The Hive

Specification

440 William Street – Commercial Development

No/street	440 William Street
Suburb	Perth
Municipality/shire/city	Town of Vincent
Reference to title	
Lot/position	Lots 5 & 6
Diagram Number	D/P 613
Owner(s)	First Exemplar Pty Ltd
Address	16 Edith Street Perth WA 6000

Revision	Date	Approved by

COPRAXIS
ARCHITECTS

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TABLE OF CONTENTS

0142 PRELIMINARIES – ABIC SW-1

1 GENERAL

1.1 GENERAL

General conditions
General: To ABIC SW-1 Simple Works Contract, issued by the Royal Australian Institute of Architects and Master Builders Association.

Interpretation
Cross reference: see ABIC SW-1 Section S *Definitions.*

1.2 THE SITE

Site restrictions
Site limitations: Comply with the following restrictions on the use of the site:

The Contractor shall specifically refer to the Conditions of approval issued by the Town of Vincent, serial no. 5.2007.416.1, including the Environmental Health Specific Requirements.

The Contractor shall issue a Construction Management Plan addressing noise, hours of construction, traffic and heavy vehicle access, temporary site offices and site sheds, dust and any other appropriate matters to be submitted to and approved by the Town of Vincent.

Site restrictions
Access: Access onto and within the site, use of the site for temporary works and constructional plant, including working and storage areas, location of offices, workshops, sheds, roads and parking, is restricted to the following areas: Lots 5 & 6 William Street Perth.

Occupied premises
Nil

Protection of persons and property
Temporary works: Provide and maintain required barricades, guards, fencing, shoring, temporary roadways, footpaths, signs, lighting, watching and traffic flagging.

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 property which is to remain on or adjacent to the site, including adjoining property encroaching onto the site, and trees.

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 property which is to remain on or adjacent to the site, including adjoining property encroaching onto the site, and trees.

Existing services
General: Attend to existing services as follows:

- If the service is to be continued, repair, divert or relocate. Submit proposals.
- If the service crosses the line of a required trench, or will lose support when the trench is excavated, provide permanent support for the existing service. Submit proposals.
- If the service is to be abandoned, remove redundant parts and make safe.

Proposals: Submit proposals for action to be taken with respect to existing services before starting this work. Minimise the number and duration of interruptions.

- Purpose of submission: For review.

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.

Conditions for work on adjoining property: The owner is responsible for obtaining the permission from adjoining owners, including for work such as swinging crane jibs, erection of scaffolding and construction of formwork. The Contractor is required to give to the owner indication of the type and extent of the work to be undertaken and in what time frame indicated in the Construction Program.

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 properties described in the **Adjoining properties to be recorded schedule**:

- Inspect the properties with the architect and owners and occupants of the properties, before commencement of work.
- Make detailed records of conditions existing within the properties, especially structural defects and other damage or defacement.
- Arrange for at least 2 copies of each record, including drawings, written descriptions, and photographs, to be endorsed by the owners and occupants, 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.

Adjoining properties to be recorded schedule

Title	Owner	Description
20-28 Robinson Avenue, Perth	Builder to determine	
434-438 William Street, Perth	Builder to determine	
446-448 William Street, Perth	Builder to determine	

1.3 CONSTRUCTION PLANT

Access

Access route to site via William Street, Perth.

Parking

Owner's existing parking areas: Use only designated parking areas.

Contractor parking is to be onsite where possible. On-site Traffic Management Plan to be submitted to the Architect for review and approval prior to construction.

It is the Contractor's responsibility to adhere to the Local Authority's off-site parking requirements. Off-site Traffic Management Plan to be submitted to the Town of Vincent for approval.

Use of existing services

General: Existing services may be used as temporary services for the performance of the contract subject to conditions stated in the **Existing services schedule**.

Existing services schedule

Service	Conditions of use
Water connection	Contractor to pay for all water usage of building works during the construction contract period. Provide separate metering and reimburse owner.

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).

Temporary services
All temporary services for use during construction are the responsibility of the Contractor.

Temporary fence
All temporary fencing and site security during construction are the responsibility of the Contractor.

Project signboards
General: Provide project-specific signboards and the following:

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

Project signboard description
Location: On the front (west) boundary facing William Street.

Size: 1800mm wide x 2400mm high

Text, graphics:	The Hive	
	440 William Street Perth	
Other details:	Builder:	Builder name; Builder's licence number
		Supervisor; Supervisor's licence number
	Architect:	Copraxis Architects
		9328 4754
	Structural Engineer:	Advanced Building Engineers
		9228 4644
	Electrical Engineer:	Connell Wagner
		9223 1500
	Mechanical Engineer:	Connell Wagner
		9223 1500
	Hydraulic Engineer:	TBC Hydraulics
		9486 8666
	Fire Services Engineer:	Schwanke Consulting
		9271 1338
	BCA Consultant:	Schwanke Consulting
		9271 1338
	Acoustics Engineer:	Lloyd Acoustics
		9401 7770

1.4 BUILDING THE WORKS

Surveys
Setting out: Contractor to have a licencesed surveyor set out the building works and check existing survey marks. Surveyor to provide survey marks as required for setouts required by builder. Surveyor to check position of columns, retaining walls, external walls, and check floor levels and verticality of facade, columns, and vertical elements.

Check surveys: to be carried out by the Contractor prior to the commencement of and dring the period of construction. Sufficient markers to be installed on site, including but not limited to datums, set out points, and corner pegs to ensure accurate construction.

Final survey: Contractor to have a licencesed surveyor carry out the final survey when works are substantially complete and near to practical completion, and provided to the Architect for distribution amongst consultants as required.

Survey marks
Definition: The term 'survey mark' means 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 owner's survey marks in their true positions.

Rectification: If the owner's survey marks are disturbed or obliterated, immediately give notice and rectify the disturbance or obliteration.

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.

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.

Program of work

Construction program: Show the following:

- Sequence of work.
- Critical paths of activities related to the work.
- Allowance for holidays.
- Activity inter-relationships.
- External dependencies including provision of access, document approvals and work by others.
- Periods within which various stages or parts of the work are to be executed.

Time scale: Working days.

Updated program: The Contractor must give the architect and updated program where the date for practical completion has been adjusted by 5 working days. Identify changes since the previous version, and show the estimated percentage of completion for each item of work.

Program chart: Display in the contractor's site office an up-to-date bar chart and network diagram based on the construction program.

Site meetings

General: Hold and attend site meetings throughout the contract and ensure attendance of appropriate subcontractors, the architect, and appropriate consultants. Owner's representative may attend but not necessarily participate in any such meetings.

Frequency: To be determined by the contractor and the architect prior to the commencement of the contract.

Minutes: Keep minutes of site meetings. Within 5 working days after each meeting, submit to each party written copies of the minutes.

- Purpose of submission: Review and information.

Contacts: At the first site meeting, submit names and telephone numbers of responsible persons who may be contacted after hours during the course of the contract.

- Purpose of submission: Information only.

Items supplied by owner

General: Materials and other items identified in the **Items to be supplied schedule** will be supplied free of charge to the contractor for installation in the execution of the works. Unload and take delivery of them, inspect them for defects and then take care of them. If defects are found, advise. Return unused items to the owner.

Conditions of supply: Contractor to take full responsibility for items and insurances of items once delivered to site.

Notice: Contractor to give an initial 12 weeks notice to owner for requirement of items on site. Contractor to confirm delivery date a minimum of 2 weeks prior to delivery.

Items to be supplied schedule

Refer to Contract.

Changes to existing
General: Nil.

Persons other than contractor
Contractor is responsible for all subcontractors' facilities and services.

Contractor to allow site access for separate contractors to carry out specialist work where required.

Contractor to allow separate contractors acces to storage on site as necessary.

Contractor to allow separate contractors access to sanitary facilities, hoisting facilities, scaffolding as required.

Contractor is to allow for and provide all services not defined under the separate contractors' scope of works to complete the project as per this specification and all other contract documents.

It is the contractor's responsibility to liaise and interface work required of the contractor in connection with the work of separate contractors, including but not limited to penetrations, chasing, provision of plinths, sealing penetrations and making good all works. Liaise with the consultants responsible for separate contractors.

1.5 COMPLETION OF THE WORKS

Final cleaning
General: Before 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 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, for properties described in the **Adjoining properties to be recorded schedule** inspect the properties with the architect and owners and occupants of the properties, recording any damage that has occurred since the pre-commencement inspection.

Pest eradication
General: Employ suitably qualified pest exterminators. At practical completion submit a certificate stating that completed works are free of pest types identified in the **Pest eradication treatments schedule**.

Pest eradication treatments schedule

Pest type to be treated	Eradication method
Silverfish	To be approved by architect
Cockroaches	To be approved by architect
Mice	To be approved by architect
Spiders	To be approved by architect
Carpet Beetles	To be approved by architect
Wasps	To be approved by architect
Rats	To be approved by architect
Earwigs	To be approved by architect
Fleas	To be approved by architect
Moths	To be approved by architect
Ants and white ants	To be approved by architect

Removal of plant
General: Within 10 working days after practical completion, remove temporary works and construction plant no longer required. Remove the balance before the end of the defects liability period.

1.6 PAYMENT FOR THE WORKS

Import costs
See ABIC SW-1 clause N1 *Contract Price*.

Anticipated progress payments
See ABIC SW-1 clauses N3-N15. The Contractor shall submit the schedule addressing each trade or package, not just the total claim. This will be linked to the program of work.

General: At commencement of the works, submit a schedule of anticipated progress claims which will be made throughout the contract. Submit a revised schedule with each progress claim.

Purpose of submission: Information only.

Progress claims
Break down: With each progress claim, submit a statement of amounts claimed in respect of each worksection or trade heading designated in the specification.

Purpose of submission: Review.

Method of measurement
General: In accordance with the principles of the Australian Standard Method of Measurement of Building Works (ASMM).

Other civil engineering work: To AS 1181.

1.7 MISCELLANEOUS

Occupational Health and Safety
The Contractor shall, so far as is practicable, provide aned maintain a working enviornent in which their employees and subcontractors are not exposed to hazards: they shall also provide such information, instruction, and training to, and supervision of employees and subcontractors as is necessary to enable them to perform their work in such a manner that they are not exposed to hazards.

The contractor shall consult and cooperate with safety and health representatives, if any, and other employes at the workplace, regarding occupational safety and health at the workplace. Contractor to be aware of and comply with *WA Occupational Health and Safety Acet 1984*

Contractor and owner to observe confidentiality
Publicity: Do not issue information concerning the project for publication in the media without prior written approval of the owner. Refer to the owner enquiries from the media concerning the project.

Compliance with the law
Requirements of authorities: The owner, before entering into the contract, has given the notices, paid the fees, and obtained the permits, approvals and other authorisations stated in the **Prior applications and approvals schedule**.

Prior applications and approvals schedule

Prior notices given and applications made	Fees paid	Permits, approvals and authorisations received
Development Approval		Approval to Commence Development Serial No. 5.2007.416.1

Authority conditions schedule

Authority	Document	Condition
Town of Vincent	Approval to Commence Development Serial No. 5.2007.416.1	- Environmental Health specific requirements - Engineering specific requirements - Building specific requirements. All to be submitted by owner prior

Authority	Document	Condition
		to the commencement of the contract.

0169 GREEN STAR – OFFICE AS BUILT SUBMISSIONS

1 GENERAL

1.1 AIMS

Responsibilities

Obligations: Provide reporting and work methods to satisfy the nominated rating and targeted credits.

Report preparation: By suitably qualified and GBCA accredited professionals.

Assessment tool for environmental impacts of identified items during the manufacture use and post-use phase: GBCA Material calculators.

Assessment criteria: As defined in the respective GBCA Technical Manual and the respective Technical Clarifications and CIR rulings posted on the GBCA website, current at the time of assessment.

GBCA Green Star rating

Rating tool: Green Star – Office As Built Version 3 – 2008.

Conditional requirements: Conform to GBCA 'Conditional Requirements' for Energy and Land Use and Ecology.

Rating required: 5 star or as certified in GBCA Office Design rating (pending)

1.2 CROSS REFERENCES

General

General: Conform to the *General requirements* worksection.

1.3 INTERPRETATION

Abbreviations

General: For the purposes of this worksection the abbreviations given below apply:

- ASHRAE: The American Society of Heating, Refrigeration and Air-Conditioning Engineers, Inc.
- CIBSE: Chartered Institution of Building Services Engineers (UK).
- CIR: Credit Interpretation Request.
- FSC: Forest Stewardship Council.
- GBCA: Green Building Council of Australia.
- GWP: Global Warming Potential.
- ODP: Ozone Depleting Potential.
- PCBs: Polychlorinated Biphenyls.
- PVC: Polyvinylchloride.
- TVOC: Total Volatile Organic Compounds.
- VOC: Volatile Organic Compounds.

Green Star Technical Manual clause abbreviations:

- Eco: Land use and ecology.
- Emi: Emissions.
- Ene: Energy.
- IEQ: Indoor environment quality.
- Inn: Innovation.
- Man: Management.
- Mat: Materials.
- Tra: Transport.
- Wat: Water.

Definitions
General: To ISO 16818.

GBCA reference document
Document: GBCA publication Technical Manual – Green Star Office Design & Office As Built, Version 3 2008.

1.4 SUBMISSIONS

Monitoring
Mechanical services: Submit the monitoring documents to the principal.

Environmental management: Provide and implement an Environmental management plan to the NSW Environmental Management System Guidelines (1998) Section 4 and Appendix C.

- Certification: To AS/NZS ISO 14001.

Waste management: Provide and implement a Waste management plan and demonstrate the achievement of 80% of waste by weight being re-used or recycled.

- Verification: Submit records.

General
Requirement: Submit the required documentation for the clauses referenced for each of the following worksections. Refer to the *Technical Manual* for full details of Green Star requirements and to the GBCA for assistance with the assessment process.

Requirement: GBCA document:

- Man-1 Green Star Accredited Professional.

Man-1: Engage a Green Star Accredited Professional to assist in the preparation of the assessment submission.

0181 Adhesives sealants and fasteners
Requirement: GBCA document:

- IEQ-13 Volatile Organic Compounds.

IEQ-13: Document low VOC products that meet TVOC Content Limits outlined in Table IEQ-13.2.

0183 Metals and prefinishes
Requirement: GBCA document:

- IEQ-13 Volatile Organic Compounds.

0201 Demolition
Requirement: GBCA document:

- Man-7 Waste management.
- IEQ-11 Hazardous materials.
- Mat-2 Building re-use.

Man-7: Document materials and components to be recovered, re-used or recycled in the Recovered items for re-use in the works schedule, Recovered materials for delivery to the principal schedule, Demolished material for recycling in the works schedule, Demolished material for recycling off-site schedule and the Dismantle for relocation schedule.

IEQ-11: Document the removal of asbestos, lead and PCBs in accordance with the standards listed in *Table IEQ-11.1* in the **Identified hazardous materials schedule.**

Mat-2: Document the retention of major structural elements including floors, columns, beams, load-bearing walls and facades.

Note*: Mat-5 Concrete* and *Mat-7 Steel* applies to the use of recovered materials during construction, not the recovery process during demolition.

Note: *Emi-3 Refrigerant leaks* applies to methods of preventing and detecting refrigerant leaks in completed systems, not during the demolition process. Although refrigerants are not specifically listed as a material that can be recovered or recycled in *Man-7 Waste management* at present, NATSPEC makes provision for this in *Demolition*.

0221 Site management
Requirement: GBCA document:

- Man-6 Environmental management.
- Man-7 Waste management.

- Eco-1 Topsoil.
- Eco-3 Reclaimed contaminated land.

Man-6: Document management plan under **Environmental management plan (EMP).**

Man-7: Document materials to be recovered, re-used or recycled under **Waste management plan.**

Eco-1: Document measures to prevent soil erosion under **Soil erosion and sediment control plan.**

Eco-3: Document remediation of contaminated land under ***Ground contamination control plan.***

Note*: Mat-5 Concrete* and *Mat-7 Steel* applies to the use of recovered materials during construction, not the recovery process during site works or demolition. See *Demolition* for demolition materials to be re-used or recycled.

0222 Earthwork

Requirement: GBCA document:

- Eco-1 Topsoil.

Eco-1: Document measures to conserve existing topsoils on site under **Removal of topsoil** and **Placing topsoil***.*

0242 Landscape – fences and barriers

Requirement: GBCA document:

- Mat-8 Sustainable timber.

Mat-8: Refer to guidance text on the certification of timber sources.

0251 Landscape – soils

Requirement: GBCA document:

- Eco-1 Topsoil.

Eco-1: Document limits on externally sourced topsoils.

0253 Landscape – planting

Requirement: GBCA document:

- Wat-3 Landscape irrigation.

Wat-3: Document drought-resistant plants for a xeriscape garden.

0254 Irrigation

Requirement: GBCA document:

- Wat-3 Landscape irrigation.

Wat-3: Document connection of irrigation system to non-potable water supplies such as greywater or stormwater retention systems.

0271 Pavement base and subbase

Requirement: GBCA document:

- Mat-5 Concrete.

Mat-5: The standards applicable to recycled concrete aggregate for base and subbase are listed in the **Base and subbase compliance table.**

0274 Concrete pavement

Requirement: GBCA document:

- Mat-5 Concrete.
- Mat-6 Steel.

Mat-5: Document the use of recycled concrete aggregate for concrete mixes. Note minimum percentage requirement.

Mat-6: The Australian Steel Institute http://www.steel.org.au/ (Select *"ASI Groups", "Sustainability"*) provides advice about the percentage of post-consumer content in Australian steel, and identifies products meeting GBCA criteria. Reinforcing bar and mesh is mentioned.

0310 Concrete combined

Requirement: GBCA document:

- Mat-5 Concrete.
- Mat-6 Steel.

Mat-5: Document the use of recycled concrete aggregate for concrete mixes. Note minimum percentage requirement.

Mat-6: The Australian Steel Institute http://www.steel.org.au/ (Select *"ASI Groups", "Sustainability"*) provides advice about the percentage of post-consumer content in Australian steel, and identifies products meeting GBCA criteria. Reinforcing bar and mesh is mentioned.

0316 Precast concrete

Requirement: GBCA document:

- Mat-3 Re-used materials.
- Mat-5 Concrete.
- Mat-6 Steel.

Mat-3: Document the re-use of precast concrete elements.

Mat-5: Document the use of recycled concrete aggregate for concrete mixes. Note minimum percentage requirement.

Mat-6: The Australian Steel Institute http://www.steel.org.au/ (Select *"ASI Groups", "Sustainability"*) provides advice about the percentage of post-consumer content in Australian steel, and identifies products meeting GBCA criteria. Reinforcing bar and mesh is mentioned.

0317 Tilt-up concrete

Requirement: GBCA document:

- Mat-3 Re-used materials.
- Mat-5 Concrete.
- Mat-6 Steel.

Mat-3: Document the re-use of precast concrete elements.

Mat-5: Document the use of recycled concrete aggregate for concrete mixes. Note minimum percentage requirement.

Mat-6: The Australian Steel Institute http://www.steel.org.au/ (Select *"ASI Groups", "Sustainability"*) provides advice about the percentage of post-consumer content in Australian steel, and identifies products meeting GBCA criteria. Reinforcing bar and mesh is mentioned.

0331 Brick and block construction

Requirement: GBCA document:

- Mat-3 Re-used materials.

Mat-3: Document the re-use of bricks and blocks.

0332 Stone masonry

Requirement: GBCA document:

- Mat-3 Re-used materials.

Mat-3: Document the re-use of stone elements.

0333 Stone repair

Requirement: GBCA document:

- Man-7 Waste management.
- Mat-3 Re-used materials.

Mat-3: Document the re-use of stone elements.

0341 Structural steel

Requirement: GBCA document:

- Mat-6 Steel.
- Mat-9 Design for disassembly.

Mat-6: The Australian Steel Institute http://www.steel.org.au/ (Select *"ASI Groups", "Sustainability"*) provides advice about the percentage of post-consumer content in Australian steel, and identifies products meeting GBCA criteria. A number of structural steel elements are mentioned.

Mat-9: Document a Comprehensive Disassembly Plan.

0342 Light steel framing

Requirement: GBCA document:

- Mat-6 Steel.
- Mat-9 Design for disassembly.

Mat-6: The Australian Steel Institute http://www.steel.org.au/ (Select *"ASI Groups", "Sustainability"*) provides advice about the percentage of post-consumer content in Australian steel, and identifies products meeting GBCA criteria. Some steel framing elements are mentioned.

Mat-9: Document a Comprehensive Disassembly Plan.

0382 Light timber framing

Requirement: GBCA document:

- Mat-8 Sustainable timber.

Mat-8: Refer to guidance text on the certification of timber sources.

0383 Flooring and decking

Requirement: GBCA document:

- IEQ-4 Daylight
- Mat-8 Sustainable timber.

IEQ-4: Document colours that provide the required reference reflectance values.

Mat-8: Refer to guidance text on the certification of timber sources.

0421 Roofing – combined

Requirement: GBCA document:

- Mat-3 Re-used materials.
- Mat-6 Steel.
- Mat-9 Design for disassembly.

Mat-3: Document the re-use of roofing materials.

Mat-6: The Australian Steel Institute http://www.steel.org.au/ (Select *"ASI Groups", "Sustainability"*) provides advice about the percentage of post-consumer content in Australian steel, and identifies products meeting GBCA criteria. Roofing is not specifically mentioned.

Mat-9: Document a Comprehensive Disassembly Plan.

0431 Cladding – combined

Requirement: GBCA document:

- IEQ-5 Daylight glare control.
- Mat-3 Re-used materials.
- Mat-6 Steel.
- Mat-8 Sustainable timber.
- Mat-9 Design for disassembly.

Mat-3: Document the re-use of cladding materials.

Mat-6: The Australian Steel Institute http://www.steel.org.au/ (Select *"ASI Groups", "Sustainability"*) provides advice about the percentage of post-consumer content in Australian steel, and identifies products meeting GBCA criteria. Cladding is not specifically mentioned.

Mat-8: Refer to guidance text on the certification of timber sources.

Mat-9: Document a Comprehensive Disassembly Plan.

0432 Curtain walls

Requirement: GBCA document:

- IEQ-9 Thermal comfort.
- Mat-9 Design for disassembly.

IEQ-9: Document thermal performance requirements. Document U-values, Solar Heat Gain Coefficients (SHGC), WERS energy ratings and AWA Compliance Certificate requirements in the **Window and glazed door performance schedule** in *Glazing*.

Mat-9: Document a Comprehensive Disassembly Plan.

0451 Windows and glazed doors

Requirement: GBCA document:

- IEQ-1 Ventilation rates.
- IEQ-2 Air change effectiveness.
- IEQ-4 Daylight.
- IEQ-9 Thermal comfort.

- Ene-1 Greenhouse gas emissions.

IEQ-1 and *IEQ-2:* Document openable window areas for naturally ventilated spaces.

IEQ-4: Document glazing areas and their reflectance and transmittance values.

IEQ-9: Document openable window areas for naturally ventilated spaces and areas of double glazing for mechanically air conditioned spaces.

Ene-1: Document U-values, Solar Heat Gain Coefficients (SHGC), WERS energy ratings and AWA Compliance Certificate requirements in the **Window and glazed door performance schedule**.

0453 Doors and hatches

Requirement: GBCA document:

- IEQ-14 Formaldehyde minimisation.
- Mat-3 Re-used materials.

IEQ-14: Document low formaldehyde emitting products that meet the limit values outlined in Table IEQ-14.1.

Mat-3: Document the re-use of doors and hatches.

0456 Louvre windows

Requirement: GBCA document:

- IEQ-1 Ventilation rates.
- IEQ-2 Air change effectiveness.
- IEQ-4 Daylight.
- IEQ-9 Thermal comfort.
- Ene-1 Greenhouse gas emissions.

IEQ-1 and *IEQ-2:* Document openable window areas for naturally ventilated spaces.

IEQ-4: Document glazing areas and their reflectance and transmittance values.

IEQ-9: Document openable window areas for naturally ventilated spaces and areas of double glazing for mechanically air conditioned spaces.

Ene-1: Document U-values, Solar Heat Gain Coefficients (SHGC), WERS energy ratings and AWA Compliance Certificate requirements in the **Window and glazed door performance schedule.**

0461 Glazing

Requirement: GBCA document:

- IEQ-4 Daylight.
- IEQ-9 Thermal comfort.
- Ene-1 Greenhouse gas emissions.

IEQ-4: Document glazing areas and their reflectance and transmittance values.

IEQ-9: Document areas of double glazing for mechanically air conditioned spaces.

Ene-1: Document U-values, Solar Heat Gain Coefficients (SHGC), WERS energy ratings and AWA Compliance Certificate requirements in the **Window and glazed door performance schedule** if *Glazing* is associated with *Curtain walls* or *Structural glazing.* Do not use this schedule if all windows are specified in *Windows and glazed doors.*

0471 Insulation and sarking membranes

Requirement: GBCA document:

- IEQ-9 Thermal comfort.
- Ene-1 Greenhouse gas emissions.
- Emi-4 Insulant ODP.

IEQ-9 and Ene-1: Document R-values, emittance classifications and locations of insulation.

Emi-4: Document insulation that is free of ozone-depleting substances in both manufacture and composition.

0501 Demolition (interior and alterations)

Requirement: GBCA document:

- MAN-7 Waste management.
- IEQ-11 Hazardous materials.

Man-7: Document materials and components to be recovered, re-used or recycled in the Recovered items for re-use in the works schedule, Recovered materials for delivery to the principal schedule, Demolished material for recycling in the works schedule, Demolished material for recycling off-site schedule and the Dismantle for relocation schedule.

IEQ-11: Document the removal of asbestos, lead and PCBs in accordance with the standards listed in *Table IEQ-11.1*.

Note*: Mat-5 Concrete* and *Mat-7 Steel* applies to the use of recovered materials during construction, not the recovery process during demolition.

Note: *Emi-3 Refrigerant leaks* applies to methods of preventing and detecting refrigerant leaks in completed systems, not during the demolition process.

0511 Lining

Requirement: GBCA document:

- IEQ-14 Formaldehyde minimisation.

IEQ-14: Document low formaldehyde emitting products that meet the limit values outlined in Table IEQ-14.1.

0521 Partitions – demountable

Requirement: GBCA document:

- IEQ-12 Internal noise levels.
- IEQ-14 Formaldehyde minimisation.
- Mat-3 Re-used materials.

IEQ-12: Document the acoustic performance of partitions in the **Partition performance schedule.**

IEQ-14: Document low formaldehyde emitting products that meet the limit values outlined in Table IEQ-14.1.

Mat-3: Document the relocation of partitions.

0522 Partitions – framed and lined

Requirement: GBCA document:

- IEQ-12 Internal noise levels.
- IEQ-14 Formaldehyde minimisation.
- Mat-3 Re-used materials.

IEQ-12: Document the acoustic performance of partitions in the **Partition performance schedule.**

IEQ-14: Document low formaldehyde emitting products that meet the limit values outlined in Table IEQ-14.1.

Mat-3: Document the re-use of partition materials.

0524 Partitions – glazed

Requirement: GBCA document:

- IEQ-12 Internal noise levels.
- Mat-3 Re-used materials.

IEQ-12: Document the acoustic performance of partitions in the **Glazed partition and internal window performance schedule.**

Mat-3: Document the re-use of partition materials.

0527 Room dividers

Requirement: GBCA document:

- IEQ-12 Internal noise levels.
- IEQ-14 Formaldehyde minimisation.
- Mat-3 Re-used materials.

IEQ-12: Document the acoustic performance of room dividers in the Folding doors schedule, Accordion doors schedule and Operable walls schedule.

IEQ-14: Document low formaldehyde emitting products that meet the limit values outlined in Table IEQ-14.1.

Mat-3: Document the re-use of room dividers.

0531 Suspended ceilings – combined

Requirement: GBCA document:

- IEQ-4 Daylight.
- IEQ-12 Internal noise levels.
- Mat-3 Re-used materials.

IEQ-4: Document colours that provide the required reference reflectance values.

IEQ-12: Document the acoustic performance of suspended ceilings in the **Suspended ceiling performance schedule.**

Mat-3: Document the re-use of suspended ceiling elements.

0551 Joinery

Requirement: GBCA document:

- IEQ-14 Formaldehyde minimisation.
- Mat-3 Re-used materials.
- Mat-7 PVC minimisation.
- Mat-8 Sustainable timber.

IEQ-14: Document low formaldehyde emitting products that meet the limit values outlined in Table IEQ-14.1.

Mat-3: Document the re-use of joinery elements.

Mat-7: Document alternative materials to PVC.

Mat-8: Refer to guidance text on the certification of timber sources.

0571 Workstations

Requirement: GBCA document:

- IEQ-14 Formaldehyde minimisation.
- Mat-3 Re-used materials.
- Mat-7 PVC minimisation.
- Mat-8 Sustainable timber.

IEQ-14: Document low formaldehyde emitting products that meet the limit values outlined in Table IEQ-14.1.

Mat-3: Document the re-use of workstations.

Mat-7: Document alternative materials to PVC.

Mat-8: Refer to guidance text on the certification of timber sources.

0574 Window coverings

Requirement: GBCA document:

- IEQ-5 Daylight glare control.
- Mat-7 PVC minimisation.

IEQ-5: Document solar optical properties of window coverings.

Mat-7: Document alternative materials to PVC.

0651 Resilient finishes

Requirement: GBCA document:

- IEQ-13 Volatile organic compounds.

IEQ-13: Document low VOC products that meet TVOC Content Limits outlined in Table IEQ-13.2.

0652 Carpets

Requirement: GBCA document:

- IEQ-4 Daylight
- IEQ-13 Volatile organic compounds.

IEQ-4: Document colours that provide the required reference reflectance values.

IEQ-13: Document low VOC products that meet TVOC Content Limits outlined in Table IEQ-13.2.

0654 Engineered panel floors

Requirement: GBCA document:

- Mat-3 Re-used materials.

- Mat-8 Sustainable timber.

Mat-3: Document the re-use of engineering panel flooring.

Mat-8: Refer to guidance text on the certification of timber sources.

0655 Timber flooring

Requirement: GBCA document:

- Mat-3 Re-used materials.
- Mat-8 Sustainable timber.

Mat-3: Document the re-use of timber flooring.

Mat-8: Refer to guidance text on the certification of timber sources.

0671 Painting

Requirement: GBCA document:

- IEQ-4 Daylight
- IEQ-13 Volatile organic compounds.

IEQ-4: Document colours that provide the required reference reflectance values.

IEQ-13: Document low VOC products that meet TVOC Content Limits outlined in Table IEQ-13.2.

0701 Mechanical general requirements

Requirement: GBCA document:

- Man-7 Waste management.
- IEQ-12 Internal noise levels.
- Mat-6 Steel.

Man-7: Document materials and components to be recovered, re-used or recycled in the Recovered items for re-use in the works schedule, Recovered materials for delivery to the principal schedule, Demolished material for recycling in the works schedule, Demolished material for recycling off-site schedule and the Dismantle for relocation schedule.

IEQ-12: Document upper limits of noise caused by services in the **Noise level schedule.**

Mat-6: Document materials and components to be recovered or re-used.

0702 Mechanical design and install

Requirement: GBCA document:

- IEQ-1 Ventilation rates.
- Ene-1 Greenhouse gas emissions.

IEQ-1: Document the percentage improvement of ventilation rates relative to the requirements of AS 1668.2 for 95% of the Nett Lettable Area (NLA).

Ene-1: Document systems that contribute to reducing the building's greenhouse gas emissions to levels below the *Conditional Requirement.*

0711 Chillers

Requirement: GBCA document:

- IEQ-12 Internal noise levels.
- Ene-1 Greenhouse gas emissions.
- Emi-1 Refrigerant ODP.
- Emi-2 Refrigerant GWP.
- Emi-3 Refrigerant leaks.
- Emi-4 Insulant ODP.

IEQ-12: Document upper limits of noise caused by chillers in the **Chiller schedule***.*

Ene-1: Document systems that contribute to reducing the building's greenhouse gas emissions to levels below the *Conditional Requirement.*

Emi-1: Document the use of refrigerants with zero Ozone Depleting Potential (ODP).

Emi-2: Document the use of refrigerants with a Global Warming Potential (GWP) of 10 or less. These are essentially the 'natural' refrigerants, including ethane, ammonia and carbon dioxide. As they are less safe than synthetic refrigerants, caution is indicated.

Emi-3: : Document sensors for detecting refrigerant leaks.

Emi-4: Document thermal insulation that is free of ozone-depleting substances in both manufacture and composition.

0712 Water heating boilers

Requirement: GBCA document:

- Ene-1 Greenhouse gas emissions.

Ene-1: Document systems that contribute to reducing the building's greenhouse gas emissions to levels below the *Conditional Requirement.*

0713 Cooling towers

Requirement: GBCA document:

- IEQ-12 Internal noise levels.
- Ene-1 Greenhouse gas emissions.
- Wat-4 Heat rejection water.

IEQ-12: Document upper limits of noise caused by cooling towers in the **Cooling tower schedule.**

Ene-1: Document systems that contribute to reducing the building's greenhouse gas emissions to levels below the *Conditional Requirement.*

Wat-4: Document non water-based heat rejection systems or measures to reduce potable water use by cooling towers.

0714 Mechanical pumps

Requirement: GBCA document:

- IEQ-12 Internal noise levels.
- Ene-1 Greenhouse gas emissions.

IEQ-12: Document upper limits of noise caused by pumps in the **Pump schedule.**

Ene-1: Document systems that contribute to reducing the building's greenhouse gas emissions to levels below the *Conditional Requirement.*

0715 Tanks and vessels

Requirement: GBCA document:

- Ene-1 Greenhouse gas emissions.

Ene-1: Document systems that contribute to reducing the building's greenhouse gas emissions to levels below the *Conditional Requirement.*

0721 Packaged airconditioning

Requirement: GBCA document:

- IEQ-12 Internal noise levels.
- Ene-1 Greenhouse gas emissions.
- Emi-1 Refrigerant ODP.
- Emi-2 Refrigerant GWP.
- Emi-4 Insulant ODP.
- Emi-8 Legionella.

IEQ-12: Document upper limits of noise caused by airconditioning units in Air cooled packaged equipment schedule and DX computer room airconditioning unit schedule.

Ene-1: Document systems that contribute to reducing the building's greenhouse gas emissions to levels below the *Conditional Requirement.*

Emi-1: Document the use of refrigerants with zero Ozone Depleting Potential (ODP).

Emi-2: Document the use of refrigerants with a Global Warming Potential (GWP) of 10 or less. These are essentially the 'natural' refrigerants, including ethane, ammonia and carbon dioxide. As they are less safe than synthetic refrigerants, caution is indicated.

Emi-3: : Document sensors for detecting refrigerant leaks.

Emi-4: Document thermal insulation that is free of ozone-depleting substances in both manufacture and composition.

Emi-8: Document non water-based heat rejection systems.

0722 Room airconditioners

Requirement: GBCA document:

- IEQ-12 Internal noise levels.
- Ene-1 Greenhouse gas emissions.
- Emi-4 Insulant ODP.
- Emi-8 Legionella.

IEQ-12: Document upper limits of noise caused by airconditioning units in the **Room airconditioner schedule.**

Ene-1: Document systems that contribute to reducing the building's greenhouse gas emissions to levels below the *Conditional Requirement.*

Emi-4: Document thermal insulation that is free of ozone-depleting substances in both manufacture and composition.

Emi-8: Document non water-based heat rejection systems.

0723 Evaporative coolers

Requirement: GBCA document:

- IEQ-12 Internal noise levels.
- Ene-1 Greenhouse gas emissions.

IEQ-12: Document upper limits of noise caused by evaporative coolers in the **Evaporative cooler schedule.**

Ene-1: Document systems that contribute to reducing the building's greenhouse gas emissions to levels below the *Conditional Requirement.*

0724 Air handling plant – combined

Requirement: GBCA document:

- IEQ-11 Hazardous materials.
- IEQ-12 Internal noise levels.
- Ene-1 Greenhouse gas emissions.
- Emi-4 Insulant ODP.

IEQ-11: Document the removal of asbestos, lead and PCBs in accordance with the standards listed in *Table IEQ-11.1*.

IEQ-12: Document upper limits of noise caused by units in the **Air handling unit schedule.**

Ene-1: Document systems that contribute to reducing the building's greenhouse gas emissions to levels below the *Conditional Requirement.*

Emi-4: Document thermal insulation that is free of ozone-depleting substances in both manufacture and composition.

0725 Air handling plant – built up

Requirement: GBCA document:

- IEQ-11 Hazardous materials.
- IEQ-12 Internal noise levels.
- Ene-1 Greenhouse gas emissions.
- Emi-4 Insulant ODP.

IEQ-11: Document the removal of asbestos, lead and PCBs in accordance with the standards listed in *Table IEQ-11.1*.

IEQ-12: Document upper limits of noise caused by units in the **Air handling unit schedule.**

Ene-1: Document systems that contribute to reducing the building's greenhouse gas emissions to levels below the *Conditional Requirement.*

Emi-4: Document thermal insulation that is free of ozone-depleting substances in both manufacture and composition.

0726 Air handling plant – minor

Requirement: GBCA document:

- IEQ-11 Hazardous materials.
- IEQ-12 Internal noise levels.
- Ene-1 Greenhouse gas emissions.
- Emi-4 Insulant ODP.

IEQ-11: Document the removal of asbestos, lead and PCBs in accordance with the standards listed in *Table IEQ-11.1*.

IEQ-12: Document upper limits of noise caused by units in the **Room fan coil unit schedule.**

Ene-1: Document systems that contribute to reducing the building's greenhouse gas emissions to levels below the *Conditional Requirement.*

Emi-4: Document thermal insulation that is free of ozone-depleting substances in both manufacture and composition.

0727 Air handling plant – packaged

Requirement: GBCA document:

- IEQ-11 Hazardous materials.
- IEQ-12 Internal noise levels.
- Ene-1 Greenhouse gas emissions.
- Emi-4 Insulant ODP.

IEQ-11: Document the removal of asbestos, lead and PCBs in accordance with the standards listed in *Table IEQ-11.1*.

IEQ-12: Document upper limits of noise caused by units in the **Air handling unit schedule.**

Ene-1: Document systems that contribute to reducing the building's greenhouse gas emissions to levels below the *Conditional Requirement.*

Emi-4: Document thermal insulation that is free of ozone-depleting substances in both manufacture and composition.

0731 Fans

Requirement: GBCA document:

- IEQ-12 Internal noise levels.
- Ene-1 Greenhouse gas emissions.

IEQ-12: Document upper limits of noise caused by fans in the Centrifugal fan schedule, In-line centrifugal fan schedule, Axial flow fan schedule, Roof mounted fan schedule and Window/wall mounted fan schedule.

Ene-1: Document systems that contribute to reducing the building's greenhouse gas emissions to levels below the *Conditional Requirement.*

0733 Air coils

Requirement: GBCA document:

- Ene-1 Greenhouse gas emissions.

Ene-1: Document systems that contribute to reducing the building's greenhouse gas emissions to levels below the *Conditional Requirement.*

0734 Humidifiers

Requirement: GBCA document:

- IEQ-15 mould prevention.

IEQ-15: Document measures to maintain humidity within ranges nominated.

0741 Ductwork

Requirement: GBCA document:

- IEQ-12 Internal noise levels.
- Ene-1 Greenhouse gas emissions.
- Mat-4 Shell and core or integrated fitout.

IEQ-12: Document maximum in-duct NC noise levels in the **Ductwork schedule.**

Ene-1: Document systems that contribute to reducing the building's greenhouse gas emissions to levels below the *Conditional Requirement.*

Mat-4: Document ducts from air supply and return air risers to be capped off within one metre of the face of the riser.

0744 Ductwork insulation

Requirement: GBCA document:

- IEQ-11 Hazardous materials.

- IEQ-12 Internal noise levels.
- Ene-1 Greenhouse gas emissions.
- Emi-4 Insulant ODP.

IEQ-11: Document the removal of asbestos, lead and PCBs in accordance with the standards listed in *Table IEQ-11.1*.

IEQ-12: Document noise attenuation standards in the **Ductwork insulation schedule.**

Ene-1: Document systems that contribute to reducing the building's greenhouse gas emissions to levels below the *Conditional Requirement.*

Emi-4: Document ductwork insulation that is free of ozone-depleting substances in both manufacture and composition.

0745 Attenuators and acoustic louvres

Requirement: GBCA document:

- IEQ-12 Internal noise levels.

IEQ-12: Document noise attenuation standards in the Duct attenuator schedule, Acoustic louvre schedule and Cross-talk attenuator schedule.

0747 Variable air volume terminals

Requirement: GBCA document:

- IEQ-12 Internal noise levels.
- Ene-1 Greenhouse gas emissions.

IEQ-12: Document noise attenuation standards in the **VAV box schedule.**

Ene-1: Document systems that contribute to reducing the building's greenhouse gas emissions to levels below the *Conditional Requirement.*

0751 Mechanical piping

Requirement: GBCA document:

- Ene-1 Greenhouse gas emissions.

Ene-1: Document systems that contribute to reducing the building's greenhouse gas emissions to levels below the *Conditional Requirement.*

0752 Mechanical piping insulation

Requirement: GBCA document:

- IEQ-11 Hazardous materials.
- Ene-1 Greenhouse gas emissions.
- Emi-4 Insulant ODP.

IEQ-11: Document the removal of asbestos, lead and PCBs in accordance with the standards listed in *Table IEQ-11.1*.

Ene-1: Document systems that contribute to reducing the building's greenhouse gas emissions to levels below the *Conditional Requirement.*

Emi-4: Document pipework insulation that is free of ozone-depleting substances in both manufacture and composition.

0761 Refrigeration

Requirement: GBCA document:

- IEQ-12 Internal noise levels.
- Ene-1 Greenhouse gas emissions.
- Emi-1 Refrigerant ODP.
- Emi-2 Refrigerant GWP.
- Emi-3 Refrigerant leaks.
- Emi-4 Insulant ODP.

IEQ-12: Document upper limits of noise caused by refrigeration units.

Ene-1: Document systems that contribute to reducing the building's greenhouse gas emissions to levels below the *Conditional Requirement.*

Emi-1: Document the use of refrigerants with zero Ozone Depleting Potential (ODP).

Emi-2: Document the use of refrigerants with a Global Warming Potential (GWP) of 10 or less. These are essentially the 'natural' refrigerants, including ethane, ammonia and carbon dioxide. As they are less safe than synthetic refrigerants, caution is indicated.

Emi-3: : Document sensors for detecting refrigerant leaks.

Emi-4: Document thermal insulation that is free of ozone-depleting substances in both manufacture and composition.

0771 Automatic controls

Requirement: GBCA document:

- Man-4 Independent commissioning agent.
- IEQ-1 Ventilation rates.
- IEQ-3 Carbon dioxide monitoring and control.
- IEQ-5 Daylight glare control.
- Ene-1 Greenhouse gas emissions.
- Wat-1 Occupant amenity water.
- Emi-3 Refrigerant leaks.

Man-4: Document the appointment of an Independent Commissioning Agent.

IEQ-1: Document percentage improvement of ventilation rates relative to the requirements of AS 1668.2 for 95% of the Nett Lettable Area (NLA).

IEQ-3: Document duct-mounted sensors for carbon dioxide or carbon monoxide monitoring and control.

IEQ-5: Document systems that control blinds or screens that eliminate all direct sun penetration, and control glare.

Ene-1: Document systems that contribute to reducing the building's greenhouse gas emissions to levels below the *Conditional Requirement.*

Wat-1: Document maximum leakage rates for control valves.

Emi-3: : Document sensors for detecting refrigerant leaks.

0771 Automatic controls – minor

Requirement: GBCA document:

- IEQ-1 Ventilation rates.
- Ene-1 Greenhouse gas emissions.

IEQ-1: Document the percentage improvement of ventilation rates relative to the requirements of AS 1668.2 for 95% of the Nett Lettable Area (NLA).

Ene-1: Document systems that contribute to reducing the building's greenhouse gas emissions to levels below the *Conditional Requirement.*

0773 Building management systems

Requirement: GBCA document:

- IEQ-5 Daylight glare control.
- IEQ-7 Electric lighting levels.
- Ene-1 Greenhouse gas emissions.

IEQ-5: Document systems that control blinds or screens that eliminate all direct sun penetration, and control glare.

IEQ-7: Document control systems to maintain lighting levels within the required illuminance level limits for 95% of the Nett Lettable Area (NLA).

Ene-1: Document systems that contribute to reducing the building's greenhouse gas emissions to levels below the *Conditional Requirement.*

0784 Motors and starters

Requirement: GBCA document:

- Ene-1 Greenhouse gas emissions.

Ene-1: Document systems that contribute to reducing the building's greenhouse gas emissions to levels below the *Conditional Requirement.*

0791 Mechanical commissioning
Requirement: GBCA document:
- Man-2 Commissioning clauses.
- Man-4 Independent commissioning agent.
- IEQ-12 Internal noise levels.
- Ene-1 Greenhouse gas emissions.

Man-2: Document compliance with CIBSE and ASHRAE commissioning codes and guidelines.

Man-4: Document the appointment of an Independent Commissioning Agent.

IEQ-12: Document the required limits for sound pressure level measurements.

Ene-1: Document systems that contribute to reducing the building's greenhouse gas emissions to levels below the *Conditional Requirement.*

0792 Mechanical maintenance
Requirement: GBCA document:
- Ene-1 Greenhouse gas emissions.
- Wat-1 Occupant amenity water.
- Emi-3 Refrigerant leaks.

Ene-1: Document systems that contribute to reducing the building's greenhouse gas emissions to levels below the *Conditional Requirement.*

Wat-1: Document water efficiency management systems in the **Maintenance requirements schedule.**

Emi-3: : Specify sensors for detecting refrigerant leaks.

0801 Hydraulic general requirements
Requirement: GBCA document:
- IEQ-12 Internal noise levels.
- Mat-6 Steel.
- Mat-7 PVC minimisation.

IEQ-12: Document upper limits of noise caused by hydraulic services.

Mat-6: Document materials and components to be recovered or re-used in the Recovered items for re-use in the works schedule and the Recovered items for delivery to the principal schedule.

Mat-7: Document alternative materials to PVC.

0802 Hydraulic design and install
Requirement: GBCA document:
- Wat-1 Occupant amenity water.

Wat-1: Document water efficient products in the **Appliances schedule** and the **Sanitary fixtures schedule**. Document rainwater tanks in the **Rainwater tank schedule.**

0811 Sanitary fixtures
Requirement: GBCA document:
- Wat-1 Occupant amenity water.

Wat-1: Document water efficient products in the **Sanitary fixtures schedules.**

0812 Tapware
Requirement: GBCA document:
- Wat-1 Occupant amenity water.

Wat-1: Document water efficient products in the **Appliances schedule** and the **Tapware schedules.**

0813 Water heaters
Requirement: GBCA document:
- Ene-1 Greenhouse gas emissions.
- Ene-5 Peak energy demand reduction.
- Emi-4 Insulant ODP.

Ene-1: Document systems that contribute to reducing the building's greenhouse gas emissions to levels below the *Conditional Requirement.*

Ene-5: Document solar and heat pump hot water systems in the **Solar water heater schedule** and the **Heat pump water heater schedule.**

Emi-4: Document thermal insulation that is free of ozone-depleting substances in both manufacture and composition.

0814 Hydraulic pumps

Requirement: GBCA document:

- Ene-1 Greenhouse gas emissions.
- Wat-1 Occupant amenity water.

Ene-1: Document systems that contribute to reducing the building's greenhouse gas emissions to levels below the *Conditional Requirement.*

Wat-1: Document pumps for rainwater harvesting systems in the **Pump schedule.**

0822 Wastewater

Requirement: GBCA document:

- Emi-6 Discharge to sewer.

Emi-6: Document septic tanks in the **Septic tank schedule**. Specify greywater treatment systems.

0823 Cold and heated water

Requirement: GBCA document:

- Ene-1 Greenhouse gas emissions.
- Wat-1 Occupant amenity water.
- Emi-4 Insulant ODP.

Ene-1: Document systems that contribute to reducing the building's greenhouse gas emissions to levels below the *Conditional Requirement.*

Wat-1: Document water efficient products.

Emi-4: Document thermal insulation that is free of ozone-depleting substances in both manufacture and composition.

0825 Rainwater storage systems

Requirement: GBCA document:

- Wat-1 Occupant amenity water.

Wat-1: Document rainwater tanks in the *Rainwater tank schedule*.

0901 Electrical general requirements

Requirement: GBCA document:

- Mat-3 Re-used materials.
- Mat-6 Steel.
- Mat-7 PVC minimisation.

Mat-3: Document the re-use of materials and components.

Mat-6: Document materials and components to be re-used or recycled in the Recovered items for re-use in the works schedule and the Demolished material for recycling schedule.

Mat-7: Document alternative materials to PVC.

0902 Electrical design and install

Requirement: GBCA document:

- Ene-1 Greenhouse gas emissions.

Ene-1: Document systems that contribute to reducing the building's greenhouse gas emissions to levels below the *Conditional Requirement.*

0931 Power generation – diesel

Requirement: GBCA document:

- IEQ-12 Internal noise levels.
- Ene-1 Greenhouse gas emissions.
- Ene-5 Peak energy demand reduction.

IEQ-12: Document engine exhaust silencers and insulation, and allowable noise level.

Ene-1: Document systems that contribute to reducing the building's greenhouse gas emissions to levels below the *Conditional Requirement.*

Ene-5: Document diesel power generation system capacity in the **Performance schedule**.

0933 Power generation – photovoltaic

Requirement: GBCA document:

- Ene-1 Greenhouse gas emissions.
- Ene-5 Peak energy demand reduction.

Ene-1: Document systems that contribute to reducing the building's greenhouse gas emissions to levels below the *Conditional Requirement.*

Ene-5: Document photovoltaic power generation system capacity in the **System performance schedule**.

0951 Lighting

Requirement: GBCA document:

- IEQ-6 High frequency ballasts.
- IEQ-7 Electric lighting levels.
- Ene-1 Greenhouse gas emissions.
- Ene-3 Lighting power density.

IEQ-6: Document high frequency ballasts for fluorescent luminaries in the **Luminaire schedule**.

IEQ-7: Document lighting levels in the **Luminaire schedule** and the **Lighting control schedules**.

Ene-1: Document systems that contribute to reducing the building's greenhouse gas emissions to levels below the *Conditional Requirement.*

Ene-3: Document lighting levels in the **Luminaire schedule.**

0952 Luminaires – custom built

Requirement: GBCA document:

- IEQ-6 High frequency ballasts.
- IEQ-7 Electric lighting levels.
- Ene-1 Greenhouse gas emissions.
- Ene-3 Lighting power density.

IEQ-6: Document high frequency ballasts for fluorescent luminaries in the **Custom-built luminaire schedule**.

IEQ-7: Document lighting levels in the **Custom-built luminaire schedule**.

Ene-1: Document systems that contribute to reducing the building's greenhouse gas emissions to levels below the *Conditional Requirement.*

Ene-3: Document lighting levels in the **Luminaire schedule.**

0171b GENERAL REQUIREMENTS

1 GENERAL

1.1 PRECEDENCE

Precedence
General: Requirements of subsequent worksections of the specification override conflicting requirements in this worksection.

1.2 CROSS REFERENCES

Common requirements
Associated worksections: Conform to the following:
- *Adhesives, sealants and fasteners*.
- *Fire-stopping*.
- *Metals and prefinishes*.
- *Termite control management*.
- *Timber finishes and treatment*.

Cross referencing
Within the text:
- Worksection titles are indicated by *Italicised* text.
- Clause titles are indicated by **Bold** text.

1.3 REFERENCED DOCUMENTS

Contractual relationships
General: Responsibilities and duties of the principal, contractor and contract administrator are not altered by requirements in the documents referenced in this specification.

Current editions
General: Use referenced documents which are the editions, with amendments, current 3 months before the closing date for tenders, except where other editions or amendments are required by statutory authorities.

1.4 INTERPRETATION

Abbreviations
General: For the purposes of this worksection the abbreviations given below apply.
- AS: Australian Standard.
- BCA: Building Code of Australia.
- CFC: Compressed fibre cement.
- CSIRO CMSE: ActivFire Register of Fire Protection Equipment
- MS: Mild steel.
- MSDS: Material safety data sheets.
- NATA: National Association of Testing Authorities.
- PCA: Plumbing Code of Australia.
- SS: Stainless steel.
- VOC: Volatile organic compound.

Definitions
General: For the purposes of this worksection the definitions given below apply.
- Approved: ‘Approved’, ‘reviewed’, ‘directed’, ‘rejected’, ‘endorsed’ and similar expressions mean ‘approved (reviewed, directed, rejected, endorsed) in writing by the architect.
- Attendance: ‘Attendance’, ‘provide attendance’ and similar expressions mean ‘give assistance for examination and testing’.

- Contract administrator: 'Contract administrator' has the same meaning as 'architect' or 'superintendent' and is the person appointed by the 'owner' or 'principal' under the contract.
- Default: Specified value, product or installation method which is to be provided unless otherwise documented.
- Design life: The period of time for which it is assumed, in the design, that an asset will be able to perform its intended purpose with only anticipated maintenance but no major repair or replacement being necessary.
- Documented: 'Documented', 'as documented' and similar terms mean contained in the contract documents.
- Economic life: The period of time from the acquisition of an asset to when the asset, while still physically capable of fulfilling its function and with only anticipated maintenance, ceases to be the lowest cost alternative for satisfying that function.
- Geotechnical site investigation: The process of evaluating the geotechnical characteristics of the site in the context of existing or proposed construction.
- Give notice: 'Give notice', 'submit', 'advise', 'inform' and similar expressions mean 'give notice (submit, advise, inform) in writing to the contract administrator'.
- IP: 'IP', 'IP code', 'IP rating' and similar expression have the same meaning as 'IP Code' in AS 60529.
- Maintenance period: Synonymous with 'Defects liability period'.
- Obtain: 'Obtain', 'seek' and similar expressions mean 'obtain (seek) in writing from the contract administrator'.
- Metallic-coated: Steel coated with zinc or aluminium-zinc alloy as follows:
  . Metallic-coated steel sheet: To AS 1397. Metal thicknesses specified are base metal thicknesses.
  . Ferrous open sections zinc coated by an in-line process: To AS/NZS 4791.
  . Ferrous hollow sections zinc coated by a continuous or specialised process: To AS/NZS 4792.
- Pipe: Includes pipe and tube.
- 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: A person who is listed on the National Professional Engineers Register (NPER) in the relevant discipline at the relevant time.
- Proprietary: 'Proprietary' mean identifiable by naming 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.
- Registered testing authority:
  . An organisation registered by the National Association of Testing Authorities (NATA) to test in the relevant field; or
  . An organisation outside Australia registered by an authority recognised by NATA through a mutual recognition agreement; or
  . An organisation recognised as being a Registered Testing Authority under legislation at the time the test was undertaken.
- Required: Means required by the contract documents, the local council or statutory authorities.
- If required: A conditional specification term for work which may be shown on the drawings or be a legislative requirement.
- Samples: Includes samples, prototypes and sample panels.
- Supply: 'Supply', 'furnish' and similar expressions mean 'supply only'.
- Tests:
  . Pre-completion tests: Tests carried out before completion tests.
    * Type tests: Tests carried out on an item identical with a production item, before delivery to the site.
    * Production tests: Tests carried out on a purchased item, before delivery to the site.
    * Site tests: Tests carried out on site.

. Completion tests: Tests carried out on completed installations or systems before the date for practical completion, to demonstrate that the installation or system, including components, controls and equipment, operates correctly, safely and efficiently, and meets performance and other requirements. The superintendent may direct that completion tests be carried out after the date for practical completion.

- Tolerance: The permitted difference between the upper limit and the lower limit of dimension, value or quantity.
- Verification: Provision of evidence or proof that a performance requirement has been met or a default exists.

1.5 CONTRACT DOCUMENTS

Services diagrammatic layouts

General: Layouts of service lines, plant and equipment shown on the drawings are diagrammatic only, except where figured dimensions are provided or calculable.

Before commencing work:

- Obtain measurements and other necessary information.
- Coordinate the design and installation in conjunction with all trades.

Levels

General: Spot levels take precedence over contour lines and ground profile lines.

1.6 PERFORMANCE

General

General: If required, provide structures, installations and components as follows:

- Fixed access ways: To AS 1657.
- Structural design actions: To AS/NZS 1170.0 and the **Structural design actions schedule**.
- Light level requirements: to AS 1680.2.4.

1.7 NOTICE

Inspection

Concealment: If notice of inspection is required in respect of parts of the works that are to be concealed, advise when the inspection can be made before concealment.

Minimum notice for inspections to be made: Conform to the **Notices schedule.**

Tests

General: Give notice of the time and place of nominated tests.

Minimum notice for witnessing of tests to be made: Conform to the **Notices schedule**.

Attendance

General: Provide attendance for inspection of tests.

1.8 SUBMISSIONS

Submit to: to be given to the architect.

Default timing: Make submissions at least 5 working days before ordering products for, or starting installation of, the respective portion of the works.

Program: Allow in the construction program for at least the following times for response to submissions:

- Shop drawings: 15 working days
- Samples and prototypes: 15 working days
- Manufacturers' or suppliers' recommendations: 15 working days
- Product data: 15 working days
- Product / design substitution or modification: 15 working days

Proposed products schedules: If major products are not specified as proprietary items, submit a schedule of those proposed for use within 3 weeks of site possession.

Authorities

Authorities' approvals: If required, submit documents showing approval by the authorities whose requirements apply to the work.

Correspondence: Submit copies of correspondence and notes of meetings with authorities.

Electronic submissions

File format: Adobe PDF; or CAD files in Autocad DXF or DWG format.

Transmission medium: by email with backup CD to be sent in post

Hard copy submissions

Quantity:

- Bound documents: 2 sets of paper prints (plus one electronic copy)
- Loose documents larger than A3: 2 copies
- Loose documents up to and including A3: One copy.

Standard contract drawing size: A1

Errors

General: If a submission contains errors, make a new or amended submission as appropriate, indicating changes made since the previous submission.

Identification

General: Identify the project, contractor, subcontractor or supplier, manufacturer, applicable product, model number and options, as appropriate and include pertinent contract document references. Include service connection requirements and product certification. Identify proposals for non-compliance with project requirements, and characteristics which may be detrimental to successful performance of the completed work.

Notice

Minimum notice: 5 working days

Substitution

Identified proprietary items: Identification of a proprietary item does not necessarily imply exclusive preference for the item so identified, 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, including the following:

- Evidence that the performance is equal to or greater than that specified.
- Evidence of conformity to a cited standard.
- Samples.
- Essential technical information, in English.
- Reasons for the proposed substitutions.
- Statement of the extent of revisions to the contract documents.
- Statement of the extent of revisions to the construction program.
- Statement of cost implications including costs outside the contract.
- Statement of consequent alterations to other parts of the works.

Availability: If the documented products or systems are unavailable within the time constraints of the construction program, submit evidence from the supplier.

Criteria: If the substitution is for any reason other than unavailability, submit evidence that the substitution:

- Is of net enhanced value to the principal.
- Is consistent with the contract documents and is as effectual as the identified item, detail or method.

Samples

Submission: Submit nominated samples.

Incorporation of samples: If it is intended to incorporate samples into the works, submit proposals. Incorporate samples in the works which have been endorsed for incorporation. Do not incorporate other samples.

Retention of samples: Keep endorsed samples in good condition on site, until practical completion.

Shop drawings
General: If required, submit dimensioned drawings showing details of the fabrication and installation of services and equipment, including relationship to building structure and other services, cable type and size, and marking details.

Diagrammatic layouts: Coordinate work shown diagrammatically in the contract documents, and submit dimensioned set-out drawings.

Submission medium: Hardcopy

Checking: Ensure that the drawings have been checked before submission.

1.9 DESIGN

General
Design by contractor: If the contractor provides design, use only appropriately qualified persons and comply with all statutory requirements.

Conflict with the documents: If it is believed that a conflict exists between statutory requirements and the documents, notify the contract administrator immediately and provide a recommendation to resolve the conflict.

2 PRODUCTS

2.1 GENERAL

Manufacturers' or suppliers' recommendations
Provide, including select if no selection is given, transport, deliver, store, handle, protect, finish, adjust and prepare for use, 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.

Project modifications: Advise of activities that supplement, or are contrary to, manufacturer's or suppliers' written recommendations and instructions.

Product certification: If products must comply with product certification schemes, provide them in accordance with the certification requirements.

2.2 TESTS

Attendance
General: Provide attendance on tests where nominated in worksections.

Testing authorities
General: Except for site tests, have tests carried out by a Registered testing authority and submit test reports.

- Reports: Submit copies of test reports, including certificates for type tests, showing the observations and results of tests and conformance or non-conformance with requirements.
- Site tests: Use instruments calibrated by authorities accredited by a Registered testing authority.

2.3 MATERIALS AND COMPONENTS

Consistency
General: For the whole quantity of each material or product use the same manufacturer or source and provide consistent type, size, quality and appearance.

Corrosion resistance
General: Conform to the following corrosivity category with regard to worksection corrosion resistance tables.

Corrosivity category: Low

Corrosivity category	**Low**	**Medium**	**High**
Location: Distance to	More than 10 km from	1 to 10 km from water	200 to 1000 m from

Corrosivity category	Low	Medium	High
mean high water mark	water subject to breaking surf, or More than 1 km from salt water not subject to breaking surf	subject to breaking surf, or 100 to 1000 m from salt water not subject to breaking surf, or Non-heavy industrial areas	water subject to breaking surf, or 0 to 100 m from salt water not subject to breaking surf, or Heavy industrial areas

Situation
The following classification of situation applies to tables in the worksection corrosion resistance tables.

- Internal:
  . building fabric protected from salt and moisture by vapour barriers, sarking, sheathing and building wraps.
- External:
  . includes external leaf and air spaces behind external leaf brickwork or blockwork walls.

Galvanizing
Severe conditions: Galvanize mild steel components (including fasteners) to AS 1214 or AS/NZS 4680 as appropriate, if:

- Exposed to weather.
- Embedded in masonry.
- Exposed to or in air spaces behind external leaf of masonry walls.
- In contact with chemically treated timber, other than CCA.

3 EXECUTION

3.1 WALL CHASING

Holes and chases
General: If holes and chases are required in masonry walls, provide proposals to demonstrate that the structural integrity of the wall is maintained. Do not chase walls nominated as fire rated or acoustic. Parallel chases or recesses on opposite faces of a wall shall not be closer than 600 mm to each other.

Chasing of blockwork: Only in core-filled hollow blocks or in solid blocks which are not designated as structural and shall be to the **Concrete blockwork chasing table**.

Concrete blockwork chasing table

Block thickness (mm)	Depth of chase (maximum mm)
190	35
140	25
90	20

3.2 FIXING

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

Fasteners
Use proprietary fasteners capable or transmitting the loads imposed, and sufficient to ensure the rigidity of the assembly.

3.3 COMPLETION

Samples
General: Remove unincorporated samples on completion.

Warranties

General: If a warranty is documented or if a manufacturer's standard warranty extends beyond the end of the defects liability period, name First Exemplar Pty Ltd as warrantee. Register with manufacturers as necessary. Retain copies delivered with components and equipment and submit to the architect at practical completion.

Commencement: Commence warranty periods at practical completion or at acceptance of installation, if acceptance is not concurrent with practical completion.

Approval of installer: If installation is not by manufacturer, and product warranty is conditional on the manufacturer's approval of the installer, submit the manufacturer's written approval of the installing firm.

3.4 OPERATION AND MAINTENANCE MANUALS

General

General: Submit operation and maintenance manuals for installations to the architect.

Format – electronic copies

Printing: Provide material that can be legibly printed on A4 size paper.

Scope: Provide the same material as specified for hardcopy in electronic format.

Quantity and format: Conform to **Electronic submissions.**

Format – hard copy

General: A4 size loose leaf, in commercial quality, 4 ring binders with hard covers, each indexed, divided and titled. Include the following features:

- Cover: Identify each binder with typed or printed title '*OPERATION AND MAINTENANCE MANUAL*', to spine. Identify title of project, volume number, volume subject matter, and date of issue.
- Dividers: Durable divider for each separate element, with typed description of system and major equipment components. Clearly print short titles under laminated plastic tabs.
- Drawings: Fold drawings to A4 size and accommodate them in the binders so that they may be unfolded without being detached from the rings. Provide with reinforced punched binder tabs.
- Pagination: Number pages.
- Ring size: 50 mm maximum, with compressor bars.
- Text: Manufacturers' printed data, including associated diagrams, or typewritten, single-sided on bond paper, in clear concise English.

Number of copies: 3.

0181 ADHESIVES, SEALANTS AND FASTENERS

1 GENERAL

1.1 CROSS REFERENCES

General
General: Conform to the *General requirements* worksection.

1.2 SUBMISSIONS

Installed sealant tests
Sampling: For each sealant test take 3 samples of installed and cured sealant, each at least 50 mm long, from completed joints.

Testing: Submit the results of tests to the **Installed sealant tests schedule**.

Reinstatement: Make good the joints from which the samples were taken.

Installed sealant tests schedule

Item to be tested	Property to be tested	Applicable standard

Sealants
Samples: Submit colour samples of visible joint sealants.

Documents: Submit technical data sheets.

1.3 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of joints and penetrations prepared for the application of sealants to the **Installed sealant tests schedule**.

1.4 PERFORMANCE

Adhesives and sealants
General: Provide adhesives and sealants capable of transmitting imposed loads, sufficient to ensure the rigidity of the assembly, or integrity of the joint and which will not cause discolouration of finished surfaces.

Compatibility: Do not use sealants or adhesives that are incompatible with the products to which they are applied.

Movement: Where an adhered or sealed joint may be subject to movement, select a system accredited to accommodate the projected movement under the conditions of service.

Refurbishment: Use sealants that can be safely removed and prepared for refurbishment.

Fasteners
Provide fasteners accredited for the particular use, capable of transmitting imposed loads and maintaining the rigidity of the assembly.

2 PRODUCTS

2.1 ADHESIVES

Standards
Mastic adhesive: To AS 2329.

Polymer emulsion adhesive for timber: To AS 2754.2, not inferior to Type 3.

High strength adhesive tape
General description: A foam of cross linked polyethylene or closed cell acrylic coated both sides with a high performance acrylic adhesive system, encased in release liners of paper or polyester.

Product classification: Ensure product suitability for the following substrates:

- Firm high strength foam tapes for high energy surfaces including most bare metals such as stainless steel and aluminium.
- Conformable high strength foam for medium energy surfaces including many plastics and paints, and bare metals.
- Conformable high strength foam for lower energy surfaces including many plastics, most paints and powder coatings, and bare metals.

Thickness: Select the tape to ensure a mismatch between surfaces does not exceed half the tape thickness under the applied lamination pressure.

2.2 SEALANTS

Standards
General: To ISO 11600.

External masonry joints
General: Provide sealant and bond breaking backing materials compatible with each other and the substrate and which are non-staining to masonry. Do not use bituminous materials with absorbent masonry units.

Bond breaking backing:

- Bond breaking materials: Non-adhesive to sealant, or faced with a non-adhering material.
- Foamed materials: Closed-cell or impregnated, not water-absorbing.

Sealant colour:off white to match concrete – architect to inspect

Fire rated control joints
General: Provide sealant materials that maintain the nominated fire resistant rating.

- Fire stopping: To AS 4072.1.

Pointing and bedding
General: Provide sealants for fast moving joints in light weight building elements that are compatible with the contact materials.

Bond breaking backing:

- Bond breaking materials: Non-adhesive to sealant, or faced with a non-adhering material.
- Foamed materials: Closed-cell or impregnated, not water-absorbing.

Floor movement joints
General: Provide trafficable sealants for that are compatible with the contact materials.

Bond breaking backing:

- Bond breaking materials: Non-adhesive to sealant, or faced with a non-adhering material.
- Foamed materials: Closed-cell or impregnated, not water-absorbing.

2.3 FASTENERS

General
Masonry anchors: Proprietary expansion or chemical type.

Plain washers: To AS 1237.1.

- Provide washers to the heads and nuts of bolts, and the nuts of coach bolts.

Plugs: Proprietary purpose-made plastic.

Powder-actuated fasteners: To AS/NZS 1873.4.

Stainless steel fasteners: To ASTM A240/240M.

Steel nails: To AS 2334.

- Length: At least 2.5 x the thickness of the member being secured, and at least 4 x the thickness if the member is plywood or building board < 10 mm thick.

Unified hexagon bolts, screws and nuts: To AS/NZS 2465.

Fasteners in CCA treated timber: Epoxy coated or stainless steel.

Bolts

Coach bolts: To AS/NZS 1390.

Hexagon bolts Grades A and B: To AS 1110.1.

Hexagon bolts Grade C: To AS 1111.1.

Corrosion resistance

Corrosivity category: To the *General requirements* worksection.

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

Corrosion resistance table – low corrosivity category

Situation	Self drilling screws to AS 3566.2 Class	Threaded fasteners and anchors		Powder actuated fasteners	
		Material	Minimum local metallic coating thickness (μm)	Material grade	Minimum local metallic coating thickness (μm)
Internal	1	Electroplated zinc	4	Electroplated zinc	4
External	3	Electroplated zinc or Hot-dip galvanized	30	Stainless steel 316	

Corrosion resistance table – medium corrosivity category

Situation	Self drilling screws to AS 3566.2 Class	Threaded fasteners and anchors		Powder actuated fasteners	
		Material	Minimum local metallic coating thickness (μm)	Material grade	Minimum local metallic coating thickness (μm)
Internal	2	Electroplated zinc	12	Electroplated zinc	12
External	4	Hot-dip galvanized	50	Stainless steel 316	

Corrosion resistance table – high corrosivity category

Situation	Self drilling screws to AS 3566.2 Class	Threaded fasteners and anchors		Powder actuated fasteners	
		Material	Minimum local metallic coating thickness (μm)	Material grade	Minimum local metallic coating thickness (μm)
Internal	3	Electroplated zinc or Hot-dip galvanized	30	Stainless steel 316	
External	Stainless steel 316	Stainless steel 316		Stainless steel 316	

Finishes

Electroplating:

- Metric thread: To AS 1897.
- Imperial thread: To AS 4397.

Galvanizing:

- Threaded fasteners: To AS 1214.
- Other fasteners: To AS/NZS 4680.

Mild steel fasteners: Galvanize if:

- Embedded in masonry.
- In external timbers.
- In contact with chemically treated timber, other than CCA treated timber.

Epoxy coated:

- CCA Treated timber.

Nuts

Hexagon chamfered thin nuts Grades A and B: To AS 1112.4.

Hexagon nuts Grade C: To AS 1112.3.

Hexagon nuts Style 1 Grades A and B: To AS 1112.1.

Hexagon nuts Style 2 Grades A and B: To AS 1112.2.

Screws

Coach screws: To AS/NZS 1393.

Hexagon screws Grades A and B: To AS 1110.2.

Hexagon screws: Grade C To AS 1111.2.

Hexagon socket screws: To and AS/NZS 1421.

Machine screws: To AS/NZS 1427.

Self-drilling screws: To AS 3566.1 and AS 3566.2.

Self-tapping screws:

- Crossed recessed countersunk (flat – common head style): To AS/NZS 4407.
- Crossed recessed pan: To AS/NZS 4406.
- Crossed recessed raised countersunk (oval): To AS/NZS 4408.
- Hexagon: To AS/NZS 4402.
- Hexagon flange: To AS/NZS 4410.
- Hexagon washer: To AS/NZS 4409.
- Slotted countersunk (flat – common head style): To AS/NZS 4404.
- Slotted pan: To AS/NZS 4403.
- Slotted raised countersunk (oval – common head style): To AS/NZS 4405.

Blind rivets

Description: Expanding end type with snap mandril.

Type: Closed end for external application, open end for internal application.

End material:

- Aluminium base alloy for metallic coated or colourbond coated steel.
- Stainless steel for stainless steel sheet.
- Copper for copper sheet.

Size:

- For sheet metal to sheet metal: 3 mm.
- For sheet metal to supports, brackets and rolled steel angles: 4.8 mm.

Performance

Loads: Provide fasteners capable of transmitting the loads imposed, and sufficient to ensure the rigidity of the assembly.

3 EXECUTION

3.1 ADHESIVES

Preparation

Substrates: Ensure substrates are:

- Clean and free of any deposit or finish which may impair adhesion.
- If framed or discontinuous, support members are in full lengths without splicing.
- If solid or continuous, excessive projections are removed.

- If previously painted, cracked or flaking paint is removed and the surface lightly sanded.

Contact adhesive

Precautions: Do not use if:

- A substrate is polystyrene foam.
- A PVC substrate may allow plasticiser migration.
- The adhesive solvent can discolour the finished surface.
- Dispersal of the adhesive solvent is impaired.

Two way method: Immediately after application press firmly to transfer adhesive and then pull both surfaces apart. Allow to tack off and then reposition and press firmly together. Tap areas in contact with a hammer and padded block.

One way method: Immediately after application bring substrates together and maintain maximum surface contact for 24 hours by clamps, nails or screws as appropriate. If highly stressed employ permanent mechanical fasteners.

High strength adhesive tape

Preparation:

- Non-porous surfaces: Clean with surface cleaning solvents such as isopropyl alcohol / water, wash down and allow to dry.
- Porous surfaces: Prime the surface with a contact adhesive compatible with the tape adhesive system.

Follow the recommendations of the manufacturer for application to the following: Copper, brass, plasticized vinyl and hydrophilic surfaces such as glass and ceramics in a high humidity environment.

Applied lamination pressure: Ensure the tape experiences 100 kPa.

Application temperature: Generally above 10°C, consult the manufacturer.

Completion: Do not apply loads to the assembly for 72 hours at 21°C.

3.2 SEALANT JOINTING

Preparation for jointing

Cleaning: Cut flush joint surface protrusions and make good. Mechanically clean joint surfaces free of any deposit or finish which may impair adhesion of the sealant. Immediately before jointing remove loose particles from the joint, using oil-free compressed air.

Bond breaking: Install bond breaking backing material.

Taping: Protect the surface on each side of the joint using 50 mm wide masking tape or equivalent means. On completion of pointing remove the tape and remove any stains or marks from the surface.

Primer: Apply the recommended primer to the surfaces in contact with sealant materials.

Sealant joint proportions

General weatherproofing joints (width:depth):

- 1:1 for joint widths < 12 mm.
- 2:1 for joint widths > 12 mm.

Sealant application

General: Apply the sealant to dry joint surfaces using a pneumatic applicator gun. Ensure the sealant completely fills the joint to the required depth; that it is in good contact with the full depth of the sides and that there is no air trapped in the joint. Do not apply the sealant outside the recommended working time for the material or the primer.

Weather conditions

Two pack polyurethanes: Do not apply the sealant if ambient conditions are outside the following:

- Temperature: < 5°C or > 40°C.
- Humidity: To the manufacturer's recommendations.

Joint finish

General: Force the sealant into the joint and finish with a smooth, slightly concave surface using a tool designed for the purpose.

Protection

General: Protect the joint from inclement weather during the setting or curing period of the material.

0182b FIRE-STOPPING

1 GENERAL

1.1 CROSS REFERENCES

General
General: Conform to the General requirements worksection.

1.2 GENERAL STANDARDS

General
Service penetration fire-stopping systems: To BCA clause C3.15.
Control joint fire-stopping systems: To AS 4072.1.

1.3 INSPECTION

Notice
Inspection: Give sufficient notice so that inspection may be made of the following:
- Service penetrations completed and ready for fire-stopping.
- Finished fire-stopping, before being concealed.

2 PRODUCTS

2.1 MATERIALS

General
Shelf life: Ensure materials used have not exceeded their shelf life.
Toxic materials: Free of asbestos and lead and free of, nor requiring the use of, toxic solvents.
Toxicity in fire: Non-toxic.

Fire-stop mortars
Type: Re-enterable cement-based compound, mixed with water. Non-shrinking, moisture resistant. Insoluble in water after setting.

Formulated compound of incombustible fibres
Material: Formulated compound mixed with mineral fibres, non-shrinking, moisture resistant. Insoluble in water after setting.

Fibre stuffing
Material: Mineral fibre stuffing insulation, dry and free of other contaminants.
Standard: AS/NZS 4859.1 Section 8.

Fire-stop sealants
Material: Elastomeric sealant. Soft, permanently flexible, non-sag, non-shrinking, moisture resistant. Capable of providing a smoke-tight, gas-tight and waterproof seal when properly installed. Insoluble in water after setting.

Fire-stop foams
Material: Single component compound of reactive foam ingredients, non-shrinking, moisture resistant. Insoluble in water after setting.

Fire-stop putty
Material: Single component, mouldable, permanently flexible, non-shrinking, moisture resistant, intumescent compound which expands on exposure to surface heat gain, forming a high-volume thermally insulating char that closes gaps and voids, resists the turbulence of a severe fire. Capable of being placed by hand to form an immediate fire seal. Insoluble in water after setting.

2.2 COMPONENTS

Fire-stop collars
Material: Mechanical device with incombustible intumescent fillers covered with sheet steel jacket. Airtight and watertight.

Fire-stop pillows
Material: Formed self-contained compressible flexible mineral fibre in cloth bags, rated to permit frequent changes in service.

Accessories
Permanent dam material: Non-combustible.

Installation accessories: Provide clips, collars, fasteners, temporary stops and dams, and other devices required to position, support and contain fire-stopping and accessories.

3 EXECUTION

3.1 EXECUTION GENERALLY

General
Extent: Fire-stop and smoke-stop interruptions to fire-rated assemblies, materials and components, including penetrations through fire-rated elements, breaks within fire-rated elements (e.g. expansion joints), and junctions between fire-rated elements. The **Fire-stopping systems schedule** is not necessarily comprehensive.

Sequence: Fire-stop after services have been installed through penetrations and properly spaced and supported, after sleeving where appropriate, and after removal of temporary lines, but before restricting access to the penetrations, including before dry lining.

Ventilation: Supply ventilation for non-aqueous solvent-cured materials.

Density: Apply fire-stopping material to uniform density.

Fire-stopping exposed to view: Finish surfaces to a uniform and level condition.

Cable separation: Maintain.

Protection: Protect adjacent surfaces from damage arising through installation of fire-stopping. Protect completed fire-stopping from damage arising from other work.

Loose or damaged fire-stopping material: Remove and replace.

Penetrations by pipes and ducts: Allow for thermal movement of the pipes and ducts.

Preventing displacement: Reinforce or support fire-stopping materials with non-combustible materials when:

- The unsupported span of the fire-stopping materials > 100 mm.
- The fire-stopping materials are non-rigid (unless shown to be satisfactory by test).

Large openings: Provide fire-stopping capable of supporting the same loads as the surrounding element or provide similar structural support around the opening.

Preparation
Cleaning: Clean substrates of dirt, dust, grease, oil, loose material, and other matter which may affect bond of fire-stop material.

Primer: Clean and dry substrates for primers and sealants.

Restraint: Install backing and/or damming materials to arrest liquid material leakage. Remove temporary dams after material has cured.

3.2 SYSTEMS

Fire-stop mortars
Ambient conditions: Do not install below 5°C.

Fibre stuffing
Installation: Compress to 40% of its uncompressed volume.

Fire-stop sealants
Ambient conditions: Do not store above 32°C. Do not install outside the temperature range recommended by the sealant manufacturer. Do not install when humidity exceeds that recommended by the sealant manufacturer for safe installation.

Fire-stop foams

Ambient conditions: Do not store above 32°C. Do not install below 15°C or above 32°C. Do not apply when temperature of substrate and air is below 15°C. Maintain this minimum temperature before, during and for 3 days after installation.

Installation: Test substrates for adhesion and prime if necessary. Place in layers to ensure homogenous density, filling cavities and spaces. Place sealant to completely seal junctions with adjacent dissimilar materials.

Fire-stop putty

Ambient conditions: Do not install below 5°C. Do not allow the material to freeze.

Fire-stop collars

Installation:between all floors and fire compartments as shown on plans and as per BCA requirement

Fire-stop pillows

Ambient conditions: Do not install in conditions outside of the manufacturer's recommendations.

Labelling

Label each fire-stopping installation with a permanently fixed tag or sticker containing the following information:

- Manufacturer's name.
- Name and address of installer.
- Date of installation.

3.3 COMPLETION SUBMISSIONS

Certification

General: Submit evidence of compliance, in accordance with the recommendations of AS 4072.1 Appendix B.

Certification: Submit a completed certification document for installed fire-stopped penetrations and control joints.

- Form: To Figure B1 of AS 4072.1.

Schedule: Submit a schedule of installed fire-stopped penetrations and control joints.

- Form: To Figure B2 of AS 4072.1.

User manual

For fire-stopping systems which are intended to be modified in service, submit user manual.

3.4 MAINTENANCE

Cleaning

Remove spilled and excess fire-stopping materials without damaging other work.

0183b METALS AND PREFINISHES

1 GENERAL

1.1 CROSS REFERENCES

General
General: Conform to the General requirements worksection.

2 PRODUCTS

2.1 METALS

Coated steel
Electrogalvanizing ferrous hollow and open sections: To AS 4750.

Metallic-coated steel:

- Ferrous open sections zinc coated by an in-line process: To AS/NZS 4791.
- Ferrous hollow sections zinc coated by a continuous or specialised process: To AS/NZS 4792.

Metallic-coated steel sheet: To AS 1397. Metal thicknesses specified are base metal thicknesses.

Steel wire: To AS/NZS 4534.

Stainless steel
Bars: To ASTM A276.

Plate, sheet and strip: To ASTM A240/A240M.

Welded pipe (round): To AS 1769.

Welded pipe (square): To ASTM A554.

3 EXECUTION

3.1 GENERAL

Metal separation

- Apply an anti-corrosion low moisture transmission coating such as alkyd zinc phosphate primer or aluminium pigmented bituminous paint to contact surfaces.
- Insert a concealed separation layer such as polyethylene film, adhesive tape, or bituminous felt.

Incompatible fixings: Do not use.

Incompatible service pipes: Install lagging or grommets. Do not use absorbent, fibrous of paper products.

Brazing
General: Ensure brazed joints have sufficient lap to provide a mechanically sound joint.

Butt joints: Do not use butt jointing for joints subject to loads. If butt joints are used, do not rely on the filler metal fillet only.

Filler metal: To AS/NZS 1167.1.

Finishing
Visible joints: Finish visible joints made by welding, brazing or soldering using methods appropriate to the class of work (including grinding or buffing) before further treatment such as painting, galvanizing or electroplating. Ensure self-finished metals are without surface colour variations after jointing.

Preparation
General: Before applying decorative or protective prefinishes to metal components, complete welding, cutting, drilling and other fabrication, and prepare the surface using a suitable method.

Standard: To AS 1627.

Priming steel surfaces: If site painting is specified to otherwise uncoated mild steel or similar surfaces:

- Prime after fabrication and before delivery to the works.
- After installation, repair damaged priming and complete the coverage to unprimed surfaces.

Welding
Aluminium: To AS 1665.
Stainless steel: To AS/NZS 1554.6.
Steel: To AS/NZS 1554.1.

3.2 PREPAINTING

Air-drying enamel
Application: Spray or brush.
Finish: Full gloss.
General use:
- Primer: Two-pack epoxy primer to AS/NZS 3750.13.
- Top coats: 2 coats to AS 3730.6.

Oil resistant use:
- Primer: Two-pack epoxy primer to AS/NZS 3750.13.
- Top coats: 2 coats to AS/NZS 3750.22.

Equipment paint system
Description: Brush or spray application using paint as follows:
- Full gloss enamel finish coats, oil and petrol resistant: AS/NZS 3750.22, two coats.
- Prime coat to metal surfaces generally: AS 4089 or AS/NZS 3750.20.
- Prime coat to zinc-coated steel: AS 3730.15.
- Undercoat: AS AS/NZS 3750.21.

Prepainted metal products
Standard: To AS/NZS 2728.
Product type as noted in AS/NZS 2728: Not lower than the type appropriate to the field of application.

Two-pack liquid coating
Application: Spray.
Finish: Full gloss.
Primer: Two pack epoxy primer to AS/NZS 3750.13.
Topcoat:
- Internal use: Proprietary polyurethane or epoxy acrylic system.
- External use: Proprietary polyurethane system.

3.3 COMPLETION

Damage
General: If prefinishes are damaged, including damage caused by unauthorised site cutting or drilling, remove and replace the damaged item.

Repair
General: If a repair is required to metallic coated sheet or electrogalvanized on inline galvanized steel products, clean the affected area and apply a two-pack organic primer to AS/NZS 3750.9.

0184 TERMITE MANAGEMENT

1 GENERAL

1.1 AIMS

Responsibilities
Provide termite management materials and systems.
Selections: As documented.

1.2 CROSS REFERENCES

General
General: Conform to the *General requirements* worksection.

1.3 STANDARD

General
Termite barriers: To AS 3660.1.

1.4 INSPECTION

Notice
Inspection: Give sufficient notice so that inspection may be made of the completed termite barriers.

1.5 TESTS

Chemical soil barriers – reticulation systems
Type testing: To AS 3660.1 Appendix E.

1.6 SUBMISSIONS

Tests
Submit a Registered testing authority laboratory analysis certificate of chemical soil barrier type testing to Appendix E.

2 PRODUCTS

2.1 NON-CHEMICAL BARRIERS

Concrete slab barrier
Standard: To AS 3660.1 Section 4.
Services penetration barrier type:Homeguard TMB or Trithor – use proprietory penetration collars
To be installed by qualified installer only
Particle barriers
Standard: To AS 3660.1 Section 7.
Use only as required – qualified installer to advise - Homeguard impregnated granuals only

3 EXECUTION

3.1 NON-CHEMICAL BARRIERS

Concrete slab barrier
Standard: To AS 3660.1 Section 4.
Termite cap and strip shields
Standard: To AS 3660.1 Section 5.
Woven stainless steel mesh barriers
Standard: To AS 3660.1 Section 6.
Graded stone particles barriers
Standard: To AS 3660.1 Section 7.

3.2 CHEMICAL SOIL BARRIERS

General
Standard: To AS 3660.1 Section 8.

3.3 COMPLETION

Termite barrier notice
Provide a durable notice permanently fixed in a prominent location to BCA B1.4 (i) (ii) or clause 3.1.3.2(b) and AS 3660.1 Appendix A.

Waste materials
Progressively cleaning: Ensure that no waste materials which could attract termites remain on the site.

Warranty
Warranty: 5 years minimum

Completion inspection
At the end of the defects liability period, inspect the termite control systems and submit a report on their efficacy and status.

0185 TIMBER FINISHES AND TREATMENT

1 GENERAL

1.1 CROSS REFERENCES

General

General: Conform to the *General requirements* worksection.

1.2 INTERPRETATION

Definitions

General: For the purposes of this worksection the definitions given below apply.

- Plywood: To AS/NZS 4491.
- 'Standard trade common names': To AS/NZS 1148.
- Groups of timbers: Terms employed for that purpose in relevant Australian standards.

1.3 SUBMISSIONS

Materials

Rainforest species: Submit source certification.

Pressure preservative treatment: For timber required to be pressure treated, submit a certificate or other satisfactory evidence showing that the timber has been treated.

2 PRODUCTS

2.1 TIMBER

Durability

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

Natural durability class of heartwood: To AS 5604.

Minimum requirements:

- Class 1: Timbers in contact with ground.
- Class 2: Timbers above ground, not in continuous contact with moisture, well ventilated, protected from moisture but exposed to the weather.
- Class 3: Timbers above ground, not in continuous contact with moisture, well ventilated, protected with a finish, and well maintained.
- Class 4: Timbers fully protected from moisture, indoors, above ground, and well ventilated.

Lyctus susceptible timbers

General: Do not provide timbers containing Lyctus susceptible sapwood.

Preservative treatment

Glued laminated timber products: To AS/NZS 1604.5.

- Hazard classification: To Table A1.

Laminated veneer lumber (LVL): To AS/NZS 1604.4.

- Hazard classification. To Table A1.

Plywood: To AS/NZS 1604.3.

- Hazard classification: To Table A1.

Reconstituted wood-based products: To AS/NZS 1604.2.

- Hazard classification: To Table A1.

Sawn and round timber: To AS 1604.1.

- Hazard classification: To Table D1.

Moisture content

Tolerance: Make milled and dressed products from timbers seasoned as follows:

- To within 3% of the equilibrium moisture content appropriate to the timber and its intended conditions of use.
- To 10 – 15% moisture content.
- With no more than 3% difference between any 2 pieces in any one group.

Test: To AS/NZS 1080.1.

Protection: Protect timber and timber products stored on site from moisture and weather. For milled, prefinished, prefabricated and similar elements which are protected in the final structure, provide temporary weather protection until the permanent covering is in place.

Finished sizes

General: Provide milled timbers with actual dimensions which are at least the stated dimensions, except for dimensions qualified by a term such as 'nominal' or 'out of' to which industry standards for finished sizes apply.

Unseasoned timber

General: If unseasoned timber is used, or if variations in moisture are likely, allow for shrinkage, swelling and differential movement.

Surface finish

Hardwood: To AS 2796.1 Table B1.

Softwood: To AS 4785.1 Table B1.

3 EXECUTION

3.1 WORKMANSHIP

Ploughing

General: Back plough boards liable to warp (e.g. if exposed externally on one face). Make the width, depth and distribution of ploughs appropriate to the dimensions of the board and degree of exposure.

Painting

Edges: Chamfer edges of work to receive paint or similar coatings.

Priming: For woodwork to be painted, prime hidden surfaces before assembly.

0191 SUNDRY ITEMS

1 GENERAL

1.1 AIMS

Responsibilities

General: Provide sundry items that are:

- Undamaged and free of surface defects or distortions.
- Correctly located and aligned, plumb, level and straight.
- Connected to the nominated service(s), if required.

Selections: Conform to the **Selections**.

1.2 CROSS REFERENCES

General

General: Conform to the *General requirements* worksection.

1.3 INTERPRETATIONS

Abbreviations

General: For the purposes of this worksection the abbreviations given below apply.

1.4 INSPECTIONS

Notice

Inspection: Give notice so inspection can be made of the following:

- Set out of item locations prior to fixing.
- Completion of installation.

1.5 SUBMISSIONS

Shop drawings

General: Submit shop drawings showing the following information:

- Details of fabrication and components.
- Details of fabrication involving other trades or components.
- Information necessary for site assembly.
- Proposals for the break-up of large items as required for delivery to the site.
- Proposed method of joining the modules of large items.
- Fixing locations and types.

Samples

General: Submit samples of the following:

- Each type of joint.
- Each type of finish.
- Sections for use in fabricated work.

Labelling: Label each sample, giving the brand and product name, manufacturer's code reference, date of manufacture and intended building location.

Sealant compatibility

Compatibility statements: Submit statements from all parties to the installation that certify the compatibility of sealants with items.

0221b SITE MANAGEMENT

1 GENERAL

1.1 AIMS

Responsibilities
Designated areas for protection:Liase with Local Authority to protect footpath. All neighbouring properties to be protected from falling debris and spill

Incidental works
Generally: Undertake the following:

- Reinstatement: Reinstate undeveloped ground surfaces to the condition existing at the commencement of the contract.
- Minor trimming: As required to complete the works as documented.

1.2 CROSS REFERENCES

General
General: Conform to the *General requirements* worksection.

1.3 INTERPRETATIONS

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

- Clearance authority: Any authority covering statutory requirements relating to the project and requiring clearances for work in that particular area.
- Clearances: A formal certificate, approval or condition issued by a statutory authority to allow work to be carried out in a particular area.
- Contamination of land: The presence of a substance in, on or under the land at a concentration above that which is normally found in that locality, such that there presents a risk of harm to human health or to the environment.
- Green and organic waste: Includes all food wastes, vegetative wastes from land clearing and pruning operations, biosolids produced from the treatment of liquid wastes, garden wastes and forestry waste (bark and saw dust) and paper and cardboard products.
- Environment: The physical factors of the surroundings of human beings including the land, waters, atmosphere, climate, sound, odours, tastes, the biological factors of animals and plants and the social factor of aesthetics.
- Environmental audits: A review of environment management practices, in particular the evaluation of a site for environmental liability.
- Environmental impact assessment: A method for predicting environmental impacts of a proposed development including minimising identified impacts.
- Environmental management plan (EMP): A plan describing the management of the environmental issues and considerations for the activity being undertaken. This applies to the design, construction and operation of the buildings and infrastructure.
- Pollution incident: An incident or set of circumstances during or as a consequence of which there is, or is likely to be a leak, spill or other escape of a substance as a result of which pollution has occurred, is occurring or is likely to occur.
- Weed: An invasive plant that degrades our natural areas, reduces the sustainability or affects the health of people and animals.

SUBMISSIONS

Environmental management plan (EMP)
Submit an Environmental management plan and include the following details:

- Assignment of responsibility for environmental controls.
- Conditions of approvals, licences and permits to meet statutory requirements.

- Details of potential environmental impacts and operational control measures that are to be implemented including:
  . Heritage.
  . Preservation of visual values.
- Details of environmental protection for each activity.
- Locations of environmental controls and environmentally sensitive areas.
- Communication procedures.
- Emergency response procedures including response time.
- Environmental training plan and procedures.
- Environmental auditing program.
- Other items necessary to protect the surrounding environment.

Address the phases of activity, as appropriate:

- Before construction and site establishment.
- During construction.
- After construction, including rehabilitation activities and maintenance of erosion and sedimentation controls.

Completed environmental management plan: Submit before work commences on site.

Soil erosion and sediment control plan

Submit a soil erosion and sediment control plan and include the following details:

- Staging of operations and sequence of works.
- Diversion of upstream water around the site.
- Provision of temporary drains and catch drains.
- Application of diversion, dispersal and/or retention measures to concentrate flows to control and dissipate stormwater through the site without damage.
- Spreader banks or other structures to disperse concentrated runoff.
- Temporary grassing or other treatments such as contour ploughing or bunding to disturbed areas and long-term stockpiles.
- Restoration of disturbed areas in progress with the works.
- Use of mulch materials to protect disturbed or exposed areas where suitable.

Areas: Include all site areas and access and haulage tracks, borrow pits, stockpile and storage areas and compound areas.

Waste management plan

Submit a waste management plan and identify major waste streams that will be generated during the contract including:

- Green waste and organic waste.
- Construction waste, including:
  . Spoil.
  . Demolition waste.
  . Asphalt or bitumen.
  . Concrete
  . Metal.
  . Paint materials and empty containers.
  . Office waste.
  . Kitchen waste.
  . Sewage effluent.
- For each waste stream indicate:
  . How and where the waste is to be re-used, recycled, stockpiled or disposed off.
  . How the waste will be transported between the site and point of re-use, recycling, stockpiling, treating or disposal and who will be responsible.

Submit details of location, labelling and protection of separate skips for the identified waste stream.

Ground contamination control plan
Submit a ground contamination plan and include the following details:
- If the land is identified as contaminated, or the presence of acid sulphate soils is found, prepare a Remediation Action Plan (RAP) in accordance with the Environmental Protection Authority (EPA) guidelines.

Weed management plan
Details required:
- Identify weeds and infestation zones within the work site/investigation date.
- Method of cleaning vehicles and machinery and cleaning date.
- Cleaning bay location and treatment date.
- Contaminated fill stockpile, treatment type and treatment date.

Site preparation
Mulching: Submit details of provisions for mulching cleared vegetation.

Internal monitoring
Documents: Provide documented procedures describing:
- How environmental monitoring is to be planned, implemented and recorded.
- Non-conformance control and corrective action procedures for all of the control measures that are to be implemented.

Records: Maintain records of the results of environmental monitoring, including the effectiveness of any remedial action taken.

Internal monitoring personnel: Provide staff member's names and contact details.

Machinery and equipment: Provide details of proposed plant.

Emergency response
Emergency response personnel: Provide staff member's names and contact details.

Weed management personnel
Submit details of:
- Subcontractors who will treat weed infestations.
- Chemical handlers, qualifications, date, and spray type.

1.4 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of the following:
- Enclosures to trees to be retained.
- Trees to be removed.

2 EXECUTION

2.1 GENERAL

Community liaison
General: Notify residents about new or changed construction activities which will affect access to, or disrupt the use of, their properties.

Notice: 5 working days unless the work is of an urgent nature with safety implications.

Notification content:
- The nature of the work.
- The reason for it being undertaken.
- The expected duration.
- Changes to traffic arrangements and property access.
- The 24-hour contact number of the responsible representative.

Complaints
Report: Within 1 working day of receiving a complaint about any environmental issue, including pollution, submit a written report detailing the complaint and action taken.

Register: Keep a register of all environmental complaints and action taken.

Cultural heritage
Training: Ensure that all personnel working on site have received training relating to their responsibilities regarding cultural heritage and are made aware of any sites/areas, which must be avoided. Identify such sites/areas on a site map and make available to all relevant personnel during the works.

Notice: Give notice if any item is encountered which is suspected to be an artefact of heritage value or any relic or material suspected of being of Aboriginal or early settlement origin.

Action: Stop construction work that might affect the item and protect the item from damage or disturbance.

2.2 CONTROL AND PROTECTION

Air quality control
General: Protect adjoining owners, residents and the public against dust, dirt and water nuisance and injury. Use dust screens and watering to reduce the dust nuisance.

Lighting of fires
Prohibition: Do not light fires.

Noise control and vibration
Maximum noise level at the site boundary: as per local authority requirements

Monitoring: Measure vibration levels of the peak particle velocity to AS 2187.2.

Limits: Do not exceed the vibration or airblast overpressure recommended in AS 2187.2 Appendix J.

Dust control
Dust control measures: Install shade cloth to minimise dust blow and erect hoardings as required

Water quality
Wash out: Ensure that wash out does not enter waterways or stormwater drains.

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

Dewatering
General: Keep groundworks free of water. Provide and maintain slopes, crowns and drains on excavations and embankments to ensure free drainage. Place construction, including fill, masonry, concrete and services, on ground from which free water has been removed. Prevent water flow over freshly laid work.

Disposal: Dispose of water legally.

2.3 TRUCK CONTAMINATION

Truck contamination precautions
Covers: Use tarpaulins to prevent the dropping of materials on public roads.

Washing: Wash the underside of all vehicles leaving the site as follows:

- Mud: Do not carry mud on to adjacent paved streets or other areas.
- Noxious plants: If noxious plants, as designated by the Local Authority, are present on the site ensure seeds are not carried on to adjacent paved streets or other areas.

2.4 MANAGEMENT AND CONTROL PLAN IMPLEMENTATION

Approval
Approval authority: Town of Vincent

Implementation
General: Implement the following approved management and control plans:

- Environmental management control plan.
- Soil erosion and sediment control plan.
- Air quality control plan.
- Waste management plan.
- Ground contamination plan.
- Weed management plan.

Reporting
General: Compile the environment management plan (EMP) reports regularly to report the progress in relation to:

- Performance against statutory requirements.
- Performance against the EMP and the EMP policy, ecologically sustainable development outcomes and targets.
- Summary of monitoring, inspection and audits.
- Summary of reports required to meet the statutory requirements.
- Summary of environmental emergencies, incidents, non-compliance and complaints.

2.5 TEMPORARY LANDSCAPE FENCING

Fence dimensions
Height: 1200 mm.

Maximum post spacing: 5000 mm.

Components sizes
Corner and gate posts: Hardwood or preservative-treated softwood, 250 mm diameter.

Intermediate posts: Star picket.

Gate: Provide a suitable hinged gate with a gate latch.

Wire: Top, intermediate and bottom rows of 3.2 mm plain galvanized steel wire. Thread the top wire through pieces of plastic tube and through corner posts.

Removal
Completion: Remove the fence at the end of the planting establishment period.

2.6 MARKING

General: Before commencing earthworks, locate and mark existing underground services in the areas which will be affected by the earthworks operations including clearing, excavating and trenching.

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

les against and over toe of the fabric.

2.7 DISPOSAL OF MATERIALS

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

2.8 COMPLETION

Temporary works
Remove at completion: all scaffolding, te,porary fenncing and site facilities

Joining up
Abutments: Join new and existing work including cutting if required, in the manner appropriate to the materials and make good to existing work.

2.9 CLEANING UP

Siteworks generally
Progressive cleaning: Keep the work under the contract clean and tidy as it proceeds and regularly remove from the site rubbish and surplus material arising from the execution of the work including any work performed during the Defects Liability Period or the Plant Establishment Period.

Removal of plant: Within fourteen days of the date of Practical Completion, remove Temporary Works, Construction Plant, buildings, workshops and equipment not forming part of the Works, except such as are required for work during the Defects Liability Period or the Plant Establishment Period which shall be removed on completion of that work.

2.10 VERMIN

Vermin management
Requirement: Employ an approved firm of pest exterminators and provide a certificate from the firm stating that the completed building is free of vermin.

0222b EARTHWORK

1 GENERAL

1.1 CROSS REFERENCES

General

General: Conform to the *General requirements* worksection.

Associated worksections

Associated worksections: Conform to the following:

- *Site management*.

1.2 INTERPRETATION

Definitions

General: For the purposes of this worksection the definitions given below apply.

- Standard: To AS 1348.
- Description and classification of soils: To AS 1726.
- Site classification: To BCA clause 3.2.4.
- 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.
- Base: One or more layers of material usually constituting the uppermost structural element of a pavement and on which the surfacing may be placed, which may be composed of fine crushed rock, natural gravel, broken stone, stabilised material, asphalt or Portland cement concrete.
- Discrepancy: A difference between contract information about the site and conditions encountered on the site, including but not limited to discrepancies concerning the following:
  . The nature or quantity of the material to be excavated or placed.
  . Existing site levels.
  . Services or other obstructions beneath the site surface.
- Line of influence: A line 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.
- Rock: Monolithic material with volume greater than 0.5 m^3 which cannot be removed until broken up either by explosives or by rippers or percussion tools.
- Site topsoil: Soil excavated from the site which contains organic matter, supports plant life, conforms generally to the fine to medium texture classification of AS 4419 (loam, silt, clay loam) and is free from:
  . Stones > 25 mm diameter.
  . Clay lumps > 75 mm diameter.
  . Weeds and tree roots > 75 mm.
  . Sticks and rubbish.
  . Material toxic to plants.
- Subbase: The material laid on the subgrade below the base either for the purpose of making up additional pavement thickness required, to prevent intrusion of the subgrade into the base, or to provide a working platform.
- Subgrade: The trimmed or prepared portion of the formation on which the pavement or slab is constructed. Generally taken to relate to the upper line of the formation.

1.3 GEOTECHNICAL AND ENVIRONMENTAL SITE INVESTIGATION

Report

General: The geotechnical and environmental site investigation report provided is for information only. The geotechnical information and information on contaminants given is information on the nature of

the ground at each tested part. It is not a complete description of conditions existing at or below ground level.

1.4 RECORDS OF MEASUREMENT

Excavation and backfilling
Agreed quantities: If a schedule of rates applies, provisional quantities are specified, or there are variations to the contract levels or dimensions of excavations, do not commence backfilling or place permanent works in the excavation until the following have been agreed and recorded:

- Depths of excavations related to the datum.
- Final plan dimensions of excavations.
- Quantities of excavations in rock.

Method of measurement: To be by registered surveyor unless otherwise agreed.

Rock
Level and class: If rock is to be measured for payment purposes, whether as extra over excavation of material other than rock or for adjustment of provisional measurements, do not remove the rock until the commencing levels and the classes of rock have been determined.

1.5 INSPECTION

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

- Items to be measured as listed in *Records of measurement*.
- Areas to be cleared and/or stripped of topsoil.
- Areas stripped of topsoil.
- Excavation completed to contract levels or founding material.
- Proof roll subgrade prior to placing fill.
- Filling completed to contract levels.
- Stockpiled topsoil before spreading.

1.6 TESTS

Geotechnical testing authority
General: Use a NATA registered geotechnical testing authority.

Compaction control tests
Compaction control tests: To AS 1289.5.4.1 or AS 1289.5.7.1.

Compaction control test frequency
Standard: To AS 3798 Table 8.1.

Site area > 1500 m^2: At least (whichever requires the most tests):

- 1 test per layer per material type per 2500 m^2.
- 1 test per 500 m^3 distributed evenly throughout full depth and area.
- 3 tests per lot.

Site area 500 – 1500 m^2: At least (whichever requires the most tests):

- 1 test per layer per 1000 m^2.
- 1 test per 200 m^3 distributed evenly throughout full depth and area.
- 1 test per residential lot per layer.

Site area < 500 m^2: At least (whichever requires the most tests):

- 1 test per layer per 500 m^2.
- 1 test per 100 m^3 distributed evenly throughout full depth and area.
- 3 tests per visit.

Confined operations: 1 test per 2 layers per 50 m^2.

1.7 SUBMISSIONS

Tests
Imported fill: Submit certification or test results which establish the compliance of imported fill with the contract.

Compaction: Submit certification and/or test results in accordance with the specified level of responsibility to AS 3798.

Materials

General: Submit details of materials proposed, including the following:

- Sources of imported fill.

1.8 TOLERANCES

Tolerances

Finish: Finish the surface to the required level, grade and shape within the following tolerances:

- Under building slabs and loadbearing elements: + 0, - 25 mm.
- Pavement subgrades; + 0, - 40 mm.
- Batters: No steeper than the slope shown on the drawings. Flatter slopes shall not impact on boundaries or required clearances to buildings, pavements or landscaping.
- Other ground surfaces: ± 50 mm, provided the area remains free draining and matches adjacent construction where required. Provide smoothness as normally produced by a scraper blade.

2 PRODUCTS

2.1 FILL MATERIALS

Fill material generally

General: Inorganic, non-perishable material.

Sulphur content: Do not provide filling with sulphur content exceeding 0.5 % within 500 mm of cement bound elements (for example concrete structures or masonry) unless such elements are protected by impermeable membranes or equivalent means.

Excluded materials:

- Organic soils.
- Materials contaminated through past site usage.
- Materials which contain substances which can be dissolved or leached out, or which undergo volume change or loss of strength when disturbed and exposed to moisture.
- Silts or silt-like materials.
- Fill containing wood, metal, plastic, boulders or other deleterious material.

3 EXECUTION

3.1 REMOVAL OF TOPSOIL

General

Extent: Areas to be cut and areas to be filled and areas to be occupied by structures, pavements, embankments and the like.

Maximum depth: 200 mm.

3.2 EXCAVATION

Extent

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

Footings: Excavate for footings, pits, wells and shafts, to the required sizes and depths. Confirm that bearing capacity is adequate.

Crawl space: Provide clear space under timber floor bearers.

- Minimum clearance: 400 mm.

Proof rolling

Extent: Proof roll excavations for pavements, filling and non-spanning slabs on ground to determine the extent of any bad ground.

Disposal of excess excavated material

General: Remove excess excavated material from the site and dispose of legally.

3.3 BEARING SURFACES

General

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.

3.4 REINSTATEMENT OF EXCAVATION

General

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

3.5 SUPPORTING EXCAVATIONS

Removal of supports

General: Remove temporary supports progressively as backfilling proceeds.

Voids

General: Guard against the formation of voids outside sheeting or sheet piling if used. Fill and compact voids to a dry density similar to that of the surrounding material.

3.6 ADJACENT STRUCTURES

Temporary supports

General: Provide supports to adjacent structures where necessary, sufficient to prevent damage arising from the works.

Lateral supports: Provide lateral support using shoring.

Vertical supports: Provide vertical support where necessary using piling or underpinning or both.

Permanent supports

General: If permanent supports for adjacent structures are necessary and are not described, give notice and obtain instructions.

3.7 PREPARATION FOR FILLING

General

General: Prepare the ground surface before placing fill (including topsoil fill), ground slabs or load bearing elements. Shape to assist drainage. Remove materials which will inhibit or prevent satisfactory placement of fill layers, loose material, debris and organic matter. Compact the ground exposed after stripping or excavation in conformance with the **Compaction schedule**.

3.8 PLACING FILL

General

Layers: Place fill in near-horizontal layers of uniform thickness, deposited systematically across the fill area.

Extent: Place and compact fill to the designated dimensions, levels, grades, and cross sections so that the surface is always self draining.

Edges: At junctions of fill and existing surfaces, do not feather the edges.

Mix: Place fill in a uniform mixture.

Previous fill: Before placing subsequent fill layers, ensure that previously accepted layers still conform to requirements, including moisture content.

Protection: Protect the works from damage due to compaction operations. Where necessary, limit the size of compaction equipment or compact by hand. Commence compacting each layer at the structure and proceed away from it.

Protective covering: Do not disturb or damage the protective covering of membranes during backfilling.

3.9 PLACING TOPSOIL

Stockpiled topsoil

Cultivation: Rip to a depth of 100 mm or to the depth of rippable subgrade if less. Cultivate around services and tree roots by hand. Trim to allow for the required topsoil depth.

Herbicide: Apply before placing topsoil.

Placing: Spread and grade evenly.

Disposal of excess topsoil

On site: Dispose of surplus topsoil remaining on site by spreading evenly over the areas already placed.

Off site: Remove excess topsoil from the site and dispose of legally.

Compaction: Lightly compact topsoil so that the finished surface is smooth, free from lumps of soil, at the required level, ready for cultivation and planting.

Edges: Finish topsoil flush with abutting kerbs, mowing strips and paved surfaces. Feather edges into adjoining undisturbed ground.

3.10 COMPACTION REQUIREMENTS FOR FILL AND SUBGRADE

Density

General: Other than rolled fill to AS 2870 clause 6.4.2(b). Compact the subgrade and each layer of fill to the required depth and density, as a systematic construction operation and to conform to the **Compaction table**. Shape surfaces to provide drainage and prevent ponding.

Compaction table

Location	**Cohesive soils. Minimum dry density ratio (standard compaction) to AS 1289.5.4.1**	**Cohesionless soils. Minimum density index to AS 1289.5.6.1**
Residential: - Lot fill, house sites.	95	70
Commercial: - Fills to support minor loadings incl. floor loadings < 20 kPa and isolated pad or strip footings < 100 kPa.	98	75
Pavements: - Fill to support pavements - Subgrade to 300 mm deep	95 98	70 75

Excavated and stripped ground surface: After excavation and/or stripping, these surfaces should also be compacted in conformance with the **Compaction table** to a minium depth of 150 mm.

Maximum rock and lump size in layer after compaction: 2/3 compacted layer thickness.

Fill batter faces: Either compact separately, or overfill and cut back. Form roughened surfaces to the faces.

Moisture content

General: Adjust the moisture content of fill during compaction within the range of 85 – 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.

3.11 COMPLETION

Temporary works

Tree enclosures: Remove temporary tree enclosures at completion.

Tree marking: Remove temporary marks and tags at completion.

Temporary supports: Remove temporary supports to adjacent structures at completion.

0223b SERVICE TRENCHING

1 GENERAL

1.1 CROSS REFERENCES

General
General: Conform to the *General requirements* worksection.

1.2 DESIGN

Shoring and lining systems
Steel shoring and trench lining systems: To AS 4744.1.
Hydraulic shoring and trench lining equipment: To AS 5047.

1.3 INSPECTION

Notice
Inspection: Give notice so that inspection may be made at the following stages:
- Service trenches excavated before laying the service.
- Services laid in trenches and ready for backfilling.

1.4 SUBMISSIONS

Safety and stability
General: If shuttering and/or bracing of the sides of a trench is required for safety and stability, provide proposals.

2 EXECUTION

2.1 EXCAVATING

Existing surfaces
General: Before excavating trenches, saw-cut existing concrete and bituminous surfaces on each side of the trench to provide a straight even joint. Lift and store unit paving for later reinstatement.

Excavation
General: Excavate for underground services:
- To required lines and levels, with uniform grades.
- Straight between personnel access ways, 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 personnel access ways and pits.

Trench depths
General: As required by the relevant service and its bedding method.

Notice: If excavation is necessary below the zone of influence of the underside of adjacent footings, give notice, and provide support for the footings as instructed.

Obstructions
General: Clear trenches of sharp projections. Cut back roots encountered in trenches to at least 600 mm clear of services. Remove other obstructions including stumps and boulders which may interfere with services or bedding.

Dewatering
General: Keep trenches free of water. Place bedding material, services and backfilling on firm ground free of surface water.

Excess excavation
General: If trench excavation exceeds the correct depth, reinstate to the correct depth and bearing value using compacted bedding material or sand stabilised with 1 part of cement to 20 parts of sand by weight.

2.2 BORING

Subcontractor
General: If under road boring is required in lieu of trenches, engage a suitably qualified subcontractor to do the work.

Process
General: Ensure a tight fit to the service pipes. If voids are encountered, fill by pressure grouting.

2.3 BACKFILLING

General
General: Backfill service trenches as soon as possible after the service has been laid and bedded, if possible on the same working day. Place the backfill in layers ≤ 150 mm thick and compact to the nominated density which applies to the location of the trenches as shown on the drawings or in conformance with the **Backfill density schedule**.

Backfill density schedule

Level of compaction	Density test method	Test sample frequency	Location		
			A	B	C

Marking services
Underground marking tape: To AS/NZS 2648.1.

Backfill material
General: General fill with no stones greater than 25 mm occurring within 150 mm of the service, or other materials as required for particular services or locations. Well graded, inorganic, non-perishable material, maximum size 75 mm, plasticity index ≤ 55 %.

Under roads and paved areas and within 4 m of structures: Coarse sand, controlled low strength material or fine crushed rock.

In topsoil areas: Complete the backfilling with topsoil for at least the top 100 mm.

In reactive clay: In sites classified M, M-D, H, H-D or E to AS 2870, re-use excavated site material at a moisture content within ± 1 % of that of the adjoining in situ clay.

2.4 REINSTATEMENT OF SURFACES

General
General: Reinstate existing surfaces removed or disturbed by trench excavations to match existing and adjacent work.

0224b STORMWATER – SITE

1 GENERAL

1.1 AIMS

Responsibilities
Selections: Conform to the **Selections**.

1.2 CROSS REFERENCES

General
General: Conform to the *General requirements* worksection.

Associated worksections
Associated worksections: Conform to the following: Hydraulic Specisication (Connel Wagner)

1.3 INTERPRETATION

Definitions
General: For the purposes of this worksection the definitions given below apply.

- Pipe surround: Includes pipe overlay, pipe side support, side zone and haunch zone.

1.4 STANDARDS

Stormwater drainage
Standard: To AS/NZS 3500.3.

1.5 INSPECTION

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

- Excavated surfaces prior to placing pipe bedding material.
- Formwork and reinforcement prior to placing cast in situ concrete.
- Pipe joints prior to covering.
- Placing of cast in situ concrete.
- Upon completion.

2 PRODUCTS

2.1 MATERIALS

Joints
Solvent cement and priming fluid: To AS/NZS 3879.

Pipe and fittings
Fibre reinforced cement (FRC): To AS 4139.

- < 450 mm diameter: Pre-socketed at one end with a factory fitted *Adcol* coupling.
- > 450 mm diameter: To have a purpose machined internal spigot and socket system within the pipe wall.

Glass-reinforced polyester (GRP): To AS 3571.

Cast iron manhole covers and frames: To AS 1830 and AS 1831 as appropriate.

Polyvinyl chloride (PVC): To AS 1254, AS/NZS 1260, AS 1273.

Polyethylene (PE): To AS/NZS 4129, AS/NZS 4130, ISO 8770, or AS/NZS 2033.

Precast concrete: To AS/NZS 4058.

Rubber ring joints/elastomeric seals: To AS 1646.

Subsoil: To AS 2439.1.

Vitrified clay or ceramic: To AS 1741.

3 EXECUTION

3.1 STORMWATER DRAINS

Location
General: Provide stormwater drains to connect downpipes, surface drains, subsoil drains and drainage pits to the outlet point or point of connection. Make sure that location of piping will not interfere with other services and building elements not yet installed or built. Subject to the preceding and documented layouts, follow the most direct route with the least number of changes in direction.

Downpipe connections: Turn up branch pipelines with bends to meet the downpipe, finishing 50 mm (nominal) above finished ground or pavement level. Seal joints between downpipes and drains.

Laying
General: Lay in straight lines between changes in direction or grade with socket end placed upstream. If other pipes are adjacent, set each pipe true to line and complete each joint before laying the next pipe. If work is not continuous cap open ends to prevent entry of foreign matter.

Bedding
General: Grade the underlay evenly to the gradient of the pipeline.

Standard: In accordance with AS/NZS 3725 and AS/NZS 3725 Supplement 1.

Layers: All material shall be compacted in layers not exceeding 150 mm compacted thickness.

Trench backfill
General: The remainder of the trench to the underside of the subgrade shall be backfilled with fill material in accordance with the *Earthwork* worksection.

Anchor blocks
General: If necessary to restrain lateral and axial movement of the stormwater pipes provide anchor blocks at junctions and changes of grade or direction.

Encasement
General: Conform to the **Stormwater pipeline schedule**.

Location: Encase the pipeline in concrete at least 150 mm above and below the pipe, and 150 mm each side or the width of the trench, whichever is the greater.

3.2 SUBSOIL DRAINS

General
General: Provide subsoil drains to intercept groundwater seepage and prevent water build-up behind walls and under floors and pavements. Connect subsoil drains to surface drains or to the stormwater drainage system as applicable. Conform to the **Subsoil pipeline schedule**.

Trench width: ≥ 450 mm.

Pipe depth: Provide the following minimum clear depths, measured to the crown of the pipe, where the pipe passes below the following elements:

- 100 mm below subgrade level of the pavement, kerb or channel.
- 100 mm below the average gradient of the bottom of footings.
- 450 mm below the finished surface of unpaved ground.

3.3 PITS

Finish to exposed surfaces
General: Provide a smooth, seamless finish, using steel trowelled render or concrete cast in steel forms.

Corners: Cove or splay internal corners.

Metal access covers and grates
Standard: To AS 3996.

Cover levels: Top of cover or grate, including frame:

- In paved areas: Flush with the paving surface.
- In landscaped areas: 25 mm above finished surface.
- Gratings taking surface water runoff: Locate to receive runoff without ponding.

3.4 TESTING

Pre-completion tests

General: Before backfilling or concealing, carry out the following tests:

- Site stormwater drains and main internal drains: Air or water pressure test to AS 3500.3 Section 10.

Leaks: If leaks are found, rectify and re-test.

3.5 COMPLETION

Cleaning

General: Clean and flush the whole installation.

0242b LANDSCAPE – FENCES AND BARRIERS

1 GENERAL

1.1 AIMS

Responsibilities

General: Provide fences and barrier systems:

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

1.2 CROSS REFERENCES

General

General: Conform to the *General requirements* worksection.

Notice

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

- Setout prior to construction.
- Footings prior to pouring concrete.

2 PRODUCTS

2.1 STEEL

Steel tubes

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

- Grade: C 350 L0.

Wire

Chainwire, cable wire, tie wire and barbed wire: To AS 2423.

3 EXECUTION

3.1 CONSTRUCTION GENERALLY

Set out

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

Clearing

Fence line: Except trees or shrubs to be retained, clear vegetation within 1 metre of the fence alignment. Grub out the stumps and roots of removed trees or shrubs and trim the grass to ground level, but do not remove the topsoil.

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 and finish with a weathered top falling 25 mm from the post to ground level.

On slabs: Provide welded and drilled post base flanges for fixing with masonry anchors to the concrete.

3.2 GATES

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 to ensure smooth operation.

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

3.3 CHAINWIRE BARRIERS

Standard
General: To AS 1725.

Fence dimensions
Maximum post spacing: 3000 mm.

Component sizes
Intermediate posts: 42.4 mm diameter, 2.6 mm wall thickness.

End, corner and gate posts: 60.3 mm diameter, 2.9 mm wall thickness.

Chainwire: 3.15 mm diameter wire woven to form uniform mesh.
- Selvedges: Knuckled.
- Mesh generally: 50 mm.
- Mesh at playing end of sports enclosures: 40 mm.

Tie wire: 2 mm diameter.

Post and rail barriers:
- Rails and gooseneck stay: 33.7 mm diameter, 2.6 mm wall thickness.

Railless barriers:
- Struts: 42.4 mm diameter, 2.6 mm wall thickness.
- Cable wires:
  . Two strands: 3.15 mm diameter wire.
  . One strand: 4 mm helicoil wire.

Security barriers:
- Chainwire selvedges: Twisted and barbed.
- Barbed wire to security fencing post extensions: Barbs at 95 mm maximum centres.

Installation
Posts: Do not splice members except in posts when splice is embedded at least 150 mm into concrete. Fit tightly fitting steel caps to posts, except where fixed to overhead structure.

Chainwire: Lace chainwire to end and gate posts. Tie chainwire twice around members at 250 mm maximum intervals. Twist ends twice and cut off neatly.

Cable wire: Tension cable wire(s) to support chainwire after at least 24 hour curing of concrete footings.

Footing type: Concrete.
- Footing size:
  . Intermediate and end posts: 225 mm diameter x 600 mm depth.
  . Corner posts and gate: 225 mm diameter x 900 mm depth.

Bracing:
- Internal partitions: If at least each alternate point is fixed to the overhead structure, bracing is not required.

Post and rail barriers:

- Rails: Connect rail(s) to posts using bolted split pipe fittings and purpose-made caps and brackets with rail apertures.
- Continuous rail type fences: Join the rails together in long lengths using purpose-made sleeves or socketed connections, and pass them through the apertures of caps and brackets on intermediate posts.

Railless barriers:

- Struts: Provide struts at ends, corners and gates.

Security barriers:

- Security fencing: Strain barbed wire between post extensions.

Gates

Frame tubes: 33.7 mm diameter, 2 mm wall thickness.

Chainwire: Match fence.

Maximum width: 3600 mm.

0250b LANDSCAPE – GARDENING

1 GENERAL

1.1 AIMS

Responsibilities

General: Provide plants that have been grown to a standard that allows them to establish rapidly and grow to maturity.

Maintenance: Encourage and maintain healthy growth for the duration of the contract.

Program: Provide a suitable irrigation, pruning, fertiliser and monitoring program for all plant materials held by the supplier. Take any other precautions required to safeguard the health and well-being of all plant materials prior to and including their delivery to site.

Selections: Conform to the **Selections**.

1.2 CROSS REFERENCES

General

General: Conform to the *General requirements* worksection.

Associated worksections

1.3 STANDARDS

Soils

Site and imported topsoil: To AS 4419.

Potting mixes: To AS 3743.

Composts, soil conditioners and mulches: To AS 4454.

Tree supply: Follow the guidance given in *NATSPEC Guide: Specifying Trees – a guide to assessment of tree quality* (Clark R. 2003).

1.4 INTERPRETATIONS

Definitions

General: For the purposes of this worksection the definitions given below apply.

- Imported topsoil: Similar to naturally occurring local topsoil, suitable for the establishment and on-going viability of the selected vegetation, free of weed propagules and of contaminants, and classified by texture to AS 4419 Appendix I, as follows:
  - . Fine: Clay loam, fine sandy loam, sandy clay loam, silty loam, loam.
  - . Medium: Sandy loam, fine sandy loam.
  - . Coarse: Sand, loamy sand.
- Site topsoil: Soil excavated from the site which contains organic matter, supports plant life, conforms generally to the fine to medium texture classification to AS 4419 (loam, silt, clay loam) and is free from:
  - . Stones > 25 mm diameter.
  - . Clay lumps > 75 mm diameter.
  - . Weeds and tree roots.
  - . Sticks and rubbish.
  - . Material toxic to plants.

1.5 INSPECTION

Notice – on site

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

- Setting out completed.
- Subgrades cultivated or prepared for placing topsoil.
- Topsoil spread before planting.

- Grassing bed prepared before turfing, seeding, or temporary grassing.
- Grassing or turfing completed.
- Plant holes excavated and prepared for planting.
- Plant material set out before planting.
- Planting, staking and tying completed.
- Completion of planting establishment work.

1.6 SUBMISSIONS

Samples
General: Submit representative samples of each material, packed to prevent contamination and labelled to indicate source and content.

Bulk materials: Submit a 5 kg sample of each type specified. Submit bulk material samples, with required test results, at least 5 working days before bulk deliveries.

Materials
Supplier's data: Submit supplier's data including the following:

- Material source of supply for topsoil, filling, stone and filter fabrics.

Compost: Submit a certificate of proof of compost pH value.

Plant provenance
Locality: Provide written certification that all plant material has been grown from local provenance stock. If this is not achievable give notice.

Species: Provide written certification that all plant material is true to the required species and type.

Replacement plants
Species: Provide written certification that all plant material is true to the required species and type.

2 PRODUCTS

2.1 GRASS

Turf
Supplier: Obtain turf from RENAZA turf.

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

2.2 PLANTS

Labelling
General: Clearly label individual plants and batches.

- Label type: To withstand transit without erasure or misplacement.

Health and vigour
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.

Stress: Supply plants free from stress resulting from inadequate watering, excessive shade or excessive sunlight experienced at any time during their development.

Site environment: Supply plants that have been grown and hardened off to suit the conditions that could reasonably be anticipated to exist on site at the time of delivery.

Root development
Containers: Grow plants in their final containers for the following periods:

- Plants < 25l size: > 6 weeks.
- Plants > 25l size: > 12 weeks.

Freedom from pests and disease

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

Native species with a history of attack by native pests: Restrict plant supply to those with evidence of previous attack to < 15% of the foliage and ensure absence of actively feeding insects.

Root system

Requirement: Supply plant material with the root system:

- Well proportioned in relation to the size of the plant material.
- Conducive to successful transplantation.
- Free of any indication of having been restricted or damaged.

Root inspection: If inspection is by the removal of soil test as follows:

- For > 100 samples: Inspect 1%.
- For < 100 samples: Inspect 1 sample.

Sample plants: Replace.

Rejection: Root bound stock.

3 EXECUTION

3.1 PREPARATION

Weed eradication

Herbicide: Eradicate weeds using environmentally acceptable methods, such as a non-residual glyphosate herbicide in any of its registered formulae, at the recommended maximum rate.

Manual weeding: Regularly remove, by hand, rubbish and weed growth throughout grassed, planted and mulched areas. Remove weed growth from an area 750 mm diameter around the base of the trees in grassed areas. Continue eradication throughout the course of the works and during the planting establishment period.

Vegetative spoil

Remove vegetative spoil from site. Do not burn.

3.2 TURFING

Supply

Elapsed time: Deliver the turf within 24 hours of cutting, and lay it within 36 hours of cutting. Prevent it 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

General: 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.

Strip turf laying: Close butt the end joints and space the strips 300 mm apart. Apply a layer of top dressing between the strips of turf. Finish with an even surface.

Tamping

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

Pegging

Stabilising: On steep slopes peg the turf to prevent downslope movement. Remove the pegs when the turf is established.

Fertilising

General: 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
General: Water immediately after laying until the topsoil is moistened to its full depth. Continue watering to maintain moisture to this depth.

Mowing
Height: Mow to maintain the grass height within the required range. Do not remove more than one third of the grass height at any one time. Carry out the last mowing within 7 days before the end of the planting establishment period. Remove grass clippings from the site after each mowing.

Turfing
General: Lay turfing to the **Turfing schedule.**

Maintenance
General: Maintain turfed areas until the attainment of a dense continuous sward of healthy grass over the whole turfed area, evenly green and of a consistent height.

Failed turf: Lift failed turf and relay with new turf.

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

Top dressing
General: When the turf is established mow, remove cuttings and lightly top dress to a depth of 10 mm. Rub the dressing well into the joints and correct any unevenness in the turf surface.

3.3 PLANTING

Individual plantings in grassed areas
Method: Excavate a hole to twice the diameter of the root ball and at least 100 mm deeper than the root ball. 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.

Locations
General: If it appears necessary to vary plant locations and spacings to avoid service lines, or to cover the area uniformly, or for other reasons, give notice.

Planting conditions
Weather: Do not plant in unsuitable weather conditions such as extreme heat, cold, wind or rain. In other than sandy soils, suspend excavation when the soil is wet, or during frost periods.

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

Placing
Method: Remove the plant from the container with minimum disturbance to the root ball, ensure that the root ball 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 root ball level with the finished surface of the surrounding soil.

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

Backfilling
General: Backfill with topsoil mixture. Lightly tamp and water to eliminate air pockets. Ensure that topsoil is not placed over the top of the root ball, so that the plant stem remains the same height above ground as it was in the container.

Watering basins for plants in grass
Method: Except in irrigated grassed areas and normally moist areas, construct a watering basin around the base of each individual plant, consisting of a raised ring of soil capable of holding at least 10 L.

3.4 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.

In mass planted areas: Place after the preparation of the planting bed but before planting and other work.

In smaller areas (e.g. planter boxes): Place after the preparation of the planting bed, planting and other work.

Extent: To surrounds of plants planted in riplines and grass areas, provide mulch to 750 mm diameter.

Depths: Spread organic mulch to a depth of 75 mm, and gravel mulch to a depth of 50 mm.

3.5 SPRAYING

Notice

General: Immediately give notice of evidence of insect attack or disease amongst plant material.

Spraying

Product: Where required, spray with insecticide, fungicide or both.

3.6 STAKES AND TIES

Stakes

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

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

Stake sizes:

- For plants ≥ 2.5 m high: Three 50 x 50 x 2400 mm stakes per plant.
- For plants 1 – 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 ties fixed securely to the stakes, one tie at half the height of the main stem, others as necessary to stabilise the plant.

Tie types:

- For plants ≥ 2.5 m high: Two strands of 2.5 mm galvanized wire neatly twisted together, passed through reinforced rubber or plastic hose, and installed around stake and stem in a figure of eight pattern.
- For plants < 2.5 m high: 50 mm hessian webbing stapled to the stake.

Trunk protection

Collar guards: 200 mm length of 100 mm diameter agricultural pipe split lengthways.

3.7 COMPLETION

Product certification

Certification: Submit the supplier's written statement certifying that plants are true to the required species and type, and are free from diseases, pests and weeds.

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.

Warranty

Parties: Supplier(s) to the principal.

Form: All the plants supplied under these works are true-to-species and type, and free of disease, fungal infection and/or any other impediment to their future growth and that they have been fully acclimatised for the conditions of the site.

Submission of warranty: At the time of each delivery.

4 ESTABLISHMENT

4.1 GENERAL

Responsibilities

Plant establishment: Maintain the contract area during the plant establishment period.

Plant establishment period: The period between the date of practical completion and the date of final completion.

Reporting

Monthly report: Submit regular reports by the last Friday of each month:

- Of the general status of works.
- Include soil test results as required for the fertilising programs.
- Plant replacement requirements.

Incident reports: Report immediately verbally and confirmed in writing any disturbance or incidence affecting or likely to affect the day to day scheduling of works.

Disruption of works by others

Other contractors: Make arrangements to work around the disturbance.

4.2 GRASS

Mowing and trimming

Height: Consistent with the growth habit of the grass variety and maintained at 25 mm to 40 mm throughout the year.

Program: Weekly during the mowing season, November to March, and at bi-weekly intervals during April to October. Do not mow under wet conditions.

Raking: Once every month before mowing, during the mowing season, with a flexible rake. On alternate mowings, adopt a north-south and east-west pattern.

Edges: At the same time as mowing, trim lawn edges to plant beds, pathways, base of trees and other obstacles. Ensure trees and shrubs are not damaged.

Clippings distribution: to green waste bins

Topdressing

Topdressing material for established lawns: Weed free imported sandy topsoil to a depth of 5 mm.

Program: The spring following establishment.

Topdressing material for remediation of depressions or irregularities: Apply coarse or medium soil to AS 4419 suitable for application to turf or grass seeded areas.

Fertilising

Fertilising: Apply lawn fertiliser at the completion of the first and last mowings of the plant establishment period, and at other times as required to maintain healthy grass cover.

4.3 PLANTING WORKS

Planting

Planting: Ensure the general appearance and presentation of the landscape and the quality of plant material at date of practical completion is maintained for the full planting establishment period.

Existing plant material: Maintain existing planting and grass within the landscape contract area as specified for the corresponding classifications of new grassland or planting.

Replacements: Replace failed, dead and/or damaged plants at minimum 3 week intervals as necessary throughout the full plant establishment period.

Pruning

General: Prune to the **Pruning schedule**.

Fertilising

Soil tests: Take samples from both planting beds and lawn areas and conduct tests.

Fertilising: Base the fertilisation program on the soil testing results. Fertilise trees once every two years except where specific problems exist. Generally apply an all purpose fertiliser of N:P:K 10:4:6 at recommended rates. Alternatively apply 12 month slow release fertiliser (such as Nutricote) at the manufacturer's recommended rate. Apply all purpose fertiliser to shrubs annually in two bands and cultivated into the soil 100 mm deep.

Season: Fertilise shrubs and trees in September and March according to their seasonal growth requirement.

Insect and disease control

Period for treatment: Until the problem has been eliminated.

Chemical spray: Apply outside of normal working hours.

Stakes and ties

Generally: If plants are unable to be self supported or if stakes are damaged, stake or restake the plants as follows:

- Drive three hardwood stakes placed obliquely with the first stake on the opposite side to the prevailing winds.
- Do not single stake large plants.

Removal: If plants are robust with well developed systems and are strong enough to no longer require support, remove stakes and ties.

Weeding

Weeds: Unwanted plants and grasses considered invasive to the locality.

Program:

- Lawns: Quarterly and as determined by the relationship of the general lawn condition and weed growth.
- Trees and shrubs: As required for planted, paved and mulched areas to be weed free when observed at bi-weekly intervals.

Method: Clear and keep clear vigorous ground covers 200 mm from the base of any shrub or tree:

- Small areas: By hand.
- Large areas: Proprietary herbicides.

Herbicide application: Avoid windy days or if rain is likely to follow within 12 hours and apply:

- To the manufacturer's instructions and material data and safety sheets.
- When the weather is humid with moderate temperatures and maximum sunlight.
- When the ground has adequate soil moisture.

Rubbish removal

Rubbish: Remove loose rubbish such as bottles, papers, and cigarette butts from the site. Execute this work regularly so that all areas are free from rubbish when observed at bi-weekly intervals.

Leaf litter: Remove from all path and lawn areas.

Mulched surfaces

Inspection: Bi-weekly to determine mulch requirements.

Mulch depth: Maintain 75 mm cover and ensure weed suppression and the quality of finish.

Re mulching: Maintain the original ground levels around the base of plants.

4.4 WATERING

Establishment

Water quality:

- pH between 5.5 and 7.5.
- Total soluble salts less than 1000 mg/litre.
- No substances that would be toxic to plant growth.

Watering program: Minimum three complete waterings soaking to a depth of 150 mm at fortnightly intervals for the first 6 weeks of plant establishment irrespective of natural rainfall.

Water restrictions: Co-ordinate the water supply and confirm the watering regime against Commonwealth, State and Territory Government legislation and restrictions at the time.

Irrigation

Irrigation system program: To suit the following:

- The precipitation requirements of the individual zones/stations with regard to types of plants.
- The infiltration rate of the soil/medium and associated physical factors seasons, evaporation, exposure, topography, local authority restrictions.
- An allowance for adjustment or shut down during and after periods prolonged heavy rains.

Equipment maintenance:

- Check all components for proper operation.
- Repair or replace damaged component with equivalent parts.

- Flush any dirt or foreign matter from the system and clear all blockages.

Operation: Ensure by adjustment or replacement of components, that the overall operation of the system is efficient and operational for the entire planting establishment period.

Hand watering

General: Manually water all lawn and planting areas in the absence of an irrigation system or until the proposed irrigation system is fully operational, soaking to a depth of 150 mm for lawn and 300 mm for planting. Avoid frequent dampening of the surface. Allow the surface of the soil to partially dry out between waterings.

4.5 COMPLIANCE

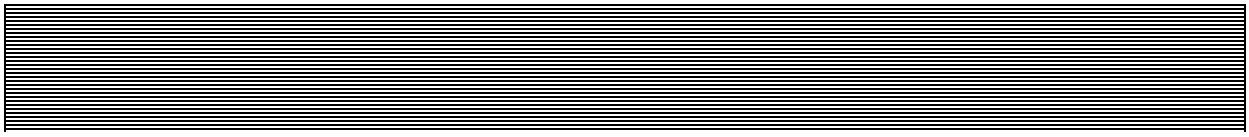
Criteria

Generally: Plant establishment shall be deemed complete, subject to the following:

- Repairs to planting media completed.
- Ground surfaces are covered with the specified treatment to the specified depths.
- Pests, disease, or nutrient deficiencies or toxicities are not evident.
- Organic and rock mulched surfaces have been maintained in a weed free and tidy condition and to the specified depth.
- Vegetation is established and well formed.
- Vegetation cover to cell, seeded and/or hydromulched areas to the **Plant establishment compliance schedule**.
- Plants have healthy root systems that have penetrated into the surrounding, undisturbed ground and not able to be lifted out of its planting hole.
- Vegetation is not restricting essential sight lines and signage.
- Only frangible species are growing within road side clear zones.
- Specified vegetation setbacks from services and road furniture are evident.
- All hard landscape works have been installed and are operating as specified.
- Collection and removal of litter.
- Removal of mulch from drainage and access areas.
- All non-conformance reports and defects notifications have been closed out.

Plant establishment compliance schedule

Plant material	**Acceptable failure per area**	**Acceptable concentration of failure**
Tube stock	< 10%	< 15% in any given location
140 mm	< 5%	< 15% in any given location
300 mm or larger	< Nil%	Nil %
Turf	< 5%	Nil %
Cells	< 5%	< 15% in any given location
Direct seeded grass species and cover crop	< 15% (determined by a 1 m^2 grid on a testing frequency of 1 grid area per 500 m^2)	< 10%
Cover crop	< 5%	Nil %



0261 LANDSCAPE – FURNITURE AND FIXTURES

1 GENERAL

1.1 AIMS

Responsibilities
Selections: Conform to the **Selections**.

1.2 CROSS REFERENCES

General
General: Conform to the *General requirements* worksection.

1.3 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of the following:
- Custom-built fixtures fabricated and ready to be delivered to the site.
- Furniture items delivered to site before installation.
- Site locations or substrates prepared to receive furniture or fixtures before installation.

1.4 SUBMISSIONS

Subcontractors
General: Submit names and contact details of proposed suppliers and installers.

Installation
General: Submit the manufacturer's standard drawings and details showing methods of construction, assembly and installation; with dimensions and tolerances.

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

2 EXECUTION

2.1 FIXING

Erection
Line and level: Erect posts or poles vertically. Erect furniture items level. Provide a level area around benches and seats where installed on slopes.

2.2 COMPLETION

Maintenance manual
General: Submit the manufacturers' data as follows:
- Recommendations for service use, care and maintenance.
- List of manufacturers and suppliers of replacement parts.

0271b PAVEMENT BASE AND SUBBASE

3 GENERAL

3.1 AIMS

Responsibilities

General: Provide base and subbase courses that are as follows:

- In conformance with the level tolerances specified.
- Tested by a geotechnical testing authority.
- In conformance with the compaction requirements supplied.

3.2 CROSS REFERENCES

General

General: Conform to the *General requirements* worksection.

Associated worksections

Associated worksections: Conform to the following:

- *Site management*.
- *Earthwork*.
- *Stormwater – site*.
- *Pavement ancillaries*

3.3 INTERPRETATION

Definitions

General: For the purposes of this worksection the definitions given below apply.

- Standard: To AS 1348.
- Absolute level tolerance: Maximum deviation from design levels.
- Relative level tolerance: Maximum deviation from a 3 m straight edge laid on the surface.

3.4 INSPECTION

Notice

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

- Prepared subgrade.
- Proof rolling of subbase prior to spreading of base.
- Proof rolling of base prior to sealing.

3.5 TESTS

Compaction control tests

Standard: To AS 1289.5.4.1 and AS 1289.5.4.2.

3.6 SUBMISSIONS

Frequency of compaction control tests

General: Not less than the following (whichever requires the most tests):

- 1 test per layer per 25 lineal metres for 2-lane roads.
- 1 test per layer per 1000 m^2 for carparks.
- 3 tests per layer.
- 3 tests per visit.

Source of material: State the supplier name, nature of material (crushed rock, natural gravel, recycled, recycled concrete aggregate) and source quarry or recycling site.

Compliance of material: Provide certification and test results from a NATA registered laboratory confirming that the material complies with the requirements of the specification.

4 PRODUCTS

4.1 BASE AND SUBBASE MATERIAL

General

Compliance: Comply with the **Base and subbase compliance table**.

Base and subbase compliance table

Course	Source	Compliance requirement
Base	Crushed rock or natural gravel	To the AUS-SPEC 1141 *Flexible pavements* worksection's **Pavement material traffic categories table**, **Acceptable pavement material types table**, and **Unbound base material properties table**
	Recycled concrete aggregate	To the SAA HB 155 Table 19
Subbase	Crushed rock or natural gravel	To the AUS-SPEC 1141 *Flexible pavements* worksection's **Pavement material traffic categories table**, **Acceptable pavement material types table**, and **Unbound subbase material properties table**
	Recycled concrete aggregate	To the SAA HB 155 Table 19

5 EXECUTION

5.1 SUBGRADE PREPARATION

General

General: Subgrade preparation to be undertaken in accordance with the *Earthwork* worksection.

5.2 SUBBASE AND BASE COMPACTION

General

General: Compact each layer of fill to the required depth and density, as a systematic construction operation and to conform to the minimum relative compaction table.

Minimum relative compaction table

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

Unstable areas: Any unstable areas which develop during rolling or are identified by proof rolling shall be removed for the full depth of the layer and disposed of and replaced with fresh material. Materials used as replacement materials shall comply with the requirements of the specification. The placing and compaction of the replacement materials shall also comply with the requirements of the specification.

Compaction requirements

General: Apply uniform and sufficient compactive effort over the whole area to be compacted. Use rollers appropriate to the materials and compaction requirements.

Moisture content

General: During spreading and compaction, maintain materials at the optimum moisture content (modified compaction) within the range of - 2% to + 1% from the optimum moisture content.

Spraying: Maintain moisture content. Use water spraying equipment capable of distributing water uniformly in controlled quantities over uniform lane widths.

5.3 PLACING BASE AND SUBBASE

General

Weak surfaces: Do not place material on a surface which has been so weakened by moisture that it will not support, without damage, the constructional plant required to perform the work.

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.

Layer thickness: 150 mm maximum and 75 mm minimum (after compaction). Provide equal layers in multilayer courses.

0272s ASPHALTIC CONCRETE

1 GENERAL

1.1 AIMS

Responsibilities

General: Provide a finished surface which is as follows:

- Free draining and evenly graded between level points.
- Even and smooth riding.

Standards

Hot mix asphalt: Comply with the recommendations of AS 2150.

0276 SEGMENTAL PAVERS – SAND BED

1 GENERAL

1.1 AIMS

Responsibilities

General: Provide segmental paving surfaces for pavement, footpath and landscape works that are as follows:

- In conformance with the level tolerances specified.
- Consistent in colour and finish.
- Firmly bonded to substrates for the expected life of the installation.
- To direct all water flowing from supply points to drainage outlets without leakage to the substrate or adjacent areas.

Selections: Conform to the **Selections**.

1.2 CROSS REFERENCES

General

General: Conform to the *General requirements* worksection.

Associated worksections

Associated worksections: Conform to the following:

- *Site management.*
- *Earthwork* for subgrade preparation.
- *Stormwater – site.*
- *Pavement base and subbase* for subbase and base preparation.
- *Pavement ancillaries*.

1.3 INTERPRETATION

Definitions

General: For the purposes of this worksection the definitions given below apply.

- Base: One or more layers of material usually constituting the uppermost structural element of a pavement and on which the surfacing may be placed, which may be composed of fine crushed rock, natural gravel, broken stone, stabilised material, asphalt or Portland cement concrete.
- Density ratio: Percentage of the maximum density at optimum moisture content as determined by AS 1289.5.2.1.
- Lippage: Height deviation between adjacent pavers.

1.4 INSPECTION

Notice

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

- Completed base preparation.
- Completed trial set-out for segmental paving.
- Completed paving.

1.5 TESTS

General

Type tests: Submit as follows:

Field test of completed pavement: Slip resistance to AS/NZS 4663.

Program: Conduct field tests immediately prior to practical completion.

Testing authority

General: Independent third party Registered testing authority.

1.6 SAMPLES

General
Segmental paving pattern: Prepare a trial set-out for each area.

1.7 SUBMISSIONS

Execution
Segmental pattern: If it appears that minor variations to joint widths will obviate cutting, submit proposals.

1.8 TOLERANCES

Tolerances
General: Conform to the **Surface level tolerances table**:

Surface level tolerances table

Item	Level tolerance	
	Absolute	**Relative**
Pavements	± 10 mm	10 mm
Footpaths	± 10 mm	5 mm

Level discontinuity: Between adjacent pavers and other surface features for footpath areas 1.5 mm and roadway areas 2.0 mm.

- Lippage: < 1 mm, with 5% not exceeding 1.5%.

2 PRODUCTS

2.1 MATERIALS

Bedding sand
Grading: To the **Bedding sand grading schedule** when tested in accordance with AS 1141.11.

Moisture content: Uniform in moisture content with spread.

Deleterious material: Free of deleterious material, such as soluble salts which may cause efflorescence.

Bedding sand grading schedule

Sieve aperture	Percentage passing (by mass)
9.52mm	100
4.75	95 – 100
2.36	80 – 100
1.18	50 – 85
600μm	25 – 60
300	10 – 30
150	5 – 15
75	0 – 10

Joint filling sand
General: Well-graded sand and free of deleterious material such as soluble salts which may cause efflorescence.

Grading: To the **Joint filling sand grading schedule** when tested in accordance with AS 1141.11.

Joint filling sand grading schedule

Sieve aperture	Percentage passing
2.36 mm	100
1.18	90 – 100
600 μm	60 – 90

Sieve aperture	Percentage passing
300	30 – 60
150	15 – 30
75	5 – 10

Moisture content: Use dry sand.

2.2 COMPONENTS

Concrete and clay segmental paving units
Standard: To AS/NZS 4455.1 and AS/NZS 4455.3.

Dimensional category: DPA1 and DPB1.

Log roundels
Softwood: Each section 75 mm thick x 200 mm minimum diameter, debarked.

Logs for edging
Size: At least 2.5 m long and 200 mm average diameter.

Sawn timber for edging
General: Select from sawn hardwood or preservative-treated softwood.

Size: 3000 x 100 x 25 mm nominal edgings; 50 mm square pegs, 400 mm long.

Sleepers
Hardwood: Sound hardwood railway sleepers to AS 3818.2.

Softwood: Sound preservative-treated softwood sleepers.

Preservative treatment
General: Hazard class 4 to AS 1604.1.

3 EXECUTION

3.1 EDGE RