



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

# HOUSING

## PART C: CONSTRUCT SPECIFICATION

### **NORTH WEST ABORIGINAL HOUSING FUND**

For BCA Class 1a, 1b and 10  
Wind regions A, B, C and D

Single and grouped dwellings

NATSPEC, December 2017



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**0131 PRELIMINARIES****1 GENERAL****1.1 PRECEDENCE****Order of precedence**

Contract documents generally: In event of ambiguity, discrepancy or inconsistency with contract documents, the following order of precedence applies:

- The Drawings.
- Schedule of variables.
- This specification.
- General conditions of contract with the Housing Authority's amendments.

Drawings: The following order of precedence applies:

- Figured dimensions over scaled dimensions.
- Larger scale drawings over the smaller scale drawings.
- Drawings showing details of particular parts of any work over general layout drawings.

**1.2 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 Housing Authority 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 Housing Authority.

**1.3 TENDERING****Tender briefing and site meeting**

Site familiarisation by tenderers: Visit the site and collect data to inform project requirements of the site(s) for which demolition and/or

construction/refurbishment work is required to AS 4120 clause 7.3.

Contact to arrange visit: Principal or representative stated in the tender documentation in **Tender Enquiries**.

Cost of inspection and associated costs: Borne by the tenderer.

**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 SITE PROCEDURES****Pre-construction site meeting**

On-site meeting: Make arrangements for an on-site pre-construction meeting with the community and Housing Authority before starting construction works. The meeting will be chaired by the principal or representative.

Site start-up discussion list: Before the meeting, distribute a list (with outlines) of items requiring discussion, agreement or resolution. Include this in the tender documentation submission for information purposes.

Completion of meeting: After the meeting, require all attending parties sign the list.

**Contractor's responsibilities**

Requirement: Take responsibility for all works on site, and take all actions required to prevent problems, conflicts or contentious behaviour.

Problems/conflicts caused by the contractor: Report any problems caused by any contracting personnel (including employees, subcontractors, agents, suppliers) or local people to the appropriate authority and take action to prevent repeat of the problem.

Contentious behaviour by local residents: Notify the appropriate community authority and the principal.

**Local regulations and community access**

Local regulations: Comply with regulations concerning behaviour and access at all times. Obtain details from the community administration.

Access restriction to the community: Only personnel actively involved in the construction process are allowed within the community or community houses.

**Code of conduct**

Contractor's behaviour: All contractors, subcontractors, suppliers, visitors and agents are to comply with local community regulations and protocols, particularly in relation to alcohol, speed limits, safety, and sacred/ceremonial areas.

Contact/liaison: Do not directly contact the local government authority regarding this contract unless initiated by the local government authority. Conduct discussions only in the presence of the Housing Authority's representative.

Disputes arising from application of this clause: An independent adjudicator will consider representations from the contractor and the Housing Authority. All parties will adhere to the determination by the adjudicator.

Loans or gifts: Do not offer loans or gifts of equipment, vehicles, food or beverages to members of the community (including elected representatives), unless it is part of contract conditions.

Services not included in the contract: Do not provide to the community (including elected council members) without prior approval from the Housing Authority.

Employment: Do not seek employment within the community during the entire term of the contract.

Close contact or sexual relationships: Do not initiate or maintain relationships with any community member. If this occurs, there will be instant dismissal and/or removal from the site and the community.

Racially discriminatory behaviour: If this occurs, there will be instant dismissal and/or removal from the site and the community.

Photographs and videos: Do not bring photographs or videos into the community without the community's consent. Make sure this is adhered to by all contracting personnel.

- Project documentation photographs or videos: Do not include individuals, dwellings (except as agreed for the project), or areas of significance (except with the written consent of the community).

Areas of significance: Undertake measures required to prevent trespassing of or interference with any areas of significance in the community. Comply with reasonable directions by the community regarding areas of significance.

#### **Prohibition of substances, alcohol and guns**

Prohibited substances and alcohol: Do not bring or consume alcohol or other prohibited substances; or supply, sell or provide to any person while on community land, or on land vested by the community. This is applicable to all contracting personnel, including subcontractors, employees, agents, suppliers and visitors.

Contracting personnel: Make sure the personnel are aware of the prohibition.

Notification of breaches: If the contractor is aware of breaches of the prohibition, notify the Housing Authority and the community.

Guns or firearms: Undertake measures to prevent the bringing of firearms into community land or land vested by the community, except where there is written consent by the community.

Animals: Undertake measures to prevent the hunting or slaying of animals on community land or land vested by the community, except where there is written consent by the community.

#### **Personnel training and procedures**

Personnel compliance: Make sure all personnel involved with the project are aware of the Aboriginal by-laws and customs that may impinge on the project. Comply with this clause and all community rules regarding conduct and visitation at the community land and on the site.

Code of conduct form: The form is included with this document. Abide by this, circulate amongst all

resident staff, sign and return to the Housing Authority within 7 days of commencement of the contract.

#### **Removal of contracting personnel**

Costs of contracting personnel removal: If removal is required from the site and replacement of other personnel is required, the costs will be borne by the Contractor.

Personnel removal: Remove personnel from the community or on land vested by the community where they are found to:

- Be recklessly or wilfully trespassing or interfering with any areas of significance.
- Be recklessly or wilfully moving outside of any screened and cleared access road or work site
- Be violating conditions imposed on the personnel entry permit.
- Have brought a prohibited substance onto the community land or land vested by the community, or to have supplied a prohibited substance to a resident of the community.
- Be behaving in a manner which is disrespectful of local Aboriginal culture and tradition, or in a manner which is offensive to the local Aboriginal people.
- Be wolf whistling or harassing in any form.

## **1.5 THE SITE**

### **Project signboards**

General: Provide project-specific signboards as follows:

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

### **Workers' amenities**

Amenities: Provide amenities for workers engaged on site to legislated and local government requirements.

Provision period: Maintain amenities on the site from commencement until practical completion.

### **Rectification**

Accessways, 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](http://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.

### **1.6 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.

### **1.7 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, 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.

Storage facilities: Cover the rental costs of storage and accommodation required by the community until practical completion.

#### **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 neighbours and the community. Obtain permission from the adjoining property owners/occupants before entering their property.

### **1.8 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 including the following:

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

Waste disposal to landfill: If required, conform to Appendix: Landfill use process map (for remote Aboriginal communities).

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)*.

**1.9 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 Housing Authority Permit Authority with other required documentation.

**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 property**

Evaluation: At practical completion, inspect the property, originally identified as possibly adversely affected by the works, with the principal, 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.

**Practical completion and handover**

Practical completion: On the day of practical completion, make sure of the following:

- Dwellings are connected to all required services.
- All appliances including hot water heaters, stoves, ovens, TV antennae/systems, and fittings have been checked and are in correct working order.
- Moving parts: Operate safely and smoothly.
- A certificate of practical completion is issued to the principal.

Handover: At handover, clear site of waste and vegetation (except trees and vegetation nominated to remain), and rake ground to an even grade.

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

Work not deemed complete: If the whole of the works are not deemed complete by the principal, the principal reserves the right to invoice the contractor for travel and accommodation costs incurred.

**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.

## 1.10 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 Housing Authority will remove the graffiti and recover the cost from the contract.

### **Maintenance during the defects liability period**

Emergency maintenance: Start as soon as practicable, within 24 hours after instructions are 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 as soon as practicable, within 72 hours after instructions are 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 Housing Authority 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****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 BCA 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 series Volume Two: Building Code of Australia Class 1 and Class 10 buildings.

**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 based 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 BCA.
- 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 council or statutory authorities.
- Supply: Supply, furnish and similar expressions mean supply only.

**1.5 BUSHFIRE PROTECTION****General**

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

Standard: To AS 3959 in conjunction with SAA HB 330.

**1.6 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 in accordance with the current written recommendations and instructions of the manufacturer or supplier.

Proprietary items/systems/assemblies: Assemble, install or fix to substrate in accordance with the current written recommendations and instructions of the manufacturer or supplier.

**Sealed containers**

General: 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).
- 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.

Removal of non-approved alternatives: 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.

**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

- 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**.

**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 for the site 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 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/NZS 2312.1 clause 2.3.

Coating designation: To AS/NZS 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 nominated as fire or acoustic rated.

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

Chasing in blockwork: Chase only core-filled hollow blocks or solid blocks not designated 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 SERVICE CONNECTION**

**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.

<b>0184 TERMITE MANAGEMENT</b>
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## **1 GENERAL**

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### **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**

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### **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 3.1.3.4.

**0201 DEMOLITION****1 GENERAL****1.1 STANDARDS****Demolition**

Standard: To AS 2601.

**1.2 EXISTING SITE CONDITIONS****Extent of demolition**

Site visit: Allow for a site visit to determine the extent of demolition required.

**Services**

Redundant/disused septic tanks: Locate and allow for decommissioning and removal to **DEMOLITION, Existing septic tanks.**

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

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

**1.3 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**

Asbestos in the workplace: To Safe Work Australia's *How to manage and control asbestos in the workplace: Code of Practice*.

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/sites/unrestricted\\_asbestos\\_licence](http://www.commerce.wa.gov.au/sites/unrestricted_asbestos_licence)

**Asbestos disposal facilities**

Metropolitan areas: Use facilities listed by the Waste Authority at [www.wasteauthority.wa.gov.au](http://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/worksafe/asbestos-removal](http://www.commerce.wa.gov.au/worksafe/asbestos-removal)

**1.4 SUBMISSIONS****Records**

Dilapidation record: Submit to the Principal a copy of the dilapidation record for inspection. 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 of the record, before commencement of demolition.

**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: Where 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.

Further action:

- Arrange for inspection by an environmental consultant to undertake sampling and analysis.
- Protocols for determining if a substance is considered acceptable or unacceptable to human health.
- Procedures for disposal or removal of find.
- Submission by an environmental consultant for assessment/validation/clearance.

**3.2 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 7 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.

#### **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.

### **3.3 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.

### **3.4 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 commencing 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.

### **3.5 DEMOLITION**

#### **Dilapidation record**

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

#### **Hazardous materials removal**

Standard: To AS 2601 clause 1.6.2.

Asbestos removal: To AS 2601 clause 3.3.2.

Materials other than asbestos: To AS 2601 clause 3.3.3.

#### **Existing septic tanks**

Redundant/disused tanks: Decommission tank as follows:

- Completely empty tanks to the *Environmental Protection (Liquid Waste) Regulations*, 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.

### **3.6 COMPLETION**

#### **Notice of completion**

General: Give at least 7 working days' notice of completion of demolition so that adjacent structures may be inspected following completion of demolition.

Rectification of damage: Repair any damage arising out of demolition work, including damage to adjacent properties, footpaths, kerbs, drains, trees and verges before leaving the site.

Rectification of damage to adjoining properties: Obtain written acceptance from the owner of each adjoining property of the completeness and standard of the rectification work.

#### **Temporary support**

General: Clear away 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 retention: If requested by the community's representative, seek approval/instructions from the principal.

