acoustic underlay

General: Resilient underlay fixed with compatible adhesive.

Adhesive

Ventilation: Provide adequate ventilation appropriate for moisture curing.

2 EXECUTION**2.1 GENERAL****Storage and handling**

General: Deliver panel flooring to site in unbroken wrapping or packs. Store in dry conditions, a minimum 100 mm above the subfloor. Do not store on the subfloor until the moisture content of the subfloor is suitable for the installation of the floor. Do not store in areas with wet plaster or paint.

Subfloor

Cleaning: Remove loose material and dust and any deposits or finishes that may impair adhesion or location and functioning of control joints.

Rectification: Conform to the following:

- Solid or continuous subfloors: Remove excessive projections and fill voids and hollows with a self-smoothing levelling compound compatible with the flooring including any adhesive.
- Plywood and particleboard subfloors: If required to achieve a smooth finish, sand joints between sheets.
- Existing timber flooring subfloors: Remove cupping, rough material and surface finishes by rough sanding.

Flatness: Conform to the following:

- Adhesive fix floors: Not greater than 3 mm deviation of the surface under a 3 m straightedge laid in any direction.
- Floating floors: Not greater than 3 mm deviation of the surface under a 1 m straightedge laid in any direction.

Moisture content alignment of flooring and subfloor

Concrete subfloor: Do not start installation of the flooring until the moisture content of the concrete subfloor conforms to AS 1884 clause 3.1.

Timber, plywood and particleboard subfloors: Do not start installation of the flooring until the moisture content of the subfloor conforms to the following:

- Dry in-service environment (air conditioned buildings): 8 to 10%.
- Normal in-service environment (intermittently heated buildings): To 12.5%.
- Moist in-service environment (unheated buildings): 12.5 to 15%.

2.2 INSTALLATION**Trial set-out**

General: Prepare a trial panel set-out to each area as follows to:

- Maximise the size of equal margins of cut panels.
- Locate control joints.

Control joints

General: Provide control joints as follows:

- Against vertical building elements: 12 mm wide cork filled.
- To divide floors into maximum dimensions of 6 m: 4 mm wide silicone sealant filled.

0655 TIMBER FLOORING**1 PRODUCTS****1.1 GENERAL****Storage and handling**

General: Deliver timber flooring to site in unbroken wrapping or packs. Store in dry conditions a minimum 100 mm above the subfloor. Do not store on the subfloor until the moisture content of the subfloor is suitable for the installation of the floor. Do not store in areas of wet plaster or paint.

Adhesive

Ventilation: Provide ventilation appropriate for moisture curing.

1.2 STRIP FLOORING**New timber**

General: Conform to the **Grading table**.

Grading table

Product	Standard	Grade
Hardwood	AS 2796.2	High Feature Grade if available for the species selected, otherwise Select Grade
Seasoned cypress pine	AS 1810	1
Softwood - pinus ssp	AS 4785.2	Appearance
Softwood - other	AS 4785.2	Select

Identification

General: Identify timber using branding or certification.

Branding: Locate the brand mark on faces which will be concealed in the works.

Recycled timber

Standard: To FWPA PN06.1039.

- Grading: To Section 5.1.

2 EXECUTION**2.1 SUPPORT FIXING****Battens for strip flooring on steel joists**

General: Screw fix seasoned battens along the steel joists with countersunk screws so that their top surfaces are aligned.

2.2 FLOOR FIXING**Room environment**

General: Fix flooring in the average in-service environment. During fixing operate the heating system of radiant heated or air conditioned rooms at 1.5°C above normal maximum temperature.

Adhesive

General: Use a polyurethane elastomer adhesive in addition to nails.

Mechanical fixing

General: Make sure the boards are in contact with the subfloor at the time of fixing, particularly where boards are machine nailed. If nails are to be less than 12 mm from ends of boards, pre-drill nail holes 0 to 1 mm undersize.

Top nailing: For boards of 65 to 130 mm cover width, use two nails.

Secret fixing: Do not use boards of more than 85 mm cover width, and use one staple or cleat skewed at 45°.

Sinking: Punch nails 3 mm below finished surfaces and fill the sinking flush with a material tinted to match the darker tone of the flooring which is compatible with the floor finish.

Control joints

Perimeters: Provide 10 mm wide expansion joints against vertical building elements.

Strip flooring: For floors greater than 6 m wide select from the following:

- Partially cramp strip flooring to allow a 1 mm gap every 600 mm or 1.5 mm every metre.
- Divide floors into maximum widths of 6 m with expansion joints 12 mm wide filled with cork.

Strip flooring

General: Blend floor boards from more than one pack to distribute the colour range and grade features throughout the floor.

Installation: Lay in straight and parallel lines with each board firmly butted to the next and firmly in contact with the subfloor. If land over joists or battens cramp sufficient only to bring the boards together and no more than 800 mm of flooring at any one time. With secret fixing do not cramp more than one board at a time.

Fixing to softwood joists or battens: Apply adhesive in addition to mechanical fixing.

Set-out: Locate joints in boards so that they are evenly distributed as follows:

- General: Staggered randomly and at least 450 mm apart.
- Butt joints: Centrally on supports.
- End-matched joints: Not adjacent within the same span between joists/battens.
- Minimum number of spans across supports: 2.

2.3 COMPLETION**Protection**

General: Provide protection as follows:

- Floors: With hardboard taped at all butt joints. Do not cover with sheet plastic.
- Stair treads: Full timber or plywood casing.

0656 FLOOR SANDING AND FINISHING**1 GENERAL****1.1 STANDARDS****General**

Timber flooring - sanding and finishing: To AS 4786.2.

2 PRODUCTS**2.1 GENERAL****Handling**

Delivery: Deliver all products to the site in the manufacturer's labelled and unopened containers.

2.2 FINISH**Filler**

General: Non-oil based and compatible with the coating system.

Coating system

Quality: Provide premium quality lines.

Combinations

General: Do not combine products from different manufacturers in a system.

Clear timber finish systems: Provide only the combinations of filler, stain and sealer recommended by the manufacturer of the topcoats.

3 EXECUTION**3.1 PREPARATION****Lighting**

General: Provide supplementary lighting to allow close examination of the entire process.

Substrates

General: Do not commence sanding until:

- Adhesives have cured.
- Floor heating has been switched off for 48 hours.
- Filler has dried as indicated by the colour fading.

Before finishing: Make sure substrates are clean and free of any deposit which may impair the following:

- Application of the coating system.
- Adhesion of resilient finishes.

Surface preparation

Requirement: Punch nails 3 mm below the surface. Remove protruding items from floor such as staples, nails and tacks. Fill open grained timber with materials compatible with those used in subsequent finishing operations.

3.2 SANDING**Basic sanding – general**

General: Remove irregularities caused by cupping or mismatching of the flooring materials, with a drum type sanding machine and coarse abrasives.

Basic sanding – strip flooring

General: First cut at 45° to the length of the boards, second cut at 90° to the first cut, and third cut parallel to the length of the boards.

Boundary areas: Bring to the same surface condition as the main sanded area, using disc sanding.

Inaccessible areas: Hand scrape to produce an even, plane surface.

Stopping and filling

General: Select a colour to produce an average match with the final coated timber in tone, colour and texture.

Minor cracks: Fill and stop punched nails with a putty knife.

Deeper holes: Fill in layers not greater than 6 mm allowing each layer to dry. Make sure cavities are filled slightly above the surface without air pockets.

Porous timber: Flood fill with the cloth application of water based filler diluted to a creamy consistency.

Finish sanding – general

General: Provide a clear finished surface free of scratch marks when observed under the design light level when standing.

Finish sanding – strip flooring

General: After basic sanding, cut twice parallel to the length of the boards using increasingly fine abrasives. If hard surfaces show excessive scratching apply an initial cut at 90° to the grain direction.

Boundary areas: Bring to the same surface condition as the main sanded area, using disc sanding.

Inaccessible areas: Hand scrape to produce the same surface condition as the main sanded area.

Water-based coating system: Sand with a final grade of paper of minimum F220 screen back.

Cleaning

General: After each sanding operation remove all dust by all of the following:

- Removal from cracks by hand.
- Vacuum cleaning.
- Tack rag cleaning.

3.3 COATING SYSTEM**General**

Finish: Provide coating systems with the following properties:

- Consistent film thickness.
- Consistent level of gloss.

Wet paint warning

General: Place notices conspicuously and do not remove them until the coating system has cured and hardened.

Application

General: Apply coating systems in conformance with the manufacturer's recommendations. Maintain a wet edge throughout the whole area.

Sanding

General: Fine sand between coats only within the depth of the finish, and remove dust.

Finishing cork floors

Sealer: After sanding, finish with 3 coats of clear floor sealer.

Timber floor coating system

Coating: If edge bonding of strip flooring is known to occur, apply a sealer compatible with the final coat.

Final coats: 2 coats of water-based polyurethane applied with a continuous wet edge and to the manufacturer's recommendations.

3.4 COMPLETION**Cleaning**

General: Vacuum clean the area and protect with fabric drop sheets. Do not use plastic sheeting.

0671 PAINTING**1 GENERAL****1.1 STANDARDS****Painting**

General: To the recommendations of those parts of AS/NZS 2311 referenced in this worksection.

2 PRODUCTS**2.1 PAINTING MATERIAL****Paint brand**

Quality: If the product is offered in a number of levels of quality, provide premium quality lines.

Handling

Delivery: Deliver paints to the site in the manufacturer's labelled and unopened containers.

Low VOC emitting paints

VOC limits for low odour/low environmental impact paint types:

- Primers and undercoats: < 65 g/litre.
- Low gloss white or light coloured latex paints for wall areas: < 16 g/litre.
- Coloured low gloss latex paints: < 16 g/litre.
- Gloss latex paints for timber doors and trims: < 75 g/litre.

Combinations

General: Do not combine products from different manufacturers in a system.

Clear timber finish systems: Provide only the combinations of putty, stain and sealer recommended by the manufacturer of the top coats.

Putty and fillers

Material: To the recommendation of the paint system manufacturer as suitable for the substrate and compatible with the primer.

Tinting

General: Provide only products which are colour tinted by the manufacturer or supplier.

3 EXECUTION**3.1 PREPARATION****Order of work**

Other trades: Before painting, complete the work of other trades as far as practicable within the area to be painted, except for the installation of fittings, floor sanding and laying flooring materials.

Clear finishes: Complete clear timber finishes before commencing opaque paint finishes in the same area.

Protection

General: Before painting, clean the area and protect from dust contamination. Use drop sheets and masking agents to protect surfaces, including finished surfaces and adjacent surfaces during painting.

Fixtures and furniture: Remove door furniture, switch plates, light fittings and other fixtures before painting, and refix in position on completion of painting.

Wet paint warning

Notice: Place in a conspicuous location and do not remove until the paint is dry.

Substrate preparation - generally

General: Prepare substrates to receive the painting systems.

Cleaning: Clean down the substrate surface. Do not cause damage to the substrate or the surroundings.

Filling: Fill cracks and holes with fillers, sealants, putties or grouting cements as appropriate for the finishing system and substrate, and sand smooth.

- Clear finish: Provide filler tinted to match the substrate.

Clear timber finish systems: Prepare the surface so that its attributes will show through the clear finish without blemishes, using methods including the following:

- Removal of bruises.
- Removal of discolourations, including staining by oil, grease and nailheads.
- Bleaching where necessary to match the timber colour sample.
- Puttying.
- Fine sanding, with the last abrasive no coarser than 220 grit, so that there are no scratches across the grain.

Exposed steel in coastal areas

Requirement: Before painting, including before applying primers and sealers, clean exposed steel surfaces to the recommendations of AS 2312.1 Section 4.

Unpainted surfaces

Standard: To AS/NZS 2311 Section 3.

Previously painted surfaces

Preparation of a substrate in good condition: To AS/NZS 2311 clause 7.4.

Preparation of a substrate in poor condition: To AS/NZS 2311 clause 7.5.

Preparation of steel substrates with protective coatings: To AS 2312.1 Section 8 and AS 1627.1.

3.2 PAINTING

Exposed steel in coastal areas

Requirement: Immediately before application of each subsequent paint coat, clean painting surface to remove any soluble salts and contamination which are likely to affect the performance of subsequent paint coatings.

Paint application: To the recommendations of AS 2312.1 Section 5 and the paint manufacturer.

Paint coating systems: To the recommendations of AS 2312.1 Section 6.

Light levels

General: ≥ 400 lux.

Paint application

Standard: To AS/NZS 2311 Section 6.

Timing: Apply the first coat immediately after substrate preparation and before contamination of the substrate can occur. Apply subsequent coats after the manufacturer's recommended drying period has elapsed.

Priming before fixing

General: Apply one coat of wood primer (2 coats to end grain) to the back of the following before fixing in position:

- External fascia boards.
- Timber door and window frames.
- Bottoms of external doors.
- Associated trims and glazing beads.
- Timber board cladding.

Spraying

General: If the paint application is by spraying, use conventional or airless equipment that conforms to the following:

- Satisfactorily atomises paint being applied.
- Does not require paint to be thinned beyond the maximum amount recommended by the manufacturer.
- Does not introduce oil, water or other contaminants into the applied paint.

Paint with known health hazards: Not permitted on site.

Sanding

Clear finishes: Sand the sealer, using abrasive no coarser than 320 grit, without cutting through the colour. Take special care with round surfaces and edges.

Repair

Requirement: Clean off marks, paint spots and stains progressively and restore damaged surfaces to their original condition. Touch up new damaged decorative paintwork or misses with the paint batch used in the original application.

Repair of galvanizing

Cleaning: For galvanized surfaces which have been subsequently welded, or which have been welded, prime the affected area.

Primer: Type 2 organic zinc rich coating for the protection of steel to AS/NZS 3750.9.

Tinting

General: Tint each coat of an opaque coating system so that each has a noticeably different tint from the preceding coat, except for top coats in systems with more than one top coat.

Services

General: Paint new services and equipment if not embedded, except chromium, anodised aluminium, GRP, PVC-U, stainless steel, non-metallic flexible materials and normally lubricated machined surfaces. Repaint proprietary items only if damaged.

3.3 PAINT SYSTEMS

Paint system description

Generally: The paint system is referred to by its final coat.

Primers and undercoats: Provide primers and undercoats recommended by the manufacturer of

the selected final coat as suitable for the substrate and the final coat.

Number of coats: Unless specified as one or two coat systems, each paint system consists of at least 3 coats.

Selection: Provide paint systems that conforms to the **Paint final coat table**.

Paint systems for interior surfaces: Provide paint system conforming to AS/NZS 2311 Tables 4.2 and 5.1, the manufacturer's recommendations and the following:

- Ceilings: Two coats of white paint.
- Walls: Two coats of low-gloss latex paint.
- Wet areas: Two coats of semi-gloss (anti-mould) latex paint.

Paint final coat table

Final coat	Applicable Australian Standard
Interior	
Flat latex	AS 3730.1
Floor varnish - moisture cured	AS 3730.27
Floor varnish - two pack isocyanate cured	AS 3730.27
Low gloss latex	AS 3730.3
Semi-gloss latex	AS 3730.2
Gloss latex	AS 3730.12
Exterior	
Full gloss solvent-borne	AS 3730.6
Flat latex	AS 3730.7
Low gloss latex	AS 3730.8
Gloss latex	AS 3730.10
Stain, lightly pigmented	AS 3730.28
Latex stain, opaque	AS 3730.16
Semi-gloss latex	AS 3730.9
Paving	
Paving paint, semi-gloss	AS 3730.29
Paving paint, gloss	AS 3730.29

0702 MECHANICAL

1 GENERAL

1.1 RESPONSIBILITIES

Mechanical systems

Requirement: Provide mechanical system, as documented.

2 AIR CONDITIONING SYSTEMS

2.1 STANDARDS

General

Mechanical ventilation: To AS 1668.1 and AS 1668.2, as required by the NCC.

Refrigeration systems: To AS/NZS 5149.1, AS/NZS 5149.2, AS/NZS 5149.3 and AS/NZS 5149.4.

Mechanical systems: Conform to the recommendations of SA HB 276.

Heating and cooling systems: To AS/NZS 5141.

2.2 AIR CONDITIONING DESIGN

Standards

General: To the recommendations of one or more of the following:

- AIRAH Design Application Manuals.
- ASHRAE Handbooks.
- CIBSE Guides.

Method of calculation: Manual or software that employs the data and methods in the above standards.

Performance

Requirement: Provide room air conditioning systems conforming to the following:

- Maximum noise levels in occupied spaces: NR 30.
- Maximum noise level at site boundary: To the *Environmental Protection (Noise) Regulation 1997*.
- Factory assembled, pre-piped, pre-wired and tested ready for installation on site.

Design criteria

Outside design conditions: Use outdoor design conditions listed in AIRAH DA09, Table 1 or Table 1A for the following:

- The location geographically closest to the site.
- Comfort (or non-critical process) conditions.

Inside design conditions:

- Summer: 24°C dry bulb, 50% relative humidity.
- Winter: 21°C dry bulb.

Temperature variation: Limit the temperature difference in air conditioned spaces served by the same zone or system to 2°C as follows:

- Between any 2 points in the space from floor level to 1500 mm above floor level.
- More than 2000 mm from cooking equipment and more than 1000 mm from any other appliance.

- When outside conditions are in the range specified above.
- After the plant has been operating for one hour.
- With the temperatures measured in the same 5 minute period.

Zoning: Divide the systems into temperature controlled zones to meet the specified permissible limits in temperature variation and the system divisions documented.

Fresh air: Supply fresh air to spaces with air conditioning systems via the air handling system.

Heating: Reverse cycle.

Windows, walls, floors and roofs: Refer to drawings for construction and insulation.

Internal window shading type: As documented.

Ambient noise emitted: Lower than the level that can be heard within a habitable room in any neighbouring residential premises, regardless of whether any door or window to that room is open.

2.3 DOCUMENTED AIR CONDITIONING SYSTEM

General

Requirement: If air conditioning systems are required, conform to the following:

- Unit type: All ceiling and wall-mounted air conditioning to be inverter type units.
- Air conditioning equipment: Install as documented on contract drawings and to be capable of meeting the documented performance standards.

Performance: Air conditioning equipment to be checked by the contractor to make sure performance criteria for all equipment components can meet the requirements of the manufacturer's specifications.

2.4 AIR CONDITIONING EQUIPMENT

Standards

Ducted air conditioners: To AS/NZS 3823.1.2.

Non-ducted air conditioners: To AS/NZS 3823.1.1.

Equipment

Performance: Supply equipment as follows:

- Made by a manufacturer with a demonstrated ability to provide spare parts and service promptly to the site.
- Operational within the documented range of outdoor design conditions under the calculated loads without excessive head pressure or icing.
- Labelled to AS/NZS 3823.2.

Refrigerant: Provide refrigerant listed as Safety Group A1 or A2L in AS/NZS ISO 817 and having an Ozone Depletion Potential of 0 and Global Warming Potential less than 700.

Reverse cycle units: Provide effective outdoor coil defrost facility that prevents room temperature dropping more than 2°C during defrost.

Split systems and variable refrigerant flow systems: Provide indoor and outdoor units from the same manufacturer, designed and automatically controlled to operate as an integrated whole, under the

documented operating conditions and over the whole capacity range of the system.

Cabinet: Aluminium, powder coated steel or moulded ABS plastic with metallic-coated steel or stainless steel fasteners. Insulate and vapour seal cabinet and drain trays to prevent external condensation under all operating conditions.

Drain trays: Aluminium, stainless steel or plastic to collect all moisture inside indoor and outdoor units.

Filters: Washable panel type with at least 85% of arrestance when tested to AS 1324.2, Test Dust No.4.

Coils: Copper tube with aluminium plate fins.

Indoor unit

Requirement: Provide multi-directional discharge grilles, multi or variable speed supply fan and access panels.

Marine environment

Outdoor coil: If located less than 5 km from salt water, provide factory applied coating resistant to dilute acids, dilute alkalis, solvents, inorganic salts and salt laden air which, when tested to ASTM B117, shows no sign of attack after 3000 hours in salt spray.

Controls

General: Provide the following functions:

- Temperature control for each zone located to accurately sense zone temperature.
- Fan speed selection for multi and variable speed fans.
- Day/night zone changeover if scheduled.
- Time switch for each system with ≥ 6 temperature programs per day, separate programs for each day of the week, manual set point override and Vacation temperature set back.

Type: Electric/electronic type supplied by the manufacturer of the air conditioning equipment. Provide an infrared controller.

Temperature settings: Set to maintain the following space temperatures:

- Cooling mode: 24°C (dry bulb) $\pm 1.5^\circ\text{C}$.

2.5 DUCTWORK

Standard

Flexible duct: To AS 4254.1.

Rigid ductwork: To AS 4254.2.

Flexible duct

Material: Aluminised fabric clamped on formed metal helix with insulation blanket wrapped around duct and covered with an outer vapour barrier.

Installation: Install flexible duct as straight as possible with minimum number of bends. Maximise bend radius but not less than required by AS 4254.1 clause 2.5.3(i). Check for and rectify any crushed flexible duct.

Support: To AS 4254.1. Limit sag to less than 40 mm/m.

Duct insulation

General: Insulate ducts to reduce heat gain and prevent condensation. Provide continuous vapour barrier around ducts carrying conditioned air.

Insulate flexible connections on ducts carrying air below ambient temperature.

Cleaning

General: Clean interior of ductwork progressively during installation.

2.6 REFRIGERATION PIPEWORK

General

Pipes: To AS/NZS 1571.

Deemed to comply: Split system manufacturer's standard pre-charged piping kit standard.

Pipe insulation

General: Insulate all refrigerant and drain piping that may sweat with chemically blown closed cell nitrile rubber in tubular form to ASTM C534. Protect insulation from sunlight and mechanical damage.

Insulation thickness: 13 mm for pipes less than DN 20, 19 mm otherwise.

Pipe duct

Duct: Run exposed piping external to the building in a metallic-coated steel duct and run cables in the same duct. Provide a removable cover or similar for access. Paint duct to match the surrounding surface.

Condensate drains

Requirement: Provide trapped, at least DN 20 condensate drains to AS/NZS 3666.1 from each indoor coil and safety tray. Provide drains from each reverse cycle outdoor coil unless casing freely drains to a roof or other location where condensate will not cause damage or pond.

2.7 UNIT INSTALLATION

General

Outdoor equipment: Provide clearance around units for condenser air flow and maintenance access. Make sure discharge air does not short-circuit to condenser intake.

Equipment at ground level: Mount on 100 mm level concrete plinth or equivalent impervious material.

Duct connections: Provide internal or external flexible duct connections at indoor unit.

Support

Wall mounted equipment: Fix to manufacturer's recommendations. Make sure the wall structure is able to support the mechanical equipment when operating. Strengthen walls if necessary to achieve this.

Rack mounted equipment: Provide 50 mm angle hot-dip galvanized support racks supported of a plinth and braced to the wall.

Vibration isolation

Suspended units: Provide at least 4 metal spring or rubber-in-shear isolation mountings with at least 25 mm static deflection and 98% isolation efficiency.

Floor mounted units: Provide neoprene waffle pads. Bolt in place.

Safety trays

General: If leaks or condensation from equipment could cause nuisance or damage to the building or its contents, provide a galvanized steel safety tray under the equipment.

2.8 ANCILLARY WORKS

Painting

Paint finish: Paint all items exposed to view and/or weather including ductwork, pipework and equipment. Submit proposed colours and locations.

Structural

Equipment weight: Submit weight of item of equipment.

Concrete work

Requirement: Provide concrete plinths as documented.

Plumbing

Requirement: Provide external floor wastes and drain points as documented.

Electrical

Power supply: Provide power supply, complete with individual circuit breakers for each unit, terminating in coiled cables adjacent to each indoor unit. Make sure there is sufficient power for testing and commissioning of equipment.

Conduits and cabling: Provide cabling in conduits or cable ducts between refrigeration and associated equipment, including thermostats and control switches.

Supply source: All electrical equipment, wiring and fittings to be from the same manufacturer throughout the installation, where possible.

Electromagnetic compatibility: Prevent electromagnetic interference. Conform to the AS/NZS 61000 series.

2.9 COMPLETION

Incidental repairs

General: Repair any surfaces that were damaged during the installation, including roofing, gutters, flooring, and ceilings.

Commissioning

General: Commission the systems to manufacturer's recommendations using instruments calibrated within the past 12 months.

Checklist: Submit signed commissioning checklist before the date for practical completion.

Cleaning

General: Clean filters, outdoor coils, grilles and diffusers before the date for practical completion.

Operating and maintenance instructions

Requirement: Provide written operating and maintenance instructions containing the following:

- Contractor's contact details for service calls.
- Manufacturers' maintenance and operation literature.
- Manufacturers' warranty certificates if the manufacturers' warranty period is greater than the defects liability period.
- Description of day to day operation.
- Setting of time switches.
- Schedule of recommended maintenance.

Record drawing: Provide a drawing of the system as installed.

2.10 MAINTENANCE

General

Maintenance period: The greater of 12 months from the date of completion of commissioning of the systems and the duration of the Defects Liability Period.

Corrective maintenance: Attend site and undertake corrective maintenance within 24 hours of receipt of verbal or written advice.

Preventative maintenance: Provide preventative maintenance recommended by the equipment manufacturer. Provide all materials including consumable items and refrigerant.

Summer preventative maintenance visit: Provide at least one preventative maintenance visit during the months of December, January or February. Carry out preventative maintenance and provide electronic data logger or thermohydrograph to record temperatures at one location in each zone over a period of 7 days. Submit results. If the temperature recorded is outside the specified tolerance identify and correct the cause and repeat the test.

Maintenance reports: Submit a signed maintenance report setting out the work done and any measured values after each visit.

3 EVAPORATIVE COOLING SYSTEMS

3.1 EVAPORATIVE COOLING

General

Evaporative air coolers: To AS 2913.

Microbial control: To AS/NZS 3666.1 as required by the NCC and the recommendations of SA/SNZ HB 32.

Performance and sizing

Performance: Supply air to each room at not less than 30 air changes per hour.

Air outlet grilles: Provide to the following rooms:

- Kitchen.
- Bedrooms.
- Lounge/dining area.
- Family room.

3.2 EVAPORATIVE AIR COOLERS

General

Requirement: Provide units consisting of a supply air fan, wet screen pack, water reservoir and pump, complete with components necessary for operation.

Minimum evaporation efficiency when new: 80%.

Pad face velocity: ≤ 2.9 m/s.

Standards

Safety: Conform to AS/NZS 60335.2.98.

Materials

Requirement: Manufacture from corrosion resistant, UV stabilised materials suitable for outdoor operation. Select from the following:

- Stainless steel: Type 304.
- Aluminium: Alloy 5251 to AS/NZS 1734.
- Glass reinforced plastic.
- Structural polymer.

Fasteners: Stainless steel, plastic or corrosion resistant non-ferrous material compatible with the materials in contact with them.

Sumps: Provide sumps with radiused corners free from gussets and stiffeners, and arranged to facilitate cleaning.

Supply air fans

General: Forward curved DWDI centrifugal type, resiliently mounted.

Material:

- Housing: UV stabilised glass reinforced plastic, polyethylene or polypropylene.
- Impeller: Metallic-coated steel or aluminium.
- Pulleys: Corrosion resistant metal keyed to shaft.
- Fan shaft: Corrosion resistant metal.

Drive: Belt type with adjustable motor pulley.

Bearings: Sealed for life type.

Motor: Two-speed, three phase tropic proof electric motor with IP 55 protection and thermal overloads. Locate motors high within the unit on adjustable mounts. Provide a water slinger on the shaft to prevent water entering the motor.

Evaporative pads

Material: Manufactured from one of the following:

- Shredded aspen wood fibre.
- Impregnated corrugated cellulose paper sheets.

Media mounting: Enclosed in frame.

Frame: Stainless steel, marine grade aluminium or plastic. Provide access to the unit by removing the frame from the unit without removing the pad from the frame.

Retaining mesh: Metallic-coated steel or polypropylene.

Ball float valves

Requirement: To AS 1910, with dezincification resistant brass body and internal components, and plastic float and float alarm. Arrange to prevent water overflowing into the dropper.

Water distribution system

Requirement: Provide the following:

- Self-priming plastic centrifugal pump.
- Heavy duty strainer.
- Plastic water trays and pipes.
- Provision for flushing and cleaning.

Bleeds, drains and overflows

Requirement: Provide bleed valve, drain valve and overflow for each cooler.

Automatic bleed: Provide an automatic bleed solenoid valve, controlled by a water conductivity sensor sensing total dissolved solids (TDS), to bleed water to waste.

Automatic dump: Provide automatic drain for sump to empty the sump contents and prevent re-filling when out of use. Provide timed automatic control as follows:

- Continuous running coolers: Dump the whole sump contents at 24 to 72 hour intervals to suit water conditions.

- Intermittently running coolers: Dump the whole sump contents and prevent refilling 4 hours after the fan stops.

Bleed controls: Adjustable from inside the unit and secured so that settings cannot change without intentional intervention during servicing.

Off-season covers

Requirement: Provide UV resistant polyweave draught proof covers, with securing lugs.

Dampers

General: If required by BCA J3.7, provide either a motorised damper interlocked to the fan or a self-closing damper.

Controls

Requirement: For each cooler provide a remote control station incorporating the following:

- Cooler start and stop.
- Fan speed selection.
- A timer to run the fan for a fixed period after shut down (with the pump stopped) in order to dry out the pads.

4 EXECUTION

4.1 INSTALLATION

Mounting

Frames: Mount the cooler on a rigid frame fabricated from either stainless steel or hot-dip galvanized steel. Arrange the frame to take the mass of the cooler evenly on all sides. Provide neoprene waffle pad mounts under the unit and bolt to the slab or building structure.

Clearance: ≥ 400 mm under the cooler.

Ground mounted coolers: Provide a concrete plinth under the cooler.

Lifting eyes: Provide lifting eyes on each corner.

Wind and rain: Conform to AS/NZS 1170.2 for wind action. Design to prevent entry of rain to the supply air duct under all likely conditions.

Connections

Ground mounted coolers: Run water, drain and electrical under the plinth.

Roof mounted coolers: Run water, drain and electrical under the roof.

Location: Rise adjacent to the cooler support frame leg.

Isolation: Provide electrical and water isolation adjacent to each unit.

Water supply

Backflow prevention: To AS/NZS 3500.1 Section 4. Provide one of the following:

- A separate backflow prevention device to each cooler and to each associated hose cock.
- A common backflow prevention device to protect a group of coolers and associated hose cocks.

Hose cock: Provide a hose cock for cleaning purposes adjacent to each cooler or group of coolers.

Water treatment: In hard water areas, provide a water softener to evaporative the cooler manufacturer's recommendations.

Drains

General: Drain to waste. Provide a visible air gap arranged so that the bleed rate can be measured.

Overflow: Run the overflow to drain. Arrange so any overflow is visible.

Duct connections

Requirement: Provide flexible duct connections at the unit .

Bushfire resistance

Sites with Bushfire Attack Level (BAL) 12.5, 19 or 29 to AS 3959: Protect evaporative coolers to AS 3959 including sealing of all penetrations and provision of either non-combustible butterfly dampers to AS 3959 or non-combustible mesh covers to AS 3959.

Water piping: If external and above ground, provide metal pipes and fittings to AS 3959.

Droppers

Material: ≥ 0.6 mm thick sheet metal.

Form: Pressed with returns at both ends to maintain a rectangular shape.

Acoustic insulation: Provide acoustic insulation ≥ 300 mm from the top of the dropper.

Flashing

Requirement: Provide flashing at wall and roof penetrations to prevent leakage of air or water through the penetration.

Profiled sheet metal roofs: Prefinished/coated steel sheeting. Colour to match the roof.

Ducting

Standards: To AS 4254.1 and AS 4254.2.

Air distribution

Requirement: Provide 4 way blow louvres or diffusers in each room served.

Control panels

Requirement: Provide minimum one control panel within each residence, providing the following operating modes:

- Ventilation only.
- Cooling.
- Fan speed control: Provide 3 speeds.

Electrical

Standard: To AS/NZS 3000.

Requirement: Provide the following:

- Provide a dedicated circuit breaker in the residence electrical load centre.
- Cabling within the residence and to the externally mounted unit. Conceal cables within the residence.
- An accessible electrical isolator switch adjacent to externally mounted units.

Water connection

Pipe material: Copper.

Pipe location: Run piping within ceiling spaces, do not run piping over roofs.

Washing out of external units: Provide wash down tap with a DN 20 screwed outlet.

Isolation valves: Install in the supply piping to external units so that the water supply can be isolated. Mount at 1800 mm above ground level.

Waste piping

General: Run piping from the unit, inside the ceiling space, and down the outside of a wall to the ground level outside the residence.

Drain piping: Minimum of 40 mm nominal diameter.

Minimum fall: 3 in 100, falling away from the external unit.

4.2 COMPLETION

Incidental repairs

General: Repair any surfaces that were damaged during the installation, including roofing, gutters, flooring, and ceilings.

Commissioning

Requirement: At completion, commission each installation to make sure it is functioning correctly. Commission the systems to manufacturer's recommendations using instruments calibrated within the past 12 months.

Checklist: Submit signed commissioning checklist before the date for practical completion.

0802 HYDRAULIC

1 GENERAL

1.1 STANDARDS

General

Plumbing and drainage: To the AS/NZS 3500 series.

Authorised products: Listed in the WaterMark Product Database, unless otherwise required by the network utility operator.

1.2 SUBMISSIONS

Records

Certificate of compliance: Within 5 working days of completing the plumbing works, including gas, lodge a Certificate of compliance with the Department of Commerce or Plumbers Licensing Board. Include all required documentation.

2 PRODUCTS

2.1 FIXTURES

Sanitary fixtures

Toilet suites: Minimum 4 stars WELS rated dual flush.

Shower heads: Minimum 3 stars WELS rated.

Bath: 1500 mm nominal length with soap holder, waste outlet, bar grate and plug.

Basin: White, vitreous china basin with overflow.

- Properties: Size, configuration and tap hole configuration, as documented on drawings.

Towel rail and robe hooks: Chrome plated brass or stainless steel rail, as documented on drawings.

Toilet roll holder: Chrome plated brass or stainless steel single roll holder, as documented on drawings.

Soap dish: Chrome plated brass or stainless steel dish, as documented on drawings.

Laundry tub: 42 litres tub and prefinished steel cabinet with side entry for concealed washing machine taps

- Tub material: Type 304 stainless steel.

Internal tap fittings

Rating: Minimum 4 stars WELS rated.

Type: All fittings other than bath outlets and showers to be chrome plated lever handled mixer tap (hot and cold) with 150 mm swivel arm with aerator outlet.

Kitchen fixtures

Sink type: Double bowl with drainer on each side and single tap hole.

Sink size: As documented on drawings.

2.2 WATER HEATERS

Types

Electric water heaters: To AS/NZS 4692.1.

- Energy performance: To AS/NZS 4692.2.

Gas hot water heaters: To AS/NZS 5263.1.2. If a flue damper is available for the water heater supplied, provide one.

- Energy performance: To AS/NZS 4552.2.

Solar water heaters: To AS/NZS 2712.

Heat pump water heaters: To AS/NZS 2712.

Heaters installed in Northern areas

Installations with hard water source: Provide heaters with bobbin elements to the manufacturer's recommendations.

3 EXECUTION

3.1 INSTALLATION

Connections to Network Utility Operator mains

General: Excavate to locate and expose the connection points and connect to the Network Utility Operator mains. On completion, backfill and compact the excavation and reinstate surfaces and elements which have been disturbed such as roads, pavements, kerbs, footpaths and nature strips.

Water meters

Sub-meters: Provide Water Corporation approved meters for multi-unit residential developments of three (3) or more units including:

- Separate meters for individual dwellings.
- Common meter for common landscaped areas.

Installation: In conformance with the *Water Corporations Application and Agreement Form and Water Corporation 20 mm and 25 mm metre – Requirements/layout*. (See www.watercorporation.com.au)

Piping

Requirement: Install piping in straight lines and to uniform grades. Arrange and support the piping so that it remains free from vibration and water hammer, while permitting thermal movement. Keep the number of joints to a minimum. Prevent direct contact between incompatible metals.

Embedded pipes: Do not embed pipes that operate under pressure in concrete or surfacing material.

Concealment: If practicable, conceal piping and fittings requiring maintenance or servicing so that they are accessible within non-habitable enclosed spaces such as roof spaces, subfloor spaces and ducts. Keep pipelines in subfloor spaces at least 150 mm above ground and make sure access can be provided throughout for inspection. Provide at least 25 mm clearance between adjacent pipelines (measured from the piping insulation where applicable).

Building penetrations: If piping or conduit penetrates building elements, provide metal or PVC-U sleeves formed from oversized pipe sections.

Cover plates: If exposed piping emerges from wall, floor or ceiling finishes, provide cover plates of non-ferrous metal, finished to match the piping, or of stainless steel.

Pipe support materials: The same as the piping, or galvanized or non-ferrous metals, with bonded PVC-U or glass fibre woven tape sleeves where needed to separate dissimilar metals.

Fixtures

Baths: Chase into masonry wall to accommodate edge of bath or provide wall sealing strip during bath tiling.

3.2 FINISHES

General

Requirement: Finish exposed piping, including fittings and supports as follows:

- In internal locations such as toilet and kitchen areas: Chrome plate copper piping to AS 1192 service condition 2, bright.
- External above ground piping, steel piping, exposed iron fittings: Paint.
- In concealed but accessible spaces (including cupboards and non-habitable enclosed spaces): Leave copper and plastic unpainted except for required identification marking. Prime steel piping and iron fittings.
- Valves: Finish valves to match connected piping.

3.3 COLD AND HEATED WATER

Standards

General: To AS/NZS 3500.1 and AS/NZS 3500.4.

Copper pipe: To AS 4809.

Piping

Pipe materials:

- Between water main and the building: Copper.
- Other locations: To the PCA.

Pipe joints:

- Copper pipes: Silver brazed capillary joints or screwed brass unions silver brazed to pipe.
- Other materials: Proprietary crimped fittings supplied by the pipe manufacturer and crimped, using tools and methods recommended by the manufacturer.

Backflow prevention

Standard: To AS/NZS 3500.1 and the requirements of the network utility operator.

Tap positions

Requirement: Locate hot tap to the left of, or above, the cold water tap.

Fittings and accessories

General: Provide the accessories and fittings necessary for the proper functioning of the plumbing systems, including taps, valves, outlets, pressure and temperature control devices, strainers, gauges and pumps.

Water heaters

Location: Locate water heaters in an easily accessible area where they can be maintained or replaced without damaging adjacent structures, fixtures or finishes.

5 star natural gas hot water units: Connect hot water service to points as documented.

- Hot water system: Designed and installed to AS/NZS 3500.4.

Tariff: Install so that the heating system qualifies for the tariff concession or subsidy offered by the statutory authority.

Isolating valves: Provide isolation valves to water heaters.

Heated water temperature

Standard: To AS/NZS 3500.4.

Maximum temperature at ablution outlets: 50°C.

Maximum recommended temperature at kitchen sinks and laundry tubs: 60°C.

Solar and heat pump systems

General: Provide a proprietary automatic water heater comprising solar collector and storage container, with or without supplementary heating unit and including connections, controls and necessary fittings.

Standard: To AS/NZS 2712.

Stand pipes

Requirement: Provide two external stand pipes (one at front and one at rear) to each dwelling fixed against the building, complete with 12 mm brass hose cocks.

Hose tap connection: Provide threaded connection (not welded) to cold water service.

- Fix hose tap to wall 600 mm above the finished ground level with backflow prevention devices to AS/NZS 3500.1.

Cleaning

General: On completion, flush the pipelines using water and leave pipelines clean.

3.4 STORMWATER

Standards

General: To AS/NZS 3500.3.

Cleaning

General: During construction, use temporary covers to openings and keep the system free of debris. On completion, clean and flush the system.

Pipe laying

General: Lay pipelines with the spigot ends in the direction of flow.

Downpipe connections

General: Turn up drain branch pipelines to finish 50 mm above finished ground or pavement level.

Subsoil drains

Connection: Connect subsoil drains to the stormwater drainage system.

Trench width: Minimum 450 mm.

Subsoil drains: Provide proprietary perforated plastic pipe.

Filter fabric: Provide a polymeric fabric formed from a plastic yarn containing stabilisers or inhibitors to make the filaments resistant to deterioration due to ultraviolet light.

Filter sock: Provide a polyester permeable sock capable of retaining particles of 0.25 mm size. Securely fit or join the sock at each joint.

Pits

Cover levels: Locate the top of covers or gratings, including frames as follows:

- In paved areas: Flush with the paving surface.
- In landscaped areas: 25 mm above finished surface.

- Gratings taking surface water runoff: Set to receive the runoff without ponding.

3.5 WASTEWATER

Standards

General: To AS/NZS 3500.2.

Waterless composting toilets: To AS/NZS 1546.2.

On-site domestic wastewater treatment units: To AS 1546.3.

Cleaning

During construction: Use temporary covers to openings and keep the system free of debris.

On completion: Clean and flush the system.

Vent pipes

Staying to roof: If fixings for stays penetrate the roof covering, seal the penetrations and make watertight.

Terminations: Provide bird-proof vent cowls made of the same material and colour as the vent pipe.

Septic tanks and interceptor tanks

Standard: To AS/NZS 1546.1.

Effluent disposal: To AS/NZS 1547.

Requirement: Provide the design and installation of septic tank and associated fittings to AS/NZS 1546.1 and the *Code of Practice for Product Approval of Onsite Wastewater Systems*.

Tank requirements and size: 1 x 1200 mm diameter and 1 x 1500 mm diameter concrete septic tanks.

Lid type: Trafficable.

Installation of apparatus for sewage treatment: To the *Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974 (WA)*.

Drains from floor level to septic tanks: Run in 100 mm sewer pipe.

I/O junctions: Bury connectors and junction boxes.

Compliance and approval: To the Health Department and local government authority's requirements.

Leach drains

Length and type: To *Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974 (WA)* and local government authority's requirements.

Installation: Construct with brickwork, concrete segments, or lightweight polypropylene modular tank system (for underground water storage).

3.6 RAINWATER TANKS

Standards

Metal tanks and rainwater goods: To AS/NZS 2179.1.

Design and installation: To the recommendations of SA HB 230.

Polyethylene tanks: To AS/NZS 4766.

Coated steel tanks: Metallic-coated steel with polymer film to AS 2070 on the inside and prepainted on the outside.

Bladder tanks: Proprietary plastic bladder type constructed from polymer conforming to AS 2070, resistant to puncture and microbial attack.

Rainwater tanks

Accessories: Provide accessories needed to complete the installation and constructed from corrosion resistant material compatible with the tank material. Include the following:

- Inlet and outlet connections.
- Floating outlet to draw water from the upper part of the tank.
- Tight fitting lids or insect proof screens at all openings.
- Flap valves at every opening to the tank.
- Calmed inlet to the tank to prevent stirring sediment.
- Flywire screened overflow siphon to skim surface contaminants.
- Vermin proof, childproof access opening.
- Easily cleanable filter before the entry to the tank with maximum 1 mm mesh size.

First flush diverter

General: Provide a first flush diverter. Arrange to drain completely.

Sizing: Select for at least 20 L/100 m² rainwater catchment area.

Construction: Corrosion resistant and compatible with the rainwater plumbing and tank.

Discharge: Discharge waste water from the first flush diverter either:

- If permitted by the local authority, onto grassed areas away from tank and building footings.
- To the stormwater installation.

Installation

Requirement: Provide structural support to withstand the mass of the tank when full without deformation or excessive settling. Support connecting piping independently of the tank. Provide a 300 mm long section of reinforced flexible hose to prevent piping exerting a load on the tank. Pipe overflow to discharge away from the tank. Prevent the entry of sunlight to the interior of the tank.

Above ground tanks: Restrain the tank to prevent movement, when empty, caused by wind and other loads. Provide a level base with gaps not exceeding 10 mm, free of sharp projections and projecting beyond the edge of the tank at all points.

Polyethylene tanks: Trim and compact the ground and place a level bed of sand at least 50 mm thick.

Coated steel tanks: Fully support the tank on a self-draining timber or concrete base. Prevent contact with dissimilar metals. Arrange so that no part of the tank is below ground level and so that adjacent ground surfaces fall away from the tank. Do not use sharp objects inside the tank. Remove swarf with a magnet if drilling or cutting.

Bladder tanks: Locate on level base free from sharp objects. Install with manufacturer's supporting frame. Provide over-pressurising relief and air vent.

Cleaning: Flush the rainwater system. Wash and flush tanks to remove manufacturing and other contaminants.

3.7 GREYWATER SYSTEMS**Standards**

Design and installation: To AS 1546.4.

Greywater diversion devices

WaterMark: Required.

Access: Locate to facilitate access for inspection and maintenance.

Tanks

General: Provide an appropriately sized surge tanks.

Overflow: Pipe to sewer.

Arrangement: Prevent the entry of sunlight to the interior of the tank.

Backflow prevention

Standard: To AS/NZS 3500.1 and the requirements of the network utility operator.

3.8 GAS**Standard**

Reticulated gas systems: To AS/NZS 5601.1.

Buried pipes

Warning tape: During backfilling, lay plastic warning tape 300 mm above and for the full length of buried gas pipes.

- Type: Minimum 100 mm wide, with GAS PIPE UNDER marked continuously.

Commissioning

General: On completion of installation and testing, turn on isolating and control valves and purge and charge the installation.

Bottle LP gas

Type: Provide spring-loaded safety relief valve where bottled LP gas is documented.

Installer: WA licensing board approved plumber.

Installation: To the AS/NZS 3500 series.

Location: Locate bottles as documented or as directed by the principal. Point relief valve away from building.

Cylinder storage and handling: Conform to AS/NZS 1596.

Labour and material: Supply labour and material required to complete the gas supply system, including manual changeover gas regulator and metal hood.

0902 ELECTRICAL**1 GENERAL****1.1 STANDARDS****General**

Electrical installation: To AS/NZS 3000 and SA HB 301.

Electrical cable selection: To AS/NZS 3008.1.1.

Telecommunications cabling: To AS/CA S008, AS/CA S009, AS/NZS 11801.1, and SA/SNZ HB 252.

1.2 INTERPRETATION**Abbreviations**

General: For the purposes of this worksection the abbreviations given below apply:

- WAER: *WA Electrical Regulations*.
- RCD: Residual Current Device.

Definition

General: For the purposes of this worksection the following definitions apply:

- Telephony: Speech and low band frequencies (= 100 kHz).

1.3 POWER SUPPLY**General**

Power supply to be underground: 415/240 V, single-phase, 50 Hertz a.c., unless otherwise documented.

Electrical services installation: Concealed.

2 PRODUCTS**2.1 GENERAL****Earth electrodes and earth conductors**

Earthing system: A Multiple Earth Neutral (MEN) system conforming to AS/NZS 3000, and the requirements of the supply authority and the Australian Communications Authority (ACA).

Labelling: Main earth electrode, earth bar provided with an engraved label and red filled letter inscribed: MAIN EARTH – DO NOT DETACH.

Smoke detection

Smoke alarms: To AS 3786.

Approved smoke alarms: Photoelectric, non-removable battery (with 10 years battery life) smoke alarms. Select from the following:

- Brooks EIB166e.
- Brooks EIB650IC.

Interconnection devices: Wireless smoke alarms. Select from the following:

- Brooks EIB166e: For EIB100.
- Brooks EIB650IC: For EIB600.

2.2 CEILING FANS - NORTHERN AREAS**Internal ceiling sweep fans**

Type: White fans with 1400 mm diameter metal blades and sealed bearings.

Mounting: Flush.

Controls: Supplied by the manufacturer with variable speed and off control.

- Mounting height: 1500 mm above finished floor level.

External ceiling sweep fans

Type: Brown or black fans with 1400 mm diameter metal blades and sealed bearings.

Design and installation: To AS/NZS 3000 clause 1.5.14.

Mounting: Flush.

Switches and socket outlets: With an International Protection (IP) Rating, to AS/NZS 3000, if installed in a location where water ingress is possible, including where exposed to cyclonic conditions.

Controls: Supplied by the manufacturer with variable speed and off control.

- Mounting height: 1500 mm above finished floor level.

3 EXECUTION**3.1 GENERAL****Applications and compliance**

General: Submit all necessary applications for electricity supply. Liaise with the electricity distributor and comply with the WAER.

3.2 CONNECTION OF MAINS POWER SUPPLY**Network cable and point of attachment**

Connection to network supply: Run aerial network operator's service cable to the private pole or as shown on drawings, to the WAER.

Point of attachment for service cable: Provide private pole or as shown on drawings, to the WAER.

Pole mounted point of attachment: Provide 12 mm galvanized round steel hook assembly welded to a steel private pole for supporting and connecting aerial network cable at the site boundary to the WAER.

Power run-in

Supply to dwelling for multiple dwellings projects: Provide cabling to switchboard and underground run-in power from the main switchboard to each dwelling.

Maximum cable span:

- Standard service bracket: 30 m.
- Long span raiser bracket: 30 m.

Private poles

General: Conform to WAER and the electricity distributor's requirements for the following:

- Weld on 12 mm round steel hooks.
- Construction, height and position of power pole.
- Points of attachment of aerial distribution such as brackets and anchor blocks.

Private pole location: As shown on drawings.

Pole: 125 (internal diameter) x 4.8 mm (thick) galvanized steel.

Pole footing: 450 x 450 x 1200 mm (deep) mass concrete.

Pole height: 6 m above finished ground level with bottom end protruding minimum 100 mm through the bottom of the footing.

Consumers mains and metering

General: Provide consumers mains and automatic meter reading in conformance with the WAER.

Private poles: If required, mount pole on concrete bases to the WAER and install electrical mains at the centre of the pole and in underground conduits.

- Electrical mains: Provide in underground conduits from the private pole or service pillar to meter panels.

Electrical/gas meter box: Standard metal single or combined cabinet.

Meter installation: Install to the electricity distributor's requirements, including for meter type.

Earth electrodes and earth conductors

Multiple or distributed master metering: Where documented, install earth electrode in cable pit near switchboard and connect earth electrode to switchboard with earth conductor.

Earth cable pit: Provide concrete lid marked MAIN EARTH and install with lid flush with surrounding finished surface.

Earth electrodes: Install so they cannot be removed from ground by hand. Do not use star pickets or galvanized iron water pipe electrodes.

3.3 LOW VOLTAGE POWER SYSTEMS

Switchboards

Standard: To AS/NZS 61439.3.

Construction: Enclosed type with a hinged lid. Provide circuit breakers and RCDs.

Location: Verify that the location selected is compliant before proceeding.

Power circuit breakers: Conform to the following:

- Provide RCD/MCB's on every circuit.
- Individually protect lighting circuits and power (GPOs) circuits by combined Residual Current Device **compliant with Department of Communities, Housing < 40 ms trip time** and Miniature Circuit Breakers (RCD/MCBs).
- Where 15A socket outlets are required, install on a separate RCD/MCB circuit.
- Where ceiling sweep fans are required, install on a separate RCD/MCB circuit.
- Where external lighting circuits are documented, install on separate RCBO circuits.
- Label circuits with permanently marked labels.

Maximum demand and spare capacity

General: Calculate the maximum demand of the installation in accordance with AS/NZS 3000 and provide a copy of the calculations.

Spare capacity: Provide the following:

- > 10% spare capacity in mains and submains.
- > 25% spare capacity in final subcircuits.

Load balancing: Spread electrical load equally across circuits to prevent overloading and inadvertent circuit breaker operation.

Spare spaces: Provide switchboards with $\geq 25\%$ spare positions for future single phase circuit breakers.

Accessories

General: Provide accessories necessary for a complete installation including but not limited to switches, dimmers, socket outlets, and telecommunications outlets. Provide accessories located in close proximity of the same size and material and from the same manufacture.

Mounting: Flush mount accessories to the wall (or ceiling) unless noted otherwise. Provide proprietary wall boxes in masonry and wall brackets in stud walls.

Wet areas: Position accessories in locations containing baths showers or other fixed water containers to comply with the requirements of AS/NZS 3000.

Provisions for air conditioning: If air conditioning is required, provide for a wall mounted future split system to the areas required. Allow for an external waterproofed power isolator mounted 500 mm above the condenser plinth.

- Power isolators: Install on a separate circuit, with a circuit breaker mounted in the load centre or meter box to AS/NZS 3000.
- Power requirements: Provide as follows:
 - . Bedrooms: 15 amp single phase.
 - . Kitchen/dining: 25 amp single phase.
 - . Lounge: 25 amp single phase.

Appliances

General: Provide final subcircuits and terminate at fixed appliances, hot water units, packaged air conditioning and other plant and equipment.

Isolation switch: Provide isolating switch adjacent to equipment.

3.4 LIGHTING

Luminaires

Standard: to AS/NZS 60598.1.

Luminaire type: Provide the following and/or as documented on drawings:

- Oyster light fittings: 32W, 350 mm diameter (nominal) fluorescent fittings and acrylic diffuser.
- LED recessed downlights: 15W fittings spaced at maximum 1.5 m spacing.
- Fluorescent tube fittings: Twin 18W T8 fluorescent tube, battens and clear prismatic diffuser or vandal resistant cover.

Luminaire colour rendering: Cool white.

Non-specified luminaires: Provide a bayonet cap batten holder and lamp at each lighting point location where no luminaire is documented.

Minimum energy performance standards:

- General: To AS/NZS 4783.2 and AS 4782.2.
- Self-ballasted lamps: To AS 4847.2.

Lighting control systems

General: Locate grouped dimmers and control devices for future access. Provide ventilation and acoustic treatment to suit the device characteristics.

Motion sensor controls: Provide to external light fittings at the front and rear of dwelling.

3.5 TELECOMMUNICATIONS**Services and cabling**

Requirement: Conform to the Australian Government's policy document

Telecommunications infrastructure in new developments.

Submissions: Submit required applications for telecommunications services to the telecommunications services carrier and liaise with the carrier.

Communication carrier: Liaise with the telecommunication services carrier and comply with all standards and requirements of the carrier.

Data cabling: Conform to the requirements of the NBN company.

Installations requiring telephony only: To AS/CA S009.

Small office/home office installations: Category 6, to AS/CA S009 and AS 11801.4.

Telecommunication/telephone outlets: Provide RJ45 8 modular jacks as documented.

- Location: Where the room in which the telephone outlet is to be installed does not have a roof space, provide a concealed conduit from the telephone outlet wall box to the internal wall, in an accessible location.

- Quantity: Provide minimum two telephone outlets per dwelling.

- Pinouts: T568A to AS/NZS 11801.1.

Telecommunications cables: Provide as follows:

- Type: Copper.

- Standard: To AS/CA S009 and AS 11801.4.

- Voice cabling: Multicore CAT 6 UTP cable as documented.

Television systems

General: Provide an analog and digital television distribution system to AS/NZS 1367 and conforming to the recommendations of Broadcast Australia and ACMA.

System requirements: Provide the following:

- Outlet assembly to each dwelling, including antenna, cable and television outlet.
- TV outlet and co-axial: Provide to living rooms, 500 mm above the finished floor level.
- An external TV aerial.
- MATV system: For developments with group dwellings serviced by a main electrical switchboard.

Antennae: Provide and locate antennae to receive all locally available free-to-air television stations.

- Antenna system: To AS 1417.

Network systems

General: Provide a coaxial cabling system suitable for satellite or cable network operator's services.

Conduits for future cabling: ≥ 25 mm diameter with drawstrings.

NBN installation

Requirement: To the *NBN Guideline*.

New buildings: To the *NBN Guideline* clause 3.5.

Location type: Open enclosures to the *NBN Guideline* clause 4.4.3.

3.6 ELECTRONIC SECURITY**Intruder alarm system**

General: Provide intruder alarm system.

Standard: To AS/NZS 2201.1.

3.7 FIRE DETECTION AND ALARMS**Smoke detection**

General: Provide smoke detectors to the requirements of the BCA 3.7.5. Connect smoke alarms to mains power.

Smoke alarms: Install hardwired smoke alarms to BCA 3.7.5 and the manufacturer's recommendations.

- More than one alarm: Interconnect alarms to BCA 3.7.5.2 (d).

3.8 CABLES LABELLING**Labelling**

General: Provide labels including control and circuit equipment ratings, functional units, notices for operational and maintenance personnel, incoming and outgoing circuit rating, sizes and origin of supply.

Telecommunications cables: Label telecommunications cables, cross connects and outlets in accordance with the requirements of AS/NZS 11801.1.

Label colours

Generally: Black lettering on white background except as follows:

- Main switch and caution labels: Red lettering on white background.
- Danger, warning labels: White lettering on red background.

3.9 COMPLETION**Testing and certification**

Electrical installations: Test to AS/NZS 3017.

Provide a certificate showing test results, certifying compliance with AS/NZS 3000.

Telecommunications cabling: To AS 11801.4. Test the cable link performance at the maximum frequency and data rate for the cable class, and the cable category. Provide a certificate showing test results and certifying compliance with AS 11801.4.

Submission: Provide ACMA Telecommunications Cabling Advice (TCA1) form.

Television and audio systems: To AS/NZS 1367. Test the complete television and audio system. Provide a certificate showing test results and certifying compliance.

REFERENCED DOCUMENTS

The following documents are incorporated into this worksection by reference:

NOHSC 2002	2005	National code of practice for the safe removal of asbestos 2nd edition
NOHSC 2018	2005	Code of Practice for the Management and Control of Asbestos in Workplaces
AS/CA S008	2010	Requirements for customer cabling products
AS/CA S009	2013	Installation requirements for customer cabling (Wiring Rules)
AS/NZS ISO 817	2016	Refrigerating systems - Refrigerant classification
AS 1074	1989	Steel tubes and tubulars for ordinary service
AS/NZS 1080		Timber - Methods of test
AS/NZS 1080.1	2012	Moisture content
AS/NZS 1163	2016	Cold-formed structural steel hollow sections
AS/NZS 1170		Structural design actions
AS/NZS 1170.1	2002	Permanent, imposed and other actions
AS/NZS 1170.2	2011	Wind actions
AS 1192	2004	Electroplated coatings - Nickel and chromium
AS/NZS 1214	2016	Hot-dip galvanized coatings on threaded fasteners (ISO metric coarse thread series) (ISO 10684:2004, MOD)
AS 1231	2000	Aluminium and aluminium alloys - Anodic oxidation coatings
AS 1288	2006	Glass in buildings - Selection and installation
AS 1289		Methods of testing soils for engineering purposes
AS 1289.3.6.1	2009	Soil classification tests - Determination of the particle size distribution of a soil - Standard method of analysis by sieving
AS 1289.5.1.1	2017	Soil compaction and density tests- Determination of dry density/moisture content relation of a soil using standard compactive effort
AS 1289.5.2.1	2017	Soil compaction and density tests - Determination of the dry density/moisture content relation of a soil using modified compactive effort
AS 1289.5.4.1	2007	Soil compaction and density tests - Compaction control test - Dry density ratio, moisture variation and moisture ratio
AS 1289.6.1.1	2014	Soil strength and consolidation tests - Determination of the California Bearing Ratio of a soil - Standard laboratory method for a remoulded specimen
AS 1324		Air filters for use in general ventilation and airconditioning
AS 1324.2	2003	Methods of test
AS/NZS 1328		Glued laminated structural timber
AS/NZS 1328.1	1998	Performance requirements and minimum production requirements
AS/NZS 1328.2	1998	Guidelines for AS/NZS 1328: Part 1 for the selection, production and installation of glued laminated structural timber
AS 1366		Rigid cellular plastics sheets for thermal insulation
AS 1366.1	1992	Rigid cellular polyurethane (RC/PUR)
AS 1366.2	1992	Rigid cellular polyisocyanurate (RC/PIR)
AS 1366.3	1992	Rigid cellular polystyrene - Moulded (RC/PS - M)
AS 1366.4	1989	Rigid cellular polystyrene - Extruded (RC/PS-E)
AS/NZS 1367	2016	Coaxial cable and optical fibre systems for the RF distribution of digital television, radio and in-house analog signals in single and multiple dwelling installations
AS 1379	2007	Specification and supply of concrete
AS 1397	2011	Continuous hot-dip metallic coated steel sheet and strip - Coatings of zinc and zinc alloyed with aluminium and magnesium
AS 1417	2015	Receiving antennas for radio and television in the VHF and UHF broadcast bands - Design, manufacture and performance of outdoor terrestrial television antennas
AS/NZS 1477	2017	PVC pipes and fittings for pressure applications
AS 1478		Chemical admixtures for concrete, mortar and grout
AS 1478.1	2000	Admixtures for concrete
AS 1530		Methods for fire tests on building materials, components and structures
AS 1530.2	1993	Test for flammability of materials
AS/NZS 1530.3	1999	Simultaneous determination of ignitability, flame propagation, heat release and smoke release
AS/NZS 1546		On-site domestic wastewater treatment units
AS/NZS 1546.1	2008	Septic tanks
AS 1546.4	2016	Domestic greywater treatment systems
AS/NZS 1546.2	2008	Waterless composting toilets
AS 1546.3	2017	Secondary treatment systems
AS/NZS 1547	2012	On-site domestic wastewater management
AS 1562		Design and installation of sheet roof and wall cladding
AS 1562.1	2018	Metal
AS 1562.3	2006	Plastics
AS/NZS 1571	1995	Copper - Seamless tubes for airconditioning and refrigeration
AS/NZS 1596	2014	The storage and handling of LP Gas
AS 1604		Specification for preservative treatment
AS 1604.1	2012	Sawn and round timber
AS 1627		Metal finishing - Preparation and pretreatment of surfaces

AS 1627.1	2003	Removal of oil, grease and related contamination
AS 1668		The use of ventilation and air conditioning in buildings
AS 1668.1	2015	Fire and smoke control in buildings
AS 1668.2	2012	Mechanical ventilation in buildings
AS 1672		Limes and limestones
AS 1672.1	1997	Limes for building
AS 1684		Residential timber-framed construction
AS 1684.2	2010	Non-cyclonic areas
AS 1684.3	2010	Cyclonic areas
AS 1684.4	2010	Simplified non-cyclonic areas
AS 1720		Timber structures
AS 1720.2	2006	Timber properties
AS 1720.3	2016	Design criteria for timber-framed residential buildings
AS 1720.5	2015	Nailplated timber roof trusses
AS/NZS 1734	1997	Aluminium and aluminium alloys - Flat sheet, coiled sheet and plate
AS 1742		Manual of uniform traffic control devices
AS 1742.2	2009	Traffic control devices for general use
AS/NZS 1748		Timber - Solid - Stress-graded for structural purposes
AS/NZS 1748.1	2011	General requirements
AS/NZS 1801	1997	Occupational protective helmets
AS 1810	1995	Timber - Seasoned cypress pine - Milled products
AS/NZS 1859		Reconstituted wood-based panels - Specifications
AS/NZS 1859.1	2017	Particleboard
AS/NZS 1859.2	2017	Dry process fibreboard
AS/NZS 1859.3	2017	Decorative overlaid wood panels
AS/NZS 1859.4	2018	Wet process fibreboard
AS 1860		Particleboard flooring
AS/NZS 1860.1	2017	Specifications
AS 1860.2	2006	Installation
AS 1884	2012	Floor coverings - Resilient sheet and tiles - Installation practices
AS 1910	2004	Water supply - Float control valves for use in hot and cold water
AS 1926		Swimming pool safety
AS 1926.1	2012	Safety barriers for swimming pools
AS 1926.2	2007	Location of safety barriers for swimming pools
AS/NZS 2032	2006	Installation of PVC pipe systems
AS 2047	2014	Windows and external glazed doors in buildings
AS 2049	2002	Roof tiles
AS 2050	2018	Installation of roof tiles
AS 2070	1999	Plastics materials for food contact use
AS 2082	2007	Timber - Hardwood - Visually stress-graded for structural purposes
AS/NZS 2098		Methods of test for veneer and plywood
AS/NZS 2098.1	2006	Moisture content of veneer and plywood
AS/NZS 2098.11	2005	Determination of formaldehyde emissions for plywood
AS/NZS 2179		Specifications for rainwater goods, accessories and fasteners
AS/NZS 2179.1	2014	Metal shape or sheet rainwater goods, and metal accessories and fasteners
AS 2201		Intruder alarm systems
AS/NZS 2201.1	2007	Client's premises - Design, installation, commissioning and maintenance
AS/NZS 2208	1996	Safety glazing materials in buildings
AS/NZS 2269		Plywood - Structural
AS/NZS 2269.0	2012	Specifications
AS/NZS 2270	2006	Plywood and blockboard for interior use
AS/NZS 2271	2004	Plywood and blockboard for exterior use
AS/NZS 2311	2017	Guide to the painting of buildings
AS/NZS 2312		Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings
AS 2312.1	2014	Paint coatings
AS 2455		Textile floor coverings - Installation practice
AS 2455.1	2019	General
AS/NZS 2588	2018	Gypsum plasterboard
AS/NZS 2589	2017	Gypsum linings - Application and finishing
AS 2601	2001	The demolition of structures
AS 2663		Textiles - Fabrics for window furnishings
AS 2663.1	1997	Uncoated fabrics
AS 2663.2	1999	Coated curtain fabrics
AS 2663.3	1999	Vertical and holland blinds
AS 2688	2017	Timber and composite doors
AS/NZS 2699		Built-in components for masonry construction
AS/NZS 2699.1	2000	Wall ties
AS/NZS 2699.2	2000	Connectors and accessories
AS/NZS 2699.3	2002	Lintels and shelf angles (durability requirements)
AS/NZS 2712	2007	Solar and heat pump water heaters - Design and construction
AS/NZS 2728	2013	Prefinished/prepainted sheet metal products for interior/exterior building applications - Performance requirements
AS/NZS 2754		Adhesives for timber and timber products
AS/NZS 2754.1	2016	Adhesives for manufacture of plywood and laminated veneer lumber (LVL)
AS 2758		Aggregates and rock for engineering purposes

AS 2758.1	2014	Concrete aggregates
AS 2796		Timber - Hardwood - Sawn and milled products
AS 2796.1	1999	Product specification
AS 2796.2	2006	Grade description
AS 2796.3	1999	Timber for furniture components
AS 2858	2008	Timber - Softwood - Visually stress-graded for structural purposes
AS 2870	2011	Residential slabs and footings
AS 2876	2000	Concrete kerbs and channels (gutters) - Manually or machine placed
AS/NZS 2904	1995	Damp-proof courses and flashings
AS/NZS 2908		Cellulose-cement products
AS/NZS 2908.2	2000	Flat sheets
AS 2913	2000	Evaporative airconditioning equipment
AS/NZS 2924		High pressure decorative laminates - Sheets made from thermosetting resins
AS/NZS 2924.1	1998	Classification and specifications
AS/NZS 3000	2018	Electrical installations (known as the Australian/New Zealand Wiring Rules)
AS/NZS 3008		Electrical installations - Selection of cables
AS/NZS 3008.1.1	2017	Cables for alternating voltages up to and including 0.6/1 kV - Typical Australian installation conditions
AS/NZS 3017	2007	Electrical installations - Verification guidelines
AS/NZS 3500		Plumbing and drainage
AS/NZS 3500.1	2018	Water services
AS/NZS 3500.2	2018	Sanitary plumbing and drainage
AS/NZS 3500.3	2018	Stormwater drainage
AS/NZS 3500.4	2018	Heated water services
AS 3566		Self-drilling screws for the building and construction industries
AS 3566.1	2002	General requirements and mechanical properties
AS 3600	2018	Concrete structures
AS 3610		Formwork for concrete
AS 3610.1	2018	Specifications
AS 3660		Termite management
AS 3660.1	2014	New building work
AS 3660.3	2014	Assessment criteria for termite management systems
AS/NZS 3666		Air-handling and water systems of buildings - Microbial control
AS/NZS 3666.1	2011	Design, installation and commissioning
AS 3700	2018	Masonry structures
AS 3705	2012	Geotextiles - Identification, marking, and general data
AS 3715	2002	Metal finishing - Thermoset powder coating for architectural applications of aluminium and aluminium alloys
AS 3727		Pavements
AS 3727.1	2016	Residential
AS 3730		Guide to the properties of paints for buildings
AS 3730.1	2006	Latex - Interior - Flat
AS 3730.2	2006	Latex - Interior - Semi-gloss
AS 3730.3	2006	Latex - Interior - Low-gloss
AS 3730.6	2006	Solvent-borne - Interior/exterior - Full gloss enamel
AS 3730.7	2006	Latex - Exterior - Flat
AS 3730.8	2006	Latex - Exterior - Low gloss
AS 3730.9	2006	Latex - Exterior - Semi-gloss
AS 3730.10	2006	Latex - Exterior - Gloss
AS 3730.12	2006	Latex - Interior - Gloss
AS 3730.16	2006	Latex - Self-priming timber finish - Exterior
AS 3730.27	2006	Clear coatings for interior timber floors
AS 3730.28	2006	Wood stain - Solvent-borne - Exterior
AS 3730.29	2006	Solvent-borne - Exterior/interior - Paving paint
AS 3740	2010	Waterproofing of domestic wet areas
AS 3743	2003	Potting mixes
AS/NZS 3750		Paints for steel structures
AS/NZS 3750.9	2009	Organic zinc-rich primer
AS 3786	2014	Smoke alarms using scattered light, transmitted light or ionization
AS 3798	2007	Guidelines on earthworks for commercial and residential developments
AS 3799	1998	Liquid membrane-forming curing compounds for concrete
AS 3818		Timber - Heavy structural products - Visually graded
AS 3818.2	2010	Railway track timbers
AS/NZS 3823		Performance of electrical appliances - Air conditioners and heat pumps
AS/NZS 3823.1.1	2012	Non-ducted airconditioners and heat pumps - Testing and rating for performance (ISO 5151:2010, MOD)
AS/NZS 3823.1.2	2012	Ducted airconditioners and air-to-air heat pumps - Testing and rating for performance (ISO 13253:2010, MOD)
AS/NZS 3823.2	2013	Energy labelling and minimum energy performance standards (MEPS) requirements
AS 3958		Ceramic tiles
AS 3958.1	2007	Guide to the installation of ceramic tiles
AS 3959	2018	Construction of buildings in bushfire prone areas
AS 3972	2010	General purpose and blended cements
AS 3999	2015	Bulk thermal insulation - Installation
AS 4049		Paints and related materials - Pavement marking materials
AS 4049.1	2005	Solvent-borne paint - For use with surface applied glass beads

AS 4049.3	2005	Waterborne paint - For use with surface applied glass beads
AS 4049.4	2006	High performance pavement marking systems
AS 4055	2012	Wind loads for housing
AS/NZS 4200		Pliable building membranes and underlays
AS/NZS 4200.1	2017	Materials
AS 4200.2	2017	Installation requirements
AS 4254		Ductwork for air-handling systems in buildings
AS 4254.1	2012	Flexible duct
AS 4254.2	2012	Rigid duct
AS 4256		Plastic roof and wall cladding materials
AS 4256.2	2006	Unplasticized polyvinyl chloride (uPVC) building sheets
AS 4256.3	2006	Glass fibre reinforced polyester (GRP)
AS 4256.5	2006	Polycarbonate
AS 4285	2019	Rooflights
AS 4288	2003	Soft underlays for textile floor coverings
AS 4312	2008	Atmospheric corrosivity zones in Australia
AS/NZS 4357		Structural laminated veneer lumber
AS/NZS 4357.0	2005	Specifications
AS 4386	2018	Cabinetry in the built-in environment - Commercial and domestic
AS 4419	2018	Soils for landscaping and garden use
AS 4440	2004	Installation of nailplated timber roof trusses
AS 4454	2012	Composts, soil conditioners and mulches
AS/NZS 4455		Masonry units, pavers, flags and segmental retaining wall units
AS/NZS 4455.1	2008	Masonry units
AS/NZS 4455.2	2010	Pavers and flags
AS/NZS 4455.3	2008	Segmental retaining wall units
AS/NZS 4505	2012	Garage doors and other large access doors
AS 4552	2005	Gas fired water heaters for hot water supply and/or central heating
AS/NZS 4552.2	2010	Minimum energy performance standards for gas water heaters
AS 4586	2013	Slip resistance classification of new pedestrian surface materials
AS/NZS 4600	2018	Cold-formed steel structures
AS 4654		Waterproofing membranes for external above-ground use
AS 4654.1	2012	Materials
AS 4654.2	2012	Design and installation
AS/NZS 4667	2000	Quality requirements for cut-to-size and processed glass
AS/NZS 4671	2001	Steel reinforcing materials
AS/NZS 4680	2006	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles
AS/NZS 4692		Electric water heaters
AS/NZS 4692.1	2005	Energy consumption, performance and general requirements
AS/NZS 4692.2	2005	Minimum Energy Performance Standard (MEPS) requirements and energy labelling
AS/NZS 4766	2006	Polyethylene storage tanks for water and chemicals
AS 4773		Masonry in small buildings
AS 4773.1	2015	Design
AS 4773.2	2015	Construction
AS/NZS 4782		Double-capped fluorescent lamps - Performance specifications
AS 4782.2	2019	Minimum Energy Performance Standard (MEPS)
AS/NZS 4783		Performance of electrical lighting equipment - Ballasts for fluorescent lamps
AS/NZS 4783.2	2002	Energy labelling and minimum energy performance standards requirements
AS 4785		Timber - Softwood - Sawn and milled products
AS 4785.1	2002	Product specification
AS 4785.2	2002	Grade description
AS 4785.3	2002	Timber for furniture components
AS 4786		Timber flooring
AS 4786.2	2005	Sanding and finishing
AS/NZS 4791	2006	Hot-dip galvanized (zinc) coatings on ferrous open sections, applied by an in-line process
AS/NZS 4792	2006	Hot-dip galvanized (zinc) coatings on ferrous hollow sections, applied by a continuous or a specialized process
AS 4809	2017	Copper pipe and fittings - Installation and commissioning
AS/NZS 4847		Self ballasted lamps for general lighting services
AS 4847.2	2019	Performance specifications - Minimum energy performance standard (MEPS)
AS/NZS 4858	2004	Wet area membranes
AS/NZS 4859		Thermal insulation of buildings
AS/NZS 4859.1	2018	General criteria and technical provisions
AS 4970	2009	Protection of trees on development sites
AS 5039	2008	Security screen doors and security window grilles
AS 5040	2003	Installation of security screen doors and window grilles
AS 5101		Methods for preparation and testing of stabilized materials
AS 5101.4	2008	Unconfined compressive strength of compacted materials
AS/NZS 5141	2018	Residential heating and cooling systems - Minimum applications and requirements for energy efficiency, performance and comfort criteria.
AS 5146		Reinforced autoclaved aerated concrete
AS 5146.1	2015	Structures
AS 5146.3	2018	Construction
AS/NZS 5149		Refrigerating systems and heat pumps – Safety and environmental requirements.
AS/NZS 5149.1	2016	Definitions, classification and selection criteria (ISO 5149-1:2014, MOD)

AS/NZS 5149.2	2016	Design, construction, testing, marking and documentation (ISO 5149-2:2014, MOD)
AS/NZS 5149.3	2016	Installation site (ISO 5149-3:2014)
AS/NZS 5149.4	2016	Operations, maintenance, repair and recovery (ISO 5149-4:2014, MOD)
AS 5203	2016	Protection of openable windows/ fall prevention – Test sequence and compliance method
AS/NZS 5263		Gas appliances
AS/NZS 5263.1.2	2016	Gas fired water heaters for hot water supply and/or central heating
AS/NZS 5601		Gas installations
AS/NZS 5601.1	2013	General installations
AS 5604	2005	Timber - Natural durability ratings
AS 6669	2016	Plywood - Formwork
AS 11801		Information technology - generic cabling for customer premises
AS/NZS 11801.1	2019	General requirements (ISO/IEC 11801-1:2017, MOD)
AS 11801.4	2019	Single-tenant homes (ISO/IEC 11801-4:2017,MOD)
AS ISO 13006	2013	Ceramic tiles - Definitions, classification, characteristics and marking (ISO 13006:1998)
AS ISO 13007		Ceramic tiles
AS ISO 13007.1	2013	Grouts and adhesives - Terms, definitions and specifications for adhesives
AS/NZS 60335		Household and similar electrical appliances - Safety
AS/NZS 60335.2.98	2005	Household and similar electrical appliances - Safety - Particular requirements for humidifiers (IEC 60335-2-98 Ed 2.1, IDT)
AS/NZS 60598		Luminaires
AS/NZS 60598.1	2017	General requirements and tests (IEC 60598-1, Ed. 8.0 (2014) MOD)
AS/NZS 61000		Electromagnetic compatibility (EMC)
AS/NZS 61439		Low-voltage switchgear and controlgear assemblies
AS/NZS 61439.3	2016	Distribution boards intended to be operated by ordinary persons (DBO) (IEC 61439-3, Ed 1.0 (2012), MOD)
SA/SNZ HB 32	1995	Control of microbial growth in air-handling and water systems of buildings
SA HB 230	2008	Rainwater tank design and installation handbook
SA/SNZ HB 252	2014	Communications Cabling Manual - Module 3: Residential communications cabling handbook
SA HB 276	2004	A guide to good practice for energy efficient installation of residential heating, cooling & air conditioning plant & equipment
SA HB 301	2001	Electrical installations - Designing to the Wiring Rules
ACCC SS	2014	Competition and Consumer (Corded Internal Window Coverings) Safety Standard
AIRAH DA09	1998	Air conditioning load estimation
Aus Gov Telecom	2015	Telecommunications infrastructure in new developments - A new approach to competition
BCA 3.1.4.4	2019	Acceptable construction - Site preparation - Termite risk management - Durable notices
BCA 3.1.1	2016	Acceptable construction - Site preparation - Earthworks
BCA 3.1.3	2019	Acceptable construction - Site preparation - Earth retaining structures
BCA 3.2.2	2019	Acceptable construction - Footings and slabs - Preparation
BCA 3.3.2	2019	Acceptable construction - Masonry - Reinforced masonry
BCA 3.10.6	2019	Attachment of decks and balconies to external walls of buildings
BCA Table 3.5.1.1	2019	Acceptable construction - Roof and wall cladding - Sheet roofing - Acceptable corrosion protection for metal sheet roofing
BCA 3.5.1	2019	Acceptable construction - Roof and wall cladding - Sheet roofing
BCA 3.5.1.2	2016	Acceptable construction - Roof and wall cladding - Roof cladding - Roof tiling
BCA 3.5.4.5	2019	Acceptable construction - Roof and wall cladding - Timber and composite wall cladding - Eaves and soffit linings
BCA 3.9.2.6	2019	Acceptable construction - Safe movement and access - Barriers and handrails - Protection of openable windows - bedrooms
BCA 3.12.1.1	2019	Acceptable construction - Energy efficiency - Building fabric - Building fabric thermal insulation
BCA 3.12.3.4	2019	Acceptable solutions - Energy efficiency - Building sealing - Exhaust fans
BCA 3.9.1	2019	Acceptable construction - Safe movement and access - Stairway and ramp construction
BCA 3.8.1.2	2019	Acceptable construction - Health and amenity - Wet areas and external weatherproofing - Wet areas
BCA 3.7.5.2	2019	Acceptable construction - Fire safety - Smoke alarms and evacuation lighting- Smoke alarm requirements
BCA 2.6	2019	Performance provisions - Energy efficiency
BCA 3.5.3.4	2019	Acceptable construction - Roof and wall cladding - Gutters and downpipes - Installation of gutters
BCA 3.5.4.2	2019	Acceptable construction - Roof and wall cladding - Timber and composite wall cladding - Timber wall cladding
BCA 3.7.5	2019	Acceptable construction - Fire safety - Smoke alarms and evacuation lighting
BCA 3.9.2.7	2019	Acceptable construction - Safe movement and access - Barriers and handrails - Protection of openable windows - rooms other than bedrooms
BCA 3.12	2019	Acceptable construction - Energy efficiency
BCA J3.7	2019	Energy efficiency - Building Sealing - Evaporative coolers
FWPA PN06.1039	2008	Interim industry standard – Recycled timber – Visually graded recycled decorative
NASH		NASH Standard Residential and Low-rise Steel Framing
NASH-1	2005	Design criteria
NASH-2	2014	Design solutions
NBN Guideline	2016	Residential preparation and installation: Single Dwelling Units (SDUs) and Multi Dwelling Units (MDUs)
PCA	2019	National Construction Code 2019 Series Volume 3 - Plumbing Code of Australia

036	2007	Waste Avoidance and Resource Recovery Act 2007
WA Gov Act No. 074	1995	Local Government Act 1995
WA Gov Act No. 087	1986	Environmental Protection Act
WA Gov Act No. 101	1984	Occupational Safety and Health Act 1984
WA Gov Act No.34	1911	Health (Miscellaneous Provisions) Act 1911
WA Gov S.R. Clearing	2004	Environmental Protection (Clearing of Native Vegetation) Regulations
WA Gov S.R. Environ	1987	Environmental Protection Regulations
WA Gov S.R. Health	1974	Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations
WA Gov S.R. Landfill	2002	Environmental Protection (Rural Landfill) Regulations
WA Gov S.R. Pesticides		2011 Health (Pesticides) Regulations
WA Gov S.R. Safety	1996	Occupational Safety and Health Regulations 1996 (WA)
WA Gov S.R. UD	2004	Environmental Protection (Unauthorised Discharges) Regulations
WA Gov S.R. Waste	2004	Environmental Protection (Controlled Waste) Regulations
WA Gov S.R. Wastewater		2013 Code of Practice for Product Approval of Onsite Wastewater Systems (Department of Health)
WAER	2015	WA Electrical Requirements (WAER)
WA Gov Act No. 024	2011	Building Act 2011
BS 2571	1990	Specification for general-purpose flexible PVC compounds for moulding and extrusion
BS 4255		Rubber used in preformed gaskets for weather exclusion from buildings
BS 4255-1	1986	Specification for non-cellular gaskets
ASTM C534/C534M	2019	Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form
ISO 10580	2010	Resilient, textile and laminate floor coverings - Test method for volatile organic compound (VOC) emissions
UN GHS	2019	Globally Harmonized System of Classification and Labelling of Chemicals (GHS)



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