**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:

- Site classification: To AS 2870 and BCA 3.2.4.
- Subgrade: The trimmed or prepared portion of the formation on which the pavement, footing or slab is constructed. Generally taken to relate to the upper line of the formation.
- 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.
- Bad ground: Ground unsuitable for the purposes of the works, including fill liable to subsidence, ground containing cavities, faults or fissures, ground contaminated by harmful substances and ground which is, or becomes, soft, wet or unstable.
- Rock: Monolithic material with volume greater than 0.5 m<sup>3</sup> which cannot be removed until broken up by rippers or percussion tools.

**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: Do not use unsuitable material for fill in conformance with AS 3798 clause 4.3.

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

General: If the following are encountered, give notice immediately 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 and imported topsoil where necessary.

Stockpile heights: Establish stockpiles to maximum height of 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 timber or steel 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, use methods including (temporary) shoring and underpinning that maintain the support of the footing and make sure that the structure and finishes supported by the footing are not damaged.

**Existing services**

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

**Bearing surfaces**

General: Provide even plane bearing surfaces for loadbearing elements including footings. Step to accommodate level changes. Make the steps to the appropriate courses if supporting masonry.

**Reinstatement of excavation**

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

**Other buildings/adjoining properties**

Requirement: Carry out excavation within 3 m of other buildings and boundaries to BCA 3.1.1 and BCA 3.1.2, 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.

Ground surrounding dwelling: Grade the ground so that stormwater flows/drains away from the dwelling and does not affect future housing planned for the community.

### 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 materials which will inhibit or prevent satisfactory placement of fill layers, loose material, debris and organic matter.

- 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.

### 3.5 PLACING FILL

#### General

Fill: Conform to the BCA 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.

Compaction: 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, in order 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:

**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.

**Paving units**

Removal: Take up 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**

General: 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 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 edging to the Landscaping Plan 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**

General: To AS 3818.2.

Hardwood: Sound durability class or preservative treated hardwood railway sleepers.

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.

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 SLEEPER WALLS****Construction**

Wall: Erect sleeper posts at 2 m centres, buried one third. Brace at half height of wall 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.

**3.3 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 for 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 to enable it to be bent.

**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 grass level. Provide control joints, filled with resilient bituminous material, at 3 m maximum centres.

Concrete kerb: Fixed form, extrusion or slip forms.

**Spade edge**

Edges: Define mass planting beds by cutting through soil with garden spade at approximately 70 mm 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 REQUIREMENTS****General**

Requirement: Provide fences and barrier systems to the Landscaping Plan as follows:

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

**Existing fencing**

Requirement: If existing fencing is to be retained, match new fencing to the existing for height and type.

**1.2 DESIGN****Wind regions C and D**

Requirement: Conform to the following:

- AS/NZS 1170.2 for Wind Regions C or D and Terrain Category 2 (TC2).
- AS 4055, as appropriate for the project site conditions.

Submission: Provide documentation of fencing details, supports and connection by a professional structural engineer.

**2 PRODUCTS****2.1 STEEL****Steel tubes**

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

- Grade: C350L0.

Post and rail finish: Hot-dip galvanized.

**Slatted cyclone fencing**

Description: Precoated or galvanized steel slatted fencing, installed with open spaces between slats to allow the breeze to flow through and, is able to withstand wind actions for Wind Regions C and D. Match the finish of all components exposed to view.

Height: 900 or 1800 mm high fencing.

Posts: 100 x 100 x 3 mm thick RHS with welded galvanized 3 mm thick cleats. Provide posts complete with covering or matching caps at the top of the posts.

Rail connectors: Galvanized 60 x 60 x 3 mm thick cleats welded to posts, or angle brackets and fixed to posts with self-drilling screws.

Rails: 40 x 40 x 1.6 mm thick galvanized tubing, roll-formed section.

Fence panels: 900 mm or 1800 mm long x 188 mm wide x 16 mm deep (0.42 BMT) thick cold roll-formed section.

Fence capping: Continuous capping finished to match fencing and fixed as recommended by the manufacturer's recommendations.

- Size: 35 x 30 x 0.4 mm tick.

Driveway gate latch and hardware: D latch and 300 mm long drop bolts with galvanized steel keepers built into the concrete driveway.

#### **Post and rail wire mesh fencing**

Description: Type A (Class 1) chain link fabric fencing to AS 1725.3.

Finish: Galvanized steel.

Fence height: 1200 mm.

## **2.2 CONCRETE**

### **General**

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

## **2.3 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.

### **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.

### **Slatted cyclone fencing**

Concrete footings: 250 mm (diameter) x 800 mm (deep) with posts set minimum 650 mm into the concrete.

Post spacing: Maximum 2.1 m apart for Wind Regions C and D.

Slat panel fixing to rail: Fix with self-drilling fixing screws with heads of screws matching the panel colour.

Bottom of fence panels: Install approximately 50 mm above ground level.

Top of fencing: Maximum 290 mm above the top rail.

Open space (gaps) between slats: 32 to 40 mm.

### **Post and rail wire mesh fencing**

Location and gate arrangement: As shown on the drawings.

Installation: To AS 1725.2 Section 4.

Footings: To AS 1725.2 Table B2 of Appendix B.

### **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. 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 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.

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 – SOFTSCAPE****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 if required.

**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: Rock free.

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

Source: Provide topsoil which contains organic matter, will support plant life and is free from stones, contaminants and weeds.

Site: If available, provide material recovered from the site.

**Fertiliser**

Description: Provide proprietary fertilisers, delivered to the site in sealed bags marked to show manufacturer or vendor, 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: Supply plants with 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: Supply plants with extension growth consistent with that exhibited in vigorous specimens of the species nominated.

Damage: Supply plants free from damage and from restricted habit due to growth in nursery rows.

Pests and disease: Supply plants with foliage free from attack by pests or disease.

**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.

**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.

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

Requirement: Clear entire site except where trees are documented on drawings 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 (Pesticide) 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 as determined by 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.

**Planting beds**

Excavated: Excavate to bring the subsoil to at least 300 mm below finished design levels. Shape the subsoil to fall to subsoil drains where required. Break up the subsoil to a further depth of 100 mm.

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

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

#### Placing topsoil

General: Spread the topsoil on the prepared subsoil and grade evenly, making the necessary allowances to permit the following:

- Required finished levels and contours may be achieved after light compaction.
- Grassed areas may be 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

#### Planting area

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.

#### Installation

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

Laying: Lay the turf in the following manner:

- In stretcher pattern with the joints staggered and close butted.
- Parallel with the long sides of level areas, and with contours on slopes.
- To 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. Continue watering to 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.

Dispersal of stormwater from roof: Lay 2 strips wide of turf directly under the dripline of the verandah roof line.

### 3.3 GRASS REINFORCING

#### Materials

Grass pavers: Lightweight interlocking plastic cellular paving system capable of sustaining pedestrian and occasional vehicular traffic including emergency vehicles.

#### 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: 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, and 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: Remove the plant from the container with minimum disturbance to the rootball, make sure that the rootball is moist and place it in its final position, in the centre of the hole and plumb, and with the top soil level of the plant rootball 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.

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 where reticulation is documented on drawings. Where reticulation is not documented on drawings, 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: Supply and install 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 where documented on drawings. Install a 10 amp 250 volt socket outlet in the cabinet.

- Supply conduit and draw wire to the reticulation cabinet.
- Position socket outlet at the bottom right hand corner of cabinet and connect to common services power circuit.

Socket outlet label: SUPPLIED BY COMMON SERVICES POWER CIRCUIT.

#### Irrigation controllers

Controllers: Provide automatic controllers that are easily programmed and include the following:

- Valve boxes.
- Manual cycle and individual control valve operation.

- Manual on/off operation of irrigation without loss of program.

- ≥ 4 on/off cycles per day.

- Day omit.

- 240 V input and 24 V output capable of operating 2 control valves simultaneously.

- ≥ 24 hour battery program backup.

- Power surge protection.

- Lockable cabinet in external locations with minimum IP 54 protection to AS 60529.

- Electrical connection: Where connected to wall outlets, provide 3 core 10 A, 240 V flexible cord and plug. Provide an isolating switch at the controller.

Power supply: For developments with multiple dwellings, connect to the common power source, not the power supply of individual dwellings.

- Metering: Connect to the common supply meter.

Number of stations in the controller: ≥ number of stations in the reticulation systems.

Number of controllers: Do not use more than one controller without the approval of the principal.

Controller type/product: Do not install without approval from the principal.

#### Underground piping and PVC-U fittings

PVC-U pipes: To AS/NZS 1477.

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

Mainline piping: Minimum Class 12 PVC-U.

Lateral piping: Minimum Class 9 PVC-U.

PVC-U fittings: Minimum Class 18 PVC-U. Allow for changes in pipework direction using fittings. Do not install pipes with excessive bending.

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

#### Concrete surrounds

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.

#### Northwest and Gold fields region

Sprinkler installation: Provide plastic sprinkler surrounds to all sprinklers to protect from lawn mower damage.

### 3.6 DRIP IRRIGATION SYSTEMS

#### Installation

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.

### 3.7 MULCHING

#### Placing mulch

General: Place mulch to the required depth, 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 sloped towards the base of plant stems in plantation beds, and not closer to the stem than 50 mm in the case of gravel mulches.

Depths: Spread organic mulch to a depth of 75 mm.

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

### 3.8 STAKES AND TIES

#### Stakes

Requirement: Provide for all new trees and shrubs.

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. Position stake on the prevailing wind side of the plant.

Stake sizes:

- For plants  $\geq$  2.5 m high: Three 50 x 50 x 2400 mm stakes per plant.
- For plants 1 to 2.5 m high: Two 50 x 50 x 1800 mm stakes per plant.
- For plants < 1 m high: One 38 x 38 x 1200 mm stake per plant.

#### 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.

### 3.9 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.

### 3.10 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: 20 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 in conformance with *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: 1:100.

**Thickness**

Minimum:

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

**Curing**

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

**Labour**

Requirement: Use only experienced and skilled labour.

**Mass concrete paving**

Slab thickness: 100 mm.

Concrete class: 20 MPa.

Pour sections: Pour in sections of not more than 10 m<sup>2</sup> or 6 m in length.

Joints: Crack groove at not more than 2 m centres.

Edge finish: Steel trowelled to a smooth surface.

**Vehicular driveways/parking**

Slab thickness: 100 mm.

Concrete class: 20 MPa.

Reinforcement: F72 mesh.

Pour sections: Pour in sections of not more than 75 m<sup>2</sup> or 12 m in length.

Joints: Provide clean construction joint between sections. Set-downs: As required for areas where the flooring finish is ceramic tiling.

Thresholds: Provide at all external openings and as required.

**Blinding layer**

Requirement: Provide 50 mm bedding sand under all concrete slabs on ground. Accurately screed so that floor level is correct and as required.

Location: Allow for all set-downs, block-outs and falls.

**Condenser plinths**

Requirement: Where 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: Where possible, mount condensers on the concrete verandah slab.

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

**2.2 JOINTS****Contraction joints**

General: Form tooled joints at maximum 2000 mm spacing.

**Expansion joints**

General: Cast-in 10 mm thick bitumen impregnated fibreboard 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 bitumen impregnated fibreboard between the paving and the wall. Otherwise, turn up the vapour barrier.

**2.3 FINISHING METHODS****Finishes**

Broom finishing: Wood float and broom to an even textured transverse scored surface with steel tooled margins. On gradients steeper than 10%, roughen the surface by scoring using a stiff brush or rake.

Exposed aggregate finish: Steel trowel to a smooth surface. After final set use clean water and brushes to remove the surface film of mortar until the aggregate is uniformly exposed without under cutting of the matrix.

Sponge finish: After floating, produce an even textured sand finish by wiping the surface using a damp sponge.

Pattern paving: After machine floating, apply a proprietary treatment producing an integral coloured and patterned surface.

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

Compact base: To AS 1289.5.2.1.

Finish: Granolithic finish.

<b>0276 PAVING – SAND BED</b>
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## **1 GENERAL**

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### **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**

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### **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**

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### **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:  $\pm 10$  mm at any point on the finished concrete 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:  $\pm 20$  mm from the lengths documented in AS 1742.2.

Longitudinal line widths:  $\pm 10$  mm from the widths documented in AS 1742.2

Transverse line lengths and widths:  $\pm 10$  mm from the lengths and widths documented in AS 1742.2.

Other markings:  $\pm 50$  mm from the documented dimensions shown on the drawings 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:  $\pm 20$  mm.

Bollard plumb: H/100.

### **2 PRODUCTS**

#### **2.1 CHANNELS AND KERBS**

##### **Concrete**

Standard: To AS 1379.

Grade: N20.

#### **2.2 LINEMARKING**

##### **Pavement marking paint**

Standard: 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**

##### **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: Galvanize after fabrication.

### **3 EXECUTION**

#### **3.1 CHANNELS AND KERBS**

##### **General**

Standard: Construct kerb and/or gutters in fixed forms, by extrusion or by slip forming.

##### **Foundation preparation**

Foundation material: Shape and compact to form a firm base before placing any kerb and/or channel.

Construction on a pavement course: To 0271 *Pavement base and subbase*.

##### **Backfill**

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

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%, when tested in conformance with AS 1289.5.4.1, for standard compactive effort.

Pavement: Backfill pavement material adjacent to new kerbs and/or channels in conformance with the drawings and 0271 *Pavement base and subbase*.

#### **3.2 LINEMARKING**

##### **Surface preparation**

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

Wet weather: Do not apply pavement marking during wet weather or if rain is likely to fall during the process or paint drying time.

Provision for traffic: Allow for traffic during application and protect pavement markings 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 paint**

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.

Markings alignment: Straight or with smooth, even curves where intended.

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

##### **Removal of pavement markings**

General: Remove pavement markings, as documented or no longer required, from the wearing surface of pavements without causing significant damage to the surface.

#### **3.3 VEHICLE BARRIERS**

##### **Log barriers**

Installation: Check out the posts to receive the rails. Set each post 600 mm into the ground 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 into the ground 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 concrete using masonry anchors, installed to the manufacturer's recommendations. Top of bolt to stop 25 mm below the top of the wheel stop.

Finish: Grout the holes flush to match the concrete finish.

##### **Steel tube bollards**

Footing: Encase buried end of bollard in concrete, minimum 600 mm deep x 250 mm diameter.

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

Filling: Fill the tube with 15 MPa concrete.

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

**0310 CONCRETE****1 GENERAL****1.1 STANDARDS****General**

Formwork design and construction, formed surfaces: To AS 3610 and AS 3610.1.

Plywood formwork: To AS 6669.

Specification and supply of concrete: To AS 1379.

Reinforced concrete construction: To AS 3600.

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 relevant period at a site.
- Weather:
  - . Cold: Ambient shade temperature < 10°C.
  - . Hot: Ambient shade temperature > 30°C.

**1.3 TOLERANCES****Finishes**

Formed surface finish quality: To AS 3610.1 Table 3.3.2 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**

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

**Plywood formwork**

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 GENERAL****Labour**

Requirement: Use only experienced and skilled labour.

**Verandah or external slabs**

Slab thickness: 100 mm.

Concrete class: 20 MPa.

Reinforcement: F73 mesh.

Pour section: Pour in sections of not more than 50 m<sup>2</sup> or 8 m in length.

Joints: Provide clean construction joints in between sections and crack grooves at each column centreline or at maximum 3 m intervals, as appropriate.

Edge finish: Steel trowelled to a smooth radius.

Freestanding carports: Where required, allow for a 2 m separation from carport roof to verandah slab to prevent roof water shedding onto the verandah.

- Pathway: Allow a 1.2 m wide path from the verandah to carport.

**3.2 POLYMERIC FILM UNDERLAY****Location**

General: 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.

**3.3 FORMWORK****Preparation**

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 time of use. Place them on a firm level surface and place reinforcement and concrete with minimum delay.

### 3.4 REINFORCEMENT

#### Supports

Proprietary concrete, metal or plastic supports: To AS/NZS 2425 and 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:  $\leq 60$  diameters.
- Mesh:  $\leq 600$  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: 225 mm.
- 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.

### 3.5 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:  $\geq 5^{\circ}\text{C}$ .
- Formwork and reinforcement before and during placing:  $\geq 5^{\circ}\text{C}$ .
- Water: Maximum  $60^{\circ}\text{C}$  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 at  $\leq 35^{\circ}\text{C}$ .
- Formwork 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  $35^{\circ}\text{C}$  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.

### 3.6 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 total cumulative number of days or fractions of days, during which the air temperature in contact with the concrete is above  $10^{\circ}\text{C}$ , 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.

#### Curing compounds

Application: 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  $5^{\circ}\text{C}$  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.

**3.7 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.

**3.8 FORMED SURFACES****Surface repairs**

Method: If surface repairs are required, submit proposals.

**3.9 UNFORMED SURFACES****Surface finishes**

General: As documented.

**Surface repairs**

Method: If surface repairs are required, submit proposals.

**3.10 COMPLETION****Formwork removal**

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

Timing: Do not disturb formwork until concrete is hardened enough 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 B Table B1.
- 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 3700. Include any additives such as colouring, as documented.

Proportions: 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.

**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 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 mm<sup>2</sup> 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) Standard.

Beams and lintels: To BCA 3.4.4, AS 4100 and AS/NZS 4600.

Corrosion protection: To BCA 3.4.4.4 based on steel member exposure.

- Lintels and masonry accessories: Provide protection to AS/NZS 2699.1, AS/NZS 2699.3 and AS 3700 clause 5.7 as appropriate for the environment classification.

**Wind regions C and D**

Framing and trusses: Conform to the following:

- AS/NZS 1170.2 for Wind Regions C or D and Terrain Category 2 (TC2).
- AS 4055, as appropriate for the project site conditions.
- Maximum truss spacing: 1200 mm centre.

**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 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**

Metallic-coating: To AS 1397.

Minimum coating class: To BCA 3.4.2.2.

**Framing members**

Cold-formed steel framing: For a proprietary system, comply with NASH-1 and NASH-2.

**Framing thickness**

Steel stud wall framing: Minimum 1.6 mm.

Verandah columns: Minimum 3 mm.

**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.

**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.

Noggings adjacent to doors: Provide noggings at the same level as and behind the door, where the door knob strikes the wall.

**Vermin barriers**

Requirement: Provide vermin barriers as follows:

- Brick veneer barrier: Fix 10 mm 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 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.

**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.

**Fixing of roof sheeting - Wind regions C and D**

Roof batten: G550 steel battens with minimum 0.75 mm BMT, total coated thickness of 0.8 mm.

**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: Provide fascia, valley gutter boards and barge boards in conformance with the manufacturer's requirements.

**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 TIMBER DURABILITY****Treatment and selection**

Requirement: To **TIMBER** in *0171 General requirements*.

**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.

Floor and wall frame member sizes: Submit a schedule of proposed member sizes, certified as meeting stated project requirements and the AS 1684 series.

**Preservative treatment**

CCA treated timber: If proposed to be used, provide 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 or AS 1720.3.

Prefabricated roof trusses: Include the following:

- On a plan, the truss layout.
- On elevations, the arrangement of members allowing for the accommodation of in-roof services and the size and section type of each member.
- Camber of bottom chord.
- The method of assembly, connection, lifting, holding down and bracing.

Prefabricated wall frames: Include the following:

- On plan, the wall layout.
- On elevations, the arrangement of members, and the size and section type of each member.
- The 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-processed 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:  $\geq 25$  mm.

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

### 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.

#### 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 gutter and barge boards

Requirement: Provide 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.

## 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 E<sub>1</sub>.

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 E<sub>1</sub>.

##### Compressed fibre cement sheeting

Standard: To AS/NZS 2908.2.

Category: Minimum 4.

Type:

- 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

##### Membrane materials

Standard: To AS 4654.1.

##### Membrane design and installation

Standard: 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. 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.

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 have them fixed 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 membrane is overlaid, topped or backfilled against, provide a protection board to protect 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.

#### **Warranty**

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 spacer**

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

#### **1.2 MATERIALS**

##### **Sheet metal roofing**

Material: Prefinished/coated or galvanized (self-finished) 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 ventilators**

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

Finish: Match adjacent roofing.

##### **Vermin mesh**

Mesh: Powder coat finished expanded aluminium mesh.

Mesh size: As required to provide bird/rodent proofing.

Colour: Black.

#### **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.

**Wall and roof junction**

Junction: Run wall cladding and lining to the underside of roof sheeting.

Installation: Lap wall cladding under the roof battens/purlin. Scribe around rafters as required and make neat bends in sheets where changes in direction occur. Make sure all edges are secured.

If above timber or steel beam: Cover sheet edge with aluminium or timber beads.

Metal separation: Provide where mesh is in direct contact with other metals.

**Raking roofs**

Roof and wall junctions: Scribe wall cladding around battens/purlins, to provide a neat junction at the underside of the roof sheeting, or provide hardwood infill panel/members.

**Reinstatement**

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

**Cleaning**

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

**2.2 SHEET METAL ROOFING****Installation**

Roof tiling: To AS 2050 and BCA 3.5.1.2.

Metal sheet roofing: To BCA 3.5.1.3.

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.

**Roof sheet finish**

Town based construction: Precoated steel sheeting.

Non-town based construction: Galvanized, self-finished steel sheeting.

**Wind regions C and D**

Fixing of roof sheeting: To the manufacturer's recommendations and as follows:

- Cyclonic fasteners and washers: Galvanized steel EPDM bonded to the manufacturer's recommendations for the appropriate substrate.

**2.3 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 3.5.2.4.

**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 panel**

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.

**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 3.5.3.5.
- 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.

**Wind regions C and D**

Cyclonic fasteners and washers: Galvanized steel EPDM bonded to the manufacturer's recommendations for the appropriate substrate.

**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 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 3.5.3.2.

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.

**Joints**

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.

## 2.4 PROFILED SHEET METAL

### Installation

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 for the following:

- Serviceability design wind pressure: To AS 2047 Table 2.1, as appropriate for the project site conditions.
- Ultimate strength test pressure: To AS 2047 Table 2.5, as appropriate for the project site conditions.

##### 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.

##### Testing - Wind regions C and D

Debris impact resistance for glazed sidelights and sliding doors: Tested for loading to AS/NZS 1170.2 clause 2.5.8.

### 2 PRODUCTS

#### 2.1 GENERAL

##### Protection of openable windows

Fall prevention: To BCA D2.24 and BCA 3.9.2.5.  
Testing: To AS 5203.

##### Glass

Safety glasses: To AS/NZS 2208.

##### Aluminium frame finishes

Powder coating: To AS 3715:

- Grade: Architectural coating.

Anodising: To AS 1231:

- Thickness:  $\geq 15$  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: Provide 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: Provide 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 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.

Roll up screens: Provide a proprietary retractable insect screen comprising aluminium frame with baked enamel finish, fibreglass mesh beaded into 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 without distortion.

**Bushfire screens and seals**

Protection: Protect glazed windows and doors from the ingress of embers.

Standard: AS 3959.

**Security/cyclone debris screens to windows**

Security grilles and screen doors: 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 transfer 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:

- Allows cleaning of any fixed lights from the outside.
- Held open position: Allow for mechanisms for holding screen 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.

Testing: Provide certification that screen has been tested to withstand impact loading from windborne debris conforming to AS/NZS 1170.2 clause 2.5.8.

**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, caulking and pointing so that water is prevented 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.

**Laminated glass**

Requirement: Provide for the following:

- Doors.
- Sliding panels.
- Windows where required.

**Security/cyclone debris screens to windows**

Location and extent: Provide to the whole area of windows and glazed sliding doors.

Installation: To AS 5040 by a Police Licensed security installer.

Door type and location: Provide sliding security screen doors to the external face of each glazed sliding door.

## 0453 DOORS AND ACCESS PANELS

### 1 GENERAL

#### 1.1 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

General: 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.

Door frames: As documented on the drawings.

##### Flush doors

General: Provide flush doors of balanced construction.

##### Door panels

Solid core doors: Tempered hardboard faced, external grade blockboard core doors, painted to all edges, including the top and bottom of doors. Do not use particleboard core doors.

Door thickness: 35 mm.

Edging: Hardwood edge stripping, drilled for locks.

##### Construction

Door thickness: 35 mm for internal and external doors.

Door width: 870 mm, unless documented otherwise.

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.

#### **Steel faced door panels and steel framed doors**

Steel door frame: Pressed metal door frames manufactured from galvanized 1.6 mm gauge steel with cut-outs for striker plates.

Steel faced doors: 37 mm (nominal) thick door clad on both sides with 0.6 mm galvanized steel skins, internally cleat joined at edges to provide hidden edge fixings.

- External steel skin: Bonded to an internal foam core with timber reinforcing sections to lock, hinge and closer positions. Fold skins at top and bottom of the leaf to completely enclose ends and seal to prevent moisture ingress.
- Lock hardware latch plate: Recess into the door edge so that it finishes flush with the external edge surface.
- Door finish: To match other doors.
- Hinge: 2 mm reinforcing hinge strip.

#### **Tolerances**

Squareness: The difference between the lengths of diagonals of a door:

- Maximum 3 mm.

Twist: The difference between perpendicular measurements taken from diagonal corners:

- Maximum 3 mm.

Door leaf clearances:

- Between other leaves and leaf and frame: 2 to 5 mm.
- Between door and floor finish:  $\pm 20$  mm after floor finish installation, except for removable toilet doors.

#### **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 transfer 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:

- Allows egress from the inside and the cleaning of any fixed lights from the outside.

- 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 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 FRAMING**

#### **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.

### 3.3 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.

#### Doors panels

Hollow core door locations: Wardrobes and W.C.s.

Solid core doors location: All external and internal doors other than wardrobe doors, including store doors, and as required on schedules/drawings.

Steel faced doors: Provide if required on schedules/drawings.

## 0454 OVERHEAD DOORS

### 1 GENERAL

#### 1.1 SUBMISSION

##### Certification – Wind regions C and D

Requirement: Submit manufacturer's data verifying the following:

- Materials, products and installation: The door is able to withstand wind pressure to AS/NZS 4505 Table 5.2 for the wind classification appropriate to the project site.
- Testing: In conformance with AS/NZS 4505 Appendix A for cyclonic regions.

#### 1.2 STANDARD

##### General

Garage doors: To AS/NZS 4505.

### 2 EXECUTION

#### 2.1 INSTALLATION

##### Frames

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.

**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.

**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.

**Door frames**

Hardware fittings: Fix the following to the door frames:

- Stainless steel escutcheon plate.
- Flat mushroom rubber buffers.

**Locks and door furniture**

External doors other than duct doors: Provide latchset and deadlocks with inside snib and proprietary stainless steel shroud (approximately 200 x 100 x 1 mm thick) around the deadlock.

Privacy locksets: Provide to bathroom, shower and W.C., and bedroom doors.

Escape lockset: Provide to store doors.

Passage lockset: Provide to all other interior doors.

Door handles: Lever sets.

Lockset finish:

- Generally: Satin chrome-plating (SCP) finish.
- Front entry door: Single cylinder mortice cylinder with stainless steel (SSS) finished deadlock.

**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.

#### **Door buffer**

Internal doors: Provide a satin chrome finished, half moon, floor mounted door stop to all doors.

Securely fix, as close as possible to the wall, so that the door and hardware does not strike the wall or other surfaces.

External doors: Provide a satin chrome, floor mounted door stop with 3 fixing points.

Levelling: If required to achieve full contact with the door, raise the door stop on a painted hardwood block fixed to the floor. Make sure the door buffer does not make contact with the door seal.

#### **Air conditioner panel**

Locks: Allow panels to be locked internally with 2 x 80 mm horizontal chrome/satin barrel bolts.

Drawing reference: Standard Detail L8A.

## **0467 GLASS COMPONENTS**

### **1 GENERAL**

#### **1.1 STANDARDS**

##### **General**

Materials and installation: To AS 1288.

Safety glasses: 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.

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.

#### **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.

### **3 EXECUTION**

#### **3.1 FIXING MIRRORS**

##### **Vinyl backed Grade A safety mirrors and solid annealed glass mirrors**

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.

#### **Mirror fixing**

Mirror locations and sizes: As shown on drawings.

Fixing: Frame or clip fixing to **Vinyl backed Grade A safety mirrors and solid annealed glass mirrors**. Do not adhesive fix to walls.

- Number of fixing points: 6 for frame and 4 for clips.
- Frame size: 20 mm face.

### **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 BCA.

### **2 PRODUCTS**

#### **2.1 MATERIALS**

##### **Fire hazard properties**

Cavity insulation material: Conform to the following, tested to AS/NZS 1530.3:

- Spread-of-Flame Index:  $\leq 9$ .
- Smoke-Developed Index:  $\leq 8$  if Spread-of-Flame Index  $> 5$ .

Material with reflective facing: Test to AS/NZS 1530.3 and the recommendations of Appendix A6.

Pliable membranes Flammability Index tested to AS 1530.2:  $\leq 5$ .

##### **Insulation**

Cellulosic fibre (loose fill): To AS/NZS 4859.1 Section 5.

Mineral wool blankets and cut pieces: To AS/NZS 4859.1 Section 8.

Polyester: To AS/NZS 4859.1 Section 7.

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.

Reflective thermal insulation: To AS/NZS 4859.1, Section 9.

Wool: To AS/NZS 4859.1, Section 6.

##### **Pliable membrane**

Standard: To AS/NZS 4200.1.

### **3 EXECUTION**

#### **3.1 GENERAL**

##### **Bulk insulation**

Standard: To AS 3999.

Requirement: 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 membrane**

Standard: To AS 4200.2 and BCA 3.12.1.1.

#### **Installation**

Safety: Comply with NOHSC:2006.

#### **Ceiling insulation**

Insulation type: Fibre batts.

R-Value: Minimum R3.0 or as required on drawings/Schedule.

Minimum thickness: As recommended by the manufacturer to achieve the required R-Value.

### **3.2 FLOOR INSULATION**

#### **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 WALL INSULATION**

#### **Framed wall thermal break strips**

Product type: Proprietary item.

Application: To steel or timber framing with lightweight external cladding.

R-Value:  $\geq 0.2$ .

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**

Product: Rigid cellular insulation board.

Application: To the inner brick skin.

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 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 ROOF INSULATION**

#### **Pliable 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 – 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: 6 mm.
- Ceiling: 6 mm.

**2 EXECUTION****2.1 CONSTRUCTION GENERALLY****Substrates or framing**

General: 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.

**Accessories and trim**

General: Provide accessories and trim as required to complete the installation.

**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.

**Wall and ceiling linings**

Store walls and ceiling: Fibre cement.

Shower walls: Fibre cement, complete with flexible wet area sealant at shower walls and floors.

Bathroom walls: Fibre cement for tiling over.

Ceiling manhole: 600 x 400 mm, as located on drawings.

**Durable wall and ceiling linings**

Location: As nominated in the Schedules.

Walls (non-wet areas): Minimum 9 mm thick fibre cement lining to the Schedule or drawings.

**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 processed fibreboard (including hardboard)

Standard: To AS/NZS 1859.4.

##### Particleboard

Standard: To AS/NZS 1859.1.

##### Dry processed 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 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 approved samples. In natural stone, 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, fine finished finish.

### **1.2 KITCHEN ASSEMBLIES**

#### **Standard**

General: To AS/NZS 4386.1.

### **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:

- Adjustable for height, side and depth location of door.
- Self-closing action.
- Hold-open function.
- Nickel plated.

Slides: Metal runners and plastic rollers with the following features:

- 30 kg loading capacity.
- 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 noggling 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.

**Wardrobe, cupboard, drawer units**

Construction: To **WARDROBE, CUPBOARD AND DRAWER UNITS** and the following:

- Framing: To **Steel cupboard and bench framing**.
- Cupboard door edging: ABS edging.
- Door panels: Moisture resistant medium density fibreboard.

**Kitchen and vanity cupboards**

Drawing reference: Drawing details L1A, L2A, L3A and L5B for sink, bench, stove and microwave, overhead, island bench, and kitchen cupboards; kitchen drawers; and vanity units.

**Built-in wardrobe**

Drawing reference: Detail L4G.

Wardrobe finish: Provide floor, wall and ceiling finishes to match room finishes to which the robe opens.

Wall recess cupboards: Provide doors to *0453 Doors and access panels*.

- Drawing reference: Detail L3A.

**Steel cupboard and bench framing**

Drawing reference: Details L1A, L2A, L3A, L4G, L5B and L13.

Framing: Provide galvanized steel frame as required to support the required cupboards, with fixing connections for fixing to wall framing and adjustable legs.

End of frames: Seal all ends.

Welded frame members: If required, butt weld. Wire brush to form a smooth surface on completion.

Fasteners: Countersink all fasteners.

Shelving: Perforated steel shelves as shown on drawings.

Frame and perforated steel shelving finish: Powder coat.

Adjustable leg finish: Stainless steel.

Stainless steel benchtops: 1.2 mm thick stainless steel, folded return at exposed edges with slightly rounded arrises to form a 20 mm deep fascia.

- Backing: Bond stainless steel to 18 mm thick compressed fibre cement sheeting with adhesive recommended by the manufacturer.
- Finishing: Remove sharp corners to exposed edges.
- Drawing reference: Joinery layout and Details L1A, L2A, L3A and L5B.

**Kitchen cupboard and cabinet hardware**

Door catches: Heavy duty concealed double magnets with minimum 13 kg pull.

Strike plates: Install screw-in steel plates. Do not install self-adhering steel strike plates.

Hinges: Powder coated steel piano hinges welded to the cupboard framing.

- Length: To fit the length of cupboard/cabinet doors.

Childproof compartment: Provide to kitchen cupboards and vanity unit complete with a childproof catch.

- Drawing reference: Detail L12.

Drawer sliders: Zinc-plated 510 mm full extension with ball bearing runner or similar.

- Fixing to drawers: Screw fixed.

Top drawer: Provide 75 mm high cutlery tray.

**High pressure decorative laminate panel benchtops**

Location: Provide for kitchen and laundry benchtops and upstands.

Thickness: Minimum 13 mm.

Upstands: Provide 45° bevel to the top edge and 5° bevel to bench junction, sealed with clear silicone.

**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 rise 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 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****Gas cooktop and upright stoves**

Generally: If required in the Schedules, provide an electric wall oven and gas cooktop or upright stove to each dwelling unit.

- Aged persons units: To Detail L5.
- Family and singles units: To Detail L5A.

Gas cooktop: 4 burner gas cooktop.

- Dimension: 600 mm wide.
  - Hob material and finish: Stainless steel, white enamel finish.
  - Ignition: 220 to 240 V, ignition through knob.
- Gas upright stove: Freestanding gas stove with 4 burners and oven.
- Dimension: 1150 (H) x 540 (W) x 620 (D) mm and 240 mm high splashback.
  - Material and finish: Stainless steel, white enamel finish.
  - Oven gross capacity: 80 litres.

**Electric wall ovens and upright stoves**

Electric wall oven and cooktop: If required in the Schedules or on drawings, provide electric wall oven (with circuit and isolator) and electric cooktop to each dwelling unit.

- Drawing reference: Detail L5B, replace gas cooktop with electric cooktop.
- Wall oven: Single electric fan forced oven with removable side opening door.
- Dimension: 595 (H) x 596 (W) x 568 (D) mm.
- Material and colour: Stainless steel, white.

Electric upright stove: If required in the Schedules or on drawings, provide electric upright stove, with circuit and isolator.

- Type: Freestanding electric stove with 4 cooking elements and conventional oven.
- Dimension: 540 (W) x 620 (D) x 1150 (H) mm.
- Material and finish: Stainless steel, white enamel finish.
- Oven gross capacity: 80 litres.
- Cabling: For each stove, provide a 900 mm long cable in flexible conduit from the isolator to the stove floor, attached with anti-tilt brackets, installed to the manufacturer's recommendations.
- Appliances isolator: Wall mounted white plastic adjacent to the stove location.

**Electric cooktops**

Type: Electric cooktop with 4 cooking elements.

Dimension: 600 (W) x 535 (D) x 58 (H) mm.

Material and finish: Stainless steel, white enamel finish.

Drawing reference: Standard Detail L5B, replace gas cooktop with electric cooktop.

#### **Rangehoods**

Type: Flued, dual fan rangehood with front recirculating option.

Location: Above cooktop or stove.

Material and finish: Stainless steel, white enamel finish.

Dimension: 598 (W) x 500 (H) x 160 (D) mm.

Noise level (high/low): 64/57 dB.

#### **Exhaust fan**

Kitchen and bathroom: 200 mm diameter.

#### **Dwelling number signage**

Location: To the front verandah beam or approved location.

Signage: 100 mm high die cast pre-painted metal numbers.

Numbers: To the Housing Authority Community Layout Plan (CLP). Confirm with the principal before ordering.

## **2 EXECUTION**

### **2.1 APPLIANCES**

#### **Appliances and exhaust fan installation**

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 outside.

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.

Fixed clothesline: Galvanized steel frame and wire.

- Drawing reference: Standard Detail G7.

#### **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 hazard properties**

Requirement: Submit evidence of conformance to PRODUCTS, **GENERAL, 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****Fire hazard properties**

Fire hazard indices for all materials: Conform to the following tested to AS/NZS 1530.3:

- Spread-of-Flame Index:  $\leq 9$ .
- Smoke-Developed Index:  $\leq 8$  if Spread-of-Flame Index  $> 5$ .

**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 COVERING TYPES****Curtain rods and brackets**

Curtain rods: Provide PVC coated 16 to 25 mm diameter galvanized steel curtain rods to all windows, except for W.C.s and showers.

Metal support brackets: Provide brackets with 75 mm projection to suit curtain rod.

- Number of brackets: 3 per curtain board.

**Curtain boards**

Location: Provide curtain boards over all window and sliding door openings, except for W.C.s and shower recesses.

Type: 100 mm (nominal) thick treated pine, double bullnose architrave with minimum 150 mm additional length each end of window opening.

Fixing: Fix to adjoining wall with one counter sunk screw at each end.

Finish: Painted the same colour as the wall.

**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 *Competition 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.

**Metal 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	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
- Base coats in multi-coat systems with cement or gypsum finishes	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.

**Metal 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 m<sup>2</sup> 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 TOPPING****1 PRODUCTS****1.1 MATERIALS****Admixtures**

Standard: To AS 1478.1.

**Aggregates**

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.

**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.
- Roughen hardened concrete by scabbling or the like to remove 2 mm of the laitance and expose the aggregate.

**Bonded toppings**

General: 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****Laying**

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.

**2.3 SURFACE FINISHES****Finishing methods – primary finish**

Machine float finish:

- After levelling, consolidate the surface using a machine float.
- Cut and fill and refloat immediately to a uniform, smooth, granular texture.
- Hand float in locations inaccessible to the machine float.

Steel trowel finish: After machine floating finish as follows:

- Produce a smooth surface relatively free from defects using power tools.
- When the surface has hardened sufficiently produce the final consolidated finish free of trowel marks and uniform in texture and appearance using steel hand trowels.

Burnished finish: Continue steel trowelling until the concrete surface attains a polished or glossy finish, uniform in texture and appearance, and free of trowel marks and defects.

Wood float finish: After machine floating use wood or plastic hand floats to produce the final consolidated finish free of float marks and uniform in texture and appearance.

Broom finish: After machine floating draw a broom or hessian belt across the surface to produce a coarse even-textured slip-resistant transverse-scored surface.

Scored or scratch finish: After screeding, give the surface a coarse scored texture using a stiff brush or rake drawn across the surface before final set.

Sponge finish: After machine floating, obtain an even textured sand finish by wiping the surface using a damp sponge.

Exposed aggregate finish: After floating and when concrete has stiffened, wet the surface and scrub with stiff fibre or wire brushes, flushing continuously with clean water, until the aggregate is uniformly exposed. Rinse the surface with water.

**Finishing methods – supplementary finish**

Abrasive blast: After steel trowelling, abrasive blast the cured surface to provide texture or to form patterns without exposing the coarse aggregate using fine hard, sharp graded abrasive particles.

Coloured applied finish: Apply a proprietary liquid or dry shake material to a steel trowel finished surface in conformance with the manufacturer's written requirements.

Stamped and coloured pattern paved finish: A complete proprietary finishing system.

Polished finish: After steel trowelling, grind the cured surface of the concrete.

**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/m<sup>2</sup> evenly distributed.

**Surface colouring**

General: Apply the colouring product after floating and before the topping surface has set and trowel into the surface so that it is even in colour.

**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: Finish cementitious toppings at junctions with differing floor finishes with a corrosion resistant metal dividing strip suitable fixed to the substrate, with 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.

**2.6 COMPLETION****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.

**0621 WATERPROOFING - WET AREAS****1 GENERAL****1.1 STANDARDS****Waterproofing wet areas**

Standard: To AS 3740.

**2 PRODUCTS****2.1 MEMBRANES****Membrane**

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 21 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.

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: 8 mm minimum to vertical corners. 10 to 12 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.

#### 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: 8 mm minimum to vertical corners. 10 to 12 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 wall and floor.

#### Curing of liquid applied systems

General: To the manufacturer's instructions.

Curing: Allow membrane to fully cure before tiling.

#### Overlaying 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.

#### Warranty

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: Comply with the recommendations of those parts of AS 3958.1 which are referenced in this worksection.

**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.

**Slip resistance**

Classification: To AS 4586.

**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 shell: 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.

**Wall tiles**

Location: Apply to shower enclosure walls to a height of 2000 mm above the shower floor.

**Bath hob**

Location: As shown on drawings.

**Ceramic floor tiles**

Tile dimension: 100 x 100 mm.

Slip resistance: R10.

**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.

**1.2 SUBMISSION****Operation and maintenance manuals**

Cleaning and polishing: Submit a maintenance manual with polishing and cleaning instructions, including details of liquids and cleaners recommended for the installed work, including for skirtings.

**2 PRODUCTS****2.1 GENERAL****Substitution of materials**

Alternative material: If proposed, provide samples and data sheets of the materials proposed. Do not order materials without written approval from the principal.

**Delivery and storage**

Delivery: Deliver materials in the original packaging, bearing the material brand name, colour, thickness and other relevant data.

Storage: Store materials in a secure dry area, away from other materials which may cause its deterioration.

**Warranties**

Requirement: Provide a warranty covering the installation, against defective materials and workmanship for the following from the date of practical completion.

Workmanship: 5 years.

Material warranty period: 15 years

Warranty statement: Include a statement that the whole of the work has been carried out to AS 1884 and the manufacturer's recommendations at the time of installation.

**2.2 MATERIALS****Wet processed fibreboard (hardboard) underlay**

Standard: To AS/NZS 1859.4.

Classification: General purpose medium board, manufactured specifically as flooring underlay.

Thickness: 5.5 mm.

**Floor tiles and planks**

Vinyl floor tiles: 2.5 mm (nominal) thick homogenous commercial grade tile with through-pattern.

- Tile size: 300 x 300 mm (nominal).

Luxury vinyl plank: 2.5 mm thick, vinyl planks with 0.55 mm thick polyurethane reinforced wear layer.

- Wear resistance group: T.

- Slip resistance: R10.

- Plank size: 1220 x 150 or 1220 x 130 mm (nominal).

**Floor sheeting**

Vinyl floor sheeting: 2 mm (nominal) thick homogenous commercial grade tile with high dent and gouge resistance.

- Wear resistance group: T.

- Slip resistance: R10.

**Wall sheeting**

Vinyl wall: 2 mm thick homogenous, commercial grade vinyl sheeting.

**Ancillary materials**

Adhesives: Adhesive recommended by the floor covering manufacturer for installations in site locations with high temperatures and humid climates.

Floor filler/leveller: To the floor covering manufacturer's recommendations.

**3 EXECUTION****3.1 PREPARATION****Substrates**

General: To AS 1884 Section 3.

Subcontractor inspection: Examine the substrate, including

walls and doors before applying resilient finish and accessories.

Wall substrate surface condition: Dry, clean, smooth, structurally sound and free from moisture, alkali, dust, dirt, wax, oils, grease, loose paint or plaster, or any other foreign matter.

Imperfections in substrate surface: Rectify before applying resilient finish and accessories.

**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 the following surface treatments:

. 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.

#### **Skirting set-out and installation**

Set-out and installation points: Mark at the required finishing point at all external and internal corners and strike a chalk line between each point to act as a guide. Make sure skirting finish is straight and levelled.

Checking: Check material in good natural light for obvious defects before positioning skirting in final location. If the material has defects, replace. Position all material in the final location before applying adhesive.

Joints: Mitre at internal and external corners.

Installation and fixing: To the manufacturer's recommendations.

#### **Skirtings**

Coved skirting: Provide a radius section at wall and floor junctions sheet, coved 100 mm up the walls. Seal around the base of all steel door frames with silicone seal.

Feather edge skirting: Provide flexible vinyl skirting with a coved base (toe) and tapered top edge as a finish to the base of the wall, over floor finishes such as vinyl, tiles and timber, where required.

- Skirting height: 100 or 150 mm high.

- Colour: To match floor finish.

#### **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.

Protection of materials: Apply suitable sheeting taped over the floors, such as 3 mm MDF or sheet paper. Maintain in position until final cleaning before practical completion.

#### **Reinstatement**

Damaged work: Repair or replace faulty or damaged work, including work which cannot be successfully cleaned. 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.

Stripping, sealing and cleaning: To the manufacturer's recommendations.

**0654 ENGINEERED PANEL FLOORS****1 PRODUCTS****1.1 MATERIALS****Flooring panels**

General: Provide the proprietary flooring system nominated.

**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.

**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**

**Recycled timber**

Standard: To FWPA PN06.1039.

- Grading: To Section 5.1.

**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.

**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****Floor sanding and finishing**

General: To AS 4786.2.

**2 PRODUCTS****2.1 FINISH****Filler**

General: Non-oil based and compatible with the coating system.

**Coating system**

Quality: Provide premium quality lines.

Combinations:

- Do not combine clear finishes from different manufacturers in a coating system.
- Provide only the combinations of filler, stain and sealer recommended by the manufacturer of the top coats.

Delivery: Deliver all products to the site in the manufacturer's labelled and unopened containers.

**3 EXECUTION****3.1 PREPARATION****Lighting**

General: Provide supplementary lighting to allow close examination of the entire process.

**Substrate**

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 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 system as follows:

- 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 the coating system 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.

**Items/surfaces requiring painting**

Requirement: Provide paint finishes and colours as required on the finishes schedule(s) and/or drawings.

**Items/surfaces not to be painted**

Requirement: Do not paint the following unless required on the Schedule or drawings:

- Fibre cement fencing/prefinished fencing.
- Roof sheeting.
- Face masonry including concrete blockwork.
- Concrete.
- Glazed ceramic tiles.
- Prefinished items, including precoated metals, chrome-plated, baked enamel or plastic items.
- Vinyl.
- Aluminium.
- Stainless steel.
- Melamine surfaced particleboard/hardboard.
- Pre-painted window frames.

**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.

**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 paints from different manufacturers in a paint 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.

## 2.2 SURFACE TREATMENT TO STEELWORK

### Primer

Coating system: Self-curing ethyl silicate based inorganic zinc system conforming to AS/NZS 3750.15, Type 3 or Type 4.

Minimum dry film thickness: 125 microns.

Metallic zinc content of dry coating: Not less than 77% of the dry film tested to AS/NZS 3750.15 Appendix E.

### Intermediate coat

Coating system: Epoxy coating conforming to AS/NZS 3750.15 and compatible over zinc primers.

Minimum dry film thickness: 125 microns.

Colour: White.

### Top coats

Coating system: High build recoatable polyurethane coating conforming to AS/NZS 3750.6.

Total coating thickness: Minimum 150 microns, consisting of 2 coats of minimum 75 microns.

## 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 steelwork

Requirement: Before painting, including before applying primers and sealers, clean exposed steel surfaces to the recommendations of AS/NZS 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/NZS 2312.1 Section 8 and AS 1627.1.

### 3.2 PAINTING

#### Exposed steelwork

Steelwork partially or wholly exposed to the weather: 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/NZS 2312.1 Section 5 and the paint manufacturer.

Paint coating systems: To the recommendations of AS/NZS 2312.1 Section 6 for atmospheric corrosive Category D (High) and long term durability of 10 to 15 years.

- Number of coats: 4 coat system, including primer.
- Water used in the painting process: To AS/NZS 4020.

#### Light levels

General:  $\geq 400$  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
<b>Interior</b>	
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
<b>Exterior</b>	
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
<b>Paving</b>	
Paving paint, semi-gloss	AS 3730.29
Paving paint, gloss	AS 3730.29

**0702 MECHANICAL DESIGN AND INSTALL****1 GENERAL****1.1 STANDARDS****General**

Mechanical ventilation: To AS/NZS 1668.1 and AS 1668.2, as required by the BCA.

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 SAA HB 276.

**1.2 AIR CONDITIONING DESIGN****Standards**

General: To the recommendations of one or more of the following:

- AIRAH Design Application Manuals.
- ASHRAE Handbook.
- CIBSE Guides.

Method of calculation: Manual or software that employs the data and methods in the above standards.

**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.

Maximum noise levels in occupied spaces: NR 30.

Ambient noise emitted: The lower of:

- A 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.
- Maximum noise level at site boundary permitted under the *Environmental Protection (Noise) Regulation 1997*.

**2 PRODUCTS****2.1 AIR CONDITIONING****General**

Requirement: Where air conditioning systems are required, conform to the following:

- Unit type: Inverter type split systems with wall or ceiling mounted indoor sections with indoor and outdoor sections designed and selected to operate together.
- 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.

**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.

Cabinets: 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.

Indoor unit: Provide multi-directional discharge grilles, multi or variable speed supply fan and access panels.

Outdoor unit: Provide weatherproof case with access panels or removable covers for access to all components. Provide compressor motor overlaid or over current protection, high pressure switch, discharge gas thermostat, crankcase heater and internal thermostat.

Fans: Statically and dynamically balanced with motors suitable for the operating environment.

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.

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

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) ± 1.5°C.

Functions: Provide the following functions:

- Temperature control with adjustable set point located to accurately sense zone temperature.
- Fan speed selection for multi and variable speed fans.

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 galvanised 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.

#### Painting

Paint finish: Paint all items exposed to view and/or weather including ductwork, pipework and equipment. Submit proposed colours and locations.

#### 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: Install cabling in conduits or cable ducts.

Electromagnetic compatibility: Prevent electromagnetic interference. Conform to the AS/NZS 61000 series.

### 3 EXECUTION

#### 3.1 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.

##### 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.

##### Pipe duct

Duct: Run exposed piping external to the building in metallic coated steel duct. Provide a removable cover or similar for access. Paint to match the surface on which it is located. Where possible, run cables in the same duct.

#### 3.2 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.

#### 3.3 COMPLETION

##### 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.

### 3.4 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.

## 0802 HYDRAULIC DESIGN AND INSTALL

### 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.

##### Shower curtain rail

Shower curtain rod: 25 mm diameter, satin finished, type 304 stainless steel rod installed at 1800 mm above the finished floor level.

- Fixing/support: Screw fixed (side mounting flanges) to wall.

Curtain rings/hooks: 50 mm (nominal) diameter type 304 stainless steel openable rings.

Shower curtain: Heavy duty, opaque, matte white vinyl curtain with nickel-plated brass grommets along top 150 mm spacing and hemmed bottom.

- Width: To suit the shower recess.

- Corner shower rails: Allow for 2 curtains to suit the shower configuration.

Towel and grab rails: 30 mm (nominal) satin finished, type 304 stainless steel rail screw fixed to walls.

- Length: 1200 mm or suit the configuration shown on drawings.

##### Toilet paper holder

Location: Install adjacent to each W.C. pan.

Type: Satin finished stainless steel single roll holder.

Installation: For stud walls, allow trimmer support at fixing points.

##### Recessed soap and shampoo holder

Location: One per shower recess as shown on drawings.

Type: Satin finished, type 304 stainless steel recessed holder.

Dimensions: 200 (W) x 300 (H) x 70 (D) mm.

Installation: Allow for wall framing support and recess to suit. Waterproof seal all connection point/joints.

#### Coat hooks

Type: Satin finished, type 304 stainless steel single hook.

Location: Fix to back of doors in bathroom and/or shower cubicles.

Fixing: Screw fixed.

- To wall: Allow stud or trimmer support at fixing points.

#### W.C. suites

Pan: 4.5 litre full flush washdown pan with open flushing rim with the following:

- Chrome flush button.
- Vitreous china pan.
- Plastic seat.

Cisterns: Dual flushed, wall fixed, PVC-U cistern installed with vandal resistant conversion kit to lock lid onto the cistern.

#### Wall/hand basins

Vanity basin: Oval self-rimming, vitreous china, inset vanity basin with two soap holders.

- Nominal dimensions: 500 x 425 mm.
- Tapholes: 1 or 3, as required.
- Bowl capacity: 7 litres.

Semi-recessed basin: Oval self-rimming, vitreous china, semi-recessed vanity basin with two soap holders.

- Nominal dimensions: 500 x 430 mm.
- Tapholes: 1 or 3, as required.
- Bowl capacity: 8 litres.

Tapware: Fixed outlet with aerator.

#### Baths

Type: White slip resistant acrylic bath to AS/NZS 2023 Section 6 with aluminium angle corner tiling strip for upstand corners.

Nominal size: 1500 mm long.

Installation: To AS/NZS 2023 Appendix B.

Tapware: Wall-mounted bath set.

#### Sinks

Type: stainless steel double bowl sink with drainer.

Nominal size: 1350 (long) x 470 mm (wide) double bowl.

Tapware: 150 mm long swivel arm outlet with aerator.

#### Wash troughs

Type: Stainless steel inset trough to AS/NZS 1229 Section 5.

Minimum bowl capacity: 70 litres.

Tapware: 150 mm long swivel arm outlet.

#### Taps and other fittings

Tap rating: Minimum 4 stars WELS rating.

Type and finish: Chrome-plated or powder coated brass star type or capstan type handles.

Finger grip only handles: Do not install.

Outlet risers: Stainless steel.

Plastic tapware: Do not install.

Shower heads: Install so that shower outlet is 1800 mm above the finished floor level.

## 2.2 WATER HEATERS

### Heaters installed in Northern areas

Installations with hard water source: Provide heaters with bobbin elements to the manufacturer's recommendations.

### Solar water heaters

Location: Provide solar water heaters only if required on drawings or the Schedules to **COLD AND HEATED WATER, Water heaters**.

Roof mounted collectors: Install in a shade free area using cyclone mounts or frame to the manufacturer's recommendations, including for the following:

- Mounting angle.
- Distance from bathrooms and kitchens.
- Tolerances.

Solar panel mounting frame: Galvanized steel frame and fixings able to withstand wind classification as defined in AS/NZS 4505 appropriate to the project site.

Collector panel stone guards: Provide galvanized steel framed welded mesh (stone guard) enclosure, to all roof mounted collector panels, to the solar heater manufacturer's recommendations.

- Finish:
  - . Town based construction: Powder coat finished to match roof colour.
  - . Non-town based construction: Galvanized, self-finished.

Electrical booster element: Single phase with thermostatic and manual control.

- Booster element control: Provide a booster element relay switch complete with push button switch and neon indicator installed as shown on electrical drawings. The relay switch is to be initiated by a single press of the push button switch and turned off by the booster element thermostat on reaching the set water temperature. Make sure connection is suitable with electrical distributor's network requirements.
- Switch location: Inside the meter box. If no location has been nominated on drawings, seek instructions from the principal.

### Heat pumps

Location: Provide if required on drawings or the Schedules to **COLD AND HEATED WATER, Water heaters**.

Type: 200 litre solar heat pump water heater and fan guard.

Installation: To AS/NZS 3500.1 and the manufacturer's recommendations including for the following:

- Valves.
- Tempering valves to bathrooms.

### 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 meter – Requirements/layout*. (See [www.watercorporation.com.au](http://www.watercorporation.com.au))

Community managed water supply: Provide Water Corporation approved meters and/or sub-meters to each dwelling and connect to the mains in conformance with **Box covers** and the Water Corporation requirements.

Above ground meters: To **Box covers**.

Consumer accounts: Open an account for each water service in the contractor's name. Pay and close account at practical completion.

General water service: Install 20 to 25 mm brass ball valve on exterior wall at 1800 mm high.

##### Box covers

Meter box: Provide a precast concrete water meter box with galvanised steel hinged lid.

Box dimension: 600 x 290 x 145 mm high box.

Box covers (hinged lid): Install lid to water meters as shown on drawings.

Principal's approval: Before ordering and installing meter box and cover, confirm details with the principal.

##### 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.

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.

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 ablation 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.

**Cleaning**

General: On completion, flush the pipelines using water and leave pipelines clean.

**3.4 STORMWATER****Drainage**

Connection to drainage system: To the local government authority's drainage system

Drainage from silt pit: Provide 90 mm diameter stormwater drain.

Existing road kerb: Demolish if required to facilitate new works. Replace or rectify on completion of works.

**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****Waste outlets and pipes**

Bathroom drains: Provide stainless steel 100 (wide) x 35 (deep) mm single length square bar grate floor channel drain.

- Outlet: Provide 95 mm diameter outlet for connection to soil drain at floor slab underside.

Floor wastes:

- Step-down or level shower recesses: Install reflux valves.
- Grates: Provide 100 mm chrome-plated brass removable gratings.

Waste pipes:

- Pipes penetrating floor slab laid on ground: Do not install with wrappings, sleeves or surrounding openings in the concrete.
- Other waste pipes encased in concrete: Provide 6 mm thick wrapping.

Relief disconnector gullies: Fit with 100 mm diameter pop-up inspection cover.

**Standards**

General: To AS/NZS 3500.2.

Waterless composting toilets: To AS/NZS 1546.2.

On-site domestic wastewater treatment units: To AS/NZS 1546.3.

**Cleaning**

During construction: Use temporary covers to openings and keep the system free of debris.

On completion: Clean and flush the system.

**Septic tanks**

Standard: To AS/NZS 1546.1.

Effluent disposal: To AS 1547.

**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.

### 3.6 STAND PIPES

#### General

Requirement: Provide two external stand pipes (one at front and one at rear) to each dwelling fixed against 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 finished ground level with backflow prevention devices to AS/NZS 3500.1.

### 3.7 SEPTIC TANKS AND INTERCEPTOR TANKS

#### Septic tanks

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*.

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 the *Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations* and the local government authority's requirements.

Installation: Construct with brickwork, concrete segments, or lightweight polypropylene modular tank system (for underground water storage).

### 3.8 RAINWATER TANKS

#### Standards

Metal tanks and rainwater goods: To AS/NZS 2179.1.

Design and installation: To the recommendations of SAA 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 m<sup>2</sup> 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.

### 3.9 GREYWATER SYSTEMS

#### Standards

Design and installation: To AS 1546.4.

#### Greywater diversion devices

Standard: To ATS 5200.460.

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.

**3.10 GAS****Supply**

Gas supply to each dwelling: If required in the Schedules, provide the following:

- Individual reticulated gas service connection and meter.
- Gas piping from gas supply to gas appliances and outlets.

**Standard**

Reticulated gas systems: To AS/NZS 5601.1.

**Connection to reticulated gas**

Consumer accounts: Open an account for connection to reticulated gas main in the contractor's name. Pay connection fees and other costs accrued before closing the account at practical completion.

Gas fitting work: Provide the following:

- Piping between gas main and meters.
- Meters and regulators.

**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**

Requirement: If bottled LP gas is required on the schedule, provide one full 45 kg capacity gas bottle to each dwelling unit.

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 directed by the principal, point relief valve away from building.

Cylinder storage and handling: Conform to AS/NZS 1596.

Gas bottle restrainer: To Detail P2 to each bottled LP gas installation.

Labour and material: Supply labour and material required to complete the gas supply system, including manual changeover gas regulator and metal hood.

**0902 ELECTRICAL DESIGN AND INSTALL****1 GENERAL****1.1 STANDARDS****General**

Electrical installation: To AS/NZS 3000 and SAA HB 301.

Electrical cable selection: To AS/NZS 3008.1.1.

Telecommunications cabling: To AS/CA S008, AS/CA S009, AS/NZS 3080, and SAA 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.

**Connection costs**

Consumer accounts: Open an account for connection to the power supply in the contractor's name. Pay connection fees and other costs accrued before closing the account at practical completion.

**2 PRODUCTS****2.1 GENERAL****Appliances**

Requirement: To **PRODUCTS, APPLIANCES** in *0572 Miscellaneous fixtures and appliances*.

**Consumers mains**

Type and size: As documented, to meet AS/NZS 3000 and the network provider's requirements.

**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.

**Main switchboard and metering panel**

Electrical meter box: Standard metal cabinet.

**Authorised products - fire detection and alarms**

Equipment: Provide equipment listed in the ActivFire Register of Fire Protection Equipment.

**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****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 poles 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: 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**

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.

- 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.

**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.

Card pre-payment electricity meter: Provide to each dwelling if required on the Schedules.

- Type: Single-phase debit meters.
- Installation: Install away from sources of water, excess heat and humidity. If installing outside, fit within a weatherproof cabinet.
- At handover: Start each meter with a \$20 standard credit and program as required by the principal to the manufacturer's recommendations.

**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.

- Location: Do not place under roofed area so that the earth around the electrodes is kept moist. Where practicable, locate adjacent to a hose cock.
- Protection: Locate in a position that is protected from damage by vehicles and lawn mowers.

### 3.3 LOW VOLTAGE POWER SYSTEMS

#### Switchboards

Standard: To AS/NZS 3439.3.

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 Housing Authority's <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.

- Label circuits with permanently marked labels.

Dwelling unit load centre finish: White, beige or light grey.

#### 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.

Fixed and stationary appliances: Treat socket outlets supplying fixed or stationary appliances likely to cause an RCD to trip due to earth leakage currents in accordance with AS/NZS 3000. Do not connect to circuits that supply socket outlets intended for hand held or portable appliances.

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.

Socket type: Provide as follows:

- Generally: 10 amp.
- External installations: 10 amp with IP Rating to AS/NZS 3000.
- Fridges and air conditioning panels: 15 amp.

Light switches: Install 1100 mm above the finished floor level.

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 all bedrooms and dining/lounge areas. 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 POWER GENERATION – PHOTOVOLTAIC

#### Systems description

Requirement: Provide photovoltaic generating system(s) as documented, incorporating the following:

- Photovoltaic array.
- Regulator.
- Inverter.
- Connection to low voltage power system.

#### Standards

Requirement: For the purpose of this worksection, conformance to the following standards relating to stand-alone systems are also applicable to those systems which are to be connected to the network supply:

- Stand-alone power systems: To AS/NZS 4509.1 and AS/NZS 4509.2.
- Grid connected systems: To AS 4777.1 and AS 4777.2.
- IEC 61836.

#### Photovoltaic module

Selection: To AS/NZS 4509.2, AS/NZS 5033 and as documented.

#### Array

Encapsulation: Required.

Toughened glass: Required.

Protection rating:  $\geq$  IPX6.

Integral bypass diode protection: Required.

#### Cells

Type: Crystalline.

Standard: To IEC 61215.

Efficiency:  $\geq 12\%$ .

#### Regulator

Selection: To AS/NZS 4509.2 and as documented.

Function: Charge cycle control including:

- Low battery voltage disconnect.

- Pulse width modulation.
- $\geq 3$  step series regulation.

Display: LCD display of:

- Battery voltage.
- Charge current.
- Ampere hours in and out.
- Load current.

Alarms: Visible and audible low and high battery voltage alarms.

Transient protection: Required.

#### **Battery system**

Selection: To meet the documented performance.

Blocking diodes: Required.

Service life:  $\geq 10$  years.

Standards: To AS 2676 and AS 4086.1.

#### **Inverter**

Selection: To meet the documented performance.

Waveform: True sine wave.

Waveform quality: To AS 4777.

Voltage regulation:  $\pm 8\%$ .

Harmonic distortion of output current:  $< 4\%$ .

Frequency regulation:  $\pm 1\%$ .

Efficiency:  $\geq 90\%$  at 10% load.

Protection: Overload, short circuit and transient required.

Automatic no-load shutdown: Required.

Display:

- Output power.
- Grid stability.

Standards: To AS 4777.2.

Synchronisation: Provide self commutation modules which automatically synchronise the inverter supply frequency and phase angle to the low voltage network or other embedded generator system.

#### **Control panel**

General: Provide photovoltaic system control panels, switchgear and controlgear assemblies as documented.

#### **Metering**

Requirement: Provide photovoltaic metering equipment to meter the energy that is exported back to the grid to the requirements of the electricity distributor.

### **3.5 LIGHTING**

#### **External lighting points**

External lights: If required, provide batten holder fixings and long life low energy bulbs.

External luminaires: Yellow anti-insect globes.

Lights in Wind Regions A, C and D: Weatherproof with heavy duty polycarbonate fittings.

#### **Internal lighting points**

Type: Batten holders to required locations.

#### **Switches**

Requirement: Flush mounted 10 amp IP56 or IP66 rated flush mounted switches, as appropriate.

#### **Luminaires**

Standard: To AS/NZS 60598.1.

Luminaire type: Provide as follows:

- Generally: LED recessed downlights, as documented.
- Garage: Fluorescent fittings.

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/NZS 4782.2.
- Self-ballasted lamps: To AS/NZS 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 front and rear of dwelling.

### **3.6 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/NZS ISO/IEC 15018.

Telecommunication/telephone outlets: Provide RJ45 8 modular jacks as documented.

- Location: Where the room in which the telephone outlet is to be installed in does not have a roof space, provide a concealed conduit from the telephone outlet wall box to the internal wall, to an accessible location.

- Quantity: Provide minimum two telephone outlets per dwelling.

- Pinouts: T568A to AS/NZS 3080.

Telecommunications cables: Provide as follows:

- Type: Copper.
- Standard: To AS/CA S009 and AS/NZS ISO/IEC 15018.
- 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.

Requirement: Provide the following:

- Provide an outlet assembly to each dwelling, including antenna, cable and television outlet.
- TV outlet and co-axial: Provide to living rooms, 500 mm above floor level.
- An external TV aerial.
- MATV system for developments of 3 units or more.

Antennae: Provide and locate antennae to receive all locally available free-to-air television stations.

- Antenna system: To AS 1417.

#### **VAST television systems**

Before tender closing: Confirm with the principal the television system currently used by the community where the project site is located.

VAST system: If in use by the community, provide a VAST system complete with the following:

- One TV outlet.
- Set-top box.
- 1 x 85 cm satellite dish suitable for VAST LNB per dwelling or site, as documented on drawings or the Schedule.

Centralised television distribution system: If one satellite dish is shared by multiple dwellings, liaise with ACMA and Broadcasting Australia and provide transmitter or cabling as required by ACMA or Broadcasting Australia.

RG6 Quad shield cabling: Provide from LNB to F connector mounting block.

Satellite dish: Align to the satellite and commission system.

Location of system components: Confirm location with the principal before installing.

VAST system not in use by the community: If not in use by the community, provide a TV system to match the system currently used by the community.

#### **Network systems**

General: Provide a coaxial cabling system suitable for satellite or cable network operator's services.

Conduits for future cabling:  $\geq 25$  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.

### **3.7 ELECTRONIC SECURITY**

#### **Intruder alarm system**

General: Provide intruder alarm system.

Standard: To AS/NZS 2201.1.

### **3.8 FIRE DETECTION AND ALARMS**

#### **Smoke detection**

General: Provide smoke detectors to the requirements of the BCA 3.7.2. Connect smoke alarms to mains power.

Smoke alarms: Install hardwired smoke alarms to BCA 3.7.2 and the manufacturer's recommendations.

- Where there is more than one alarm: Interconnect alarms in conformance with BCA 3.7.2.2(d).

### **3.9 CABLE 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 3080.

#### **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.

### **3.10 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/NZS ISO/IEC 15018. 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/NZS ISO/IEC 15018.

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.

<b>REFERENCED DOCUMENTS</b>
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The following documents are incorporated into this worksection by reference:

NOHSC 2006	1990	National code of practice for the safe use of synthetic mineral fibres
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 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)
AS/NZS 1229	2002	Laundry troughs and tubs
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 1289.5.1.1	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/NZS 1546.2	2008	Waterless composting toilets
AS 1546.3	2017	Secondary treatment systems
AS 1546.4	2016	On-site domestic wastewater treatment units
AS/NZS 1547	2012	On-site domestic wastewater management
AS 1562		Design and installation of sheet roof and wall cladding
AS 1562.1	1992	Metal
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/NZS 1668.1	2015	Fire and smoke control in multi-compartment 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 1725		Chain-link fabric fencing
AS 1725.2	2010	Tennis court fencing - Commercial
AS 1725.3	2010	Tennis court fencing - Private/Residential
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	2004	Particleboard
AS/NZS 1859.2	2004	Dry-processed fibreboard
AS/NZS 1859.3	2005	Decorative overlaid wood panels
AS/NZS 1859.4	2004	Wet-processed fibreboard
AS 1860		Particleboard flooring
AS/NZS 1860.1	2002	Specifications
AS 1860.2	2006	Installation
AS 1884	2012	Floor coverings - Resilient sheet and tiles - Installation practices
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 2023	1995	Baths for ablutionary purposes
AS/NZS 2032	2006	Installation of PVC pipe systems
AS 2047	2014	Windows and external glazed doors in buildings
AS 2050	2002	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 2098.11	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/NZS 2312.1	2014	Paint coatings
AS/NZS 2425	2015	Bar chairs in reinforced concrete - Product requirements and test methods
AS/NZS 2588	1998	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 2676		Guide to the installation, maintenance, testing and replacement of secondary batteries in buildings
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 2754		Adhesives for timber and timber products
AS/NZS 2754.1	2016	Adhesives for manufacture of plywood and laminated veneer lumber (LVL)
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/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	2007	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 3080	2013	Information technology - Generic cabling for customer premises (ISO/IEC 11801:2011, MOD)
AS/NZS 3439		Low-voltage switchgear and controlgear assemblies
AS/NZS 3439.3	2002	Particular requirements for low-voltage switchgear and controlgear assemblies intended to be installed in places where unskilled persons have access for their use - Distribution boards
AS/NZS 3500		Plumbing and drainage
AS/NZS 3500.1	2015	Water services
AS/NZS 3500.2	2015	Sanitary plumbing and drainage
AS/NZS 3500.3	2015	Stormwater drainage
AS/NZS 3500.4	2015	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	2009	Concrete structures
AS 3610	1995	Formwork for concrete
AS 3610.1	2010	Documentation and surface finish
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	2011	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	2016	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 3750.6	2009	Full gloss polyurethane (two-pack)
AS/NZS 3750.9	2009	Organic zinc-rich primer
AS/NZS 3750.15	1998	Inorganic zinc silicate paint
AS 3786	1993	Smoke alarms
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	2009	Construction of buildings in bushfire prone areas
AS 3972	2010	General purpose and blended cements
AS 3999	2015	Bulk thermal insulation - Installation
AS/NZS 4020	2005	Testing of products for use in contact with drinking water
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 4086		Secondary batteries for use with stand-alone power systems
AS 4086.1	1993	General requirements
AS 4100	1998	Steel structures
AS 4120	1994	Code of Tendering
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 4312	2008	Atmospheric corrosivity zones in Australia
AS/NZS 4357		Structural laminated veneer lumber
AS/NZS 4357.0	2005	Specifications
AS/NZS 4386		Domestic kitchen assemblies
AS/NZS 4386.1	1996	Kitchen units
AS 4419	2003	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 4509		Stand-alone power systems
AS/NZS 4509.1	2009	Safety and installation
AS/NZS 4509.2	2010	System design
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	2005	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 4777		Grid connection of energy systems via inverters
AS 4777.1	2016	Installation requirements
AS/NZS 4777.2	2015	Inverter requirements
AS 4777.3	2005	Grid protector requirements
AS/NZS 4782		Double-capped fluorescent lamps - Performance specifications
AS/NZS 4782.2	2004	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/NZS 4847.2	2010	Minimum Energy Performance Standards (MEPS) requirements
AS/NZS 4858	2004	Wet area membranes
AS/NZS 4859		Materials for the thermal insulation of buildings
AS/NZS 4859.1	2002	General criteria and technical provisions
AS 4970	2009	Protection of trees on development sites
AS/NZS 5033	2014	Installation and safety requirements for photovoltaic (PV) arrays
AS 5039	2008	Security screen doors and security window grilles
AS 5040	2003	Installation of security screen doors and window grilles
AS5101		Methods for preparation and testing of stabilized materials
AS 5101.4	2008	Unconfined compressive strength of compacted materials
AS 5146		Reinforced autoclaved aerated concrete
AS 5146.1	2015	Structures
AS/NZS 5149	2016	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 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 ISO/IEC 15018	2005	Information technology - Generic cabling for homes
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 60529	2004	Degrees of protection provided by enclosures (IP Code)
AS/NZS 60598		Luminaires
AS/NZS 60598.1	2013	General requirements and tests (IEC 60598-1, Ed. 7.0 (2008) MOD)
AS/NZS 61000		Electromagnetic compatibility (EMC)
ATS 5200		Technical Specification for plumbing and drainage products
ATS 5200.460	2005	Grey water diversion device (GWDD)
SAA HB 230	2008	Rainwater tank design and installation handbook
SAA HB 276	2004	A guide to good practice for energy efficient installation of residential heating, cooling & air conditioning plant & equipment
SA/SNZ HB 252	2014	Communications Cabling Manual - Module 3: Residential communications cabling handbook
SAA HB 301	2001	Electrical installations - Designing to the Wiring Rules
SAA HB 330	2009	Living in bushfire-prone areas
ACCC SS	2014	Competition and Consumer (Corded Internal Window Coverings) Safety Standard
AIRAH DA09	1998	Air conditioning load estimation and psychrometrics
Aus Gov Telecom	2015	Telecommunications infrastructure in new developments - A new approach to competition
BCA 3.1.1	2016	Acceptable construction - Site preparation - Earthworks
BCA 3.1.2	2016	Acceptable construction - Site preparation - Drainage
BCA 3.1.3.4	2016	Acceptable construction - Site preparation - Termite risk management - Durable notices
BCA 3.2.2	2016	Acceptable construction - Footings and slabs - Preparation
BCA 3.2.4	2016	Acceptable construction - Footings and slabs - Site classification
BCA 3.3.2	2015	Acceptable construction - Masonry - Reinforced masonry
BCA 3.4.2.2	2016	Acceptable construction - Framing - Steel framing - General
BCA 3.4.4	2016	Acceptable construction - Framing - Structural steel members
BCA 3.4.4.4	2016	Acceptable construction - Framing - Structural steel members - Corrosion protection
BCA Table 3.5.1.1a	2016	Acceptable construction - Roof and wall cladding - Roof cladding - Metal sheet roofing - Acceptable corrosion protection for sheet roofing
BCA 3.5.1.2	2016	Acceptable construction - Roof and wall cladding - Roof cladding - Roof tiling
BCA 3.5.1.3	2016	Acceptable construction - Roof and wall cladding - Roof cladding - Metal sheet roofing
BCA 3.5.2.4	2016	Acceptable construction - Roof and wall cladding - Gutters and downpipes - Installation of gutters
BCA 3.5.3.2	2016	Acceptable construction - Site preparation - Roof and wall cladding - Wall cladding - Timber cladding
BCA 3.5.3.5	2016	Acceptable construction - Roof and wall cladding - Wall cladding - Eaves and soffit linings
BCA 3.7.2	2016	Acceptable construction - Fire safety - Smoke alarms
BCA 3.7.2.2	2016	Acceptable construction - Fire safety - Smoke alarms - Requirements for smoke alarms
BCA 3.8.1.2	2016	Acceptable construction - Health and amenity - Wet areas and external weatherproofing - Wet areas
BCA 3.9.1	2016	Acceptable construction - Safe movement and access - Stair construction
BCA 3.9.2.5	2016	Acceptable construction - Safe movement and access - Barriers and handrails - Protection of openable windows
BCA 3.12.1.1	2016	Acceptable construction - Energy efficiency - Building fabric - Building fabric thermal insulation
BCA 3.12.3	2016	Acceptable construction - Energy efficiency - Building sealing
BCA D2.24	2016	Access and egress - Construction of exits - Protection of openable windows
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	NBN Guideline 2016 Residential preparation and installation: Single Dwelling Units (SDUs) and Multi Dwelling Units (MDUs)
PCA	2016	National Construction Code Series - Plumbing Code of Australia
Safe Work Australia	2016	Hazardous chemical information system
Safe Work Australia	2016	How to manage and control asbestos in the workplace – Code of Practice
WA Gov Act No. 024	2011	Building Act

WA Gov Act No. 074	1995	Local Government Act
WA Gov Act No. 101	1984	Occupational Safety and Health Act (WA)
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. Liquid waste	1996	Environmental Protection (Liquid Waste) 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 Regulations (WAER) (Energy Safety Division (Energy Safety), Department of Commerce
ASTM B117	2016	Standard practice for operating salt spray (fog) apparatus
ASTM C534	2014	Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form
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
IEC 61215		Crystalline silicon terrestrial photovoltaic (PV) modules - Design qualification and type approval
IEC 61836	2007	Solar photovoltaic energy systems - Terms, definitions and symbols
UN GHS	2017	Globally Harmonized System of Classification and Labelling of Chemicals (GHS)



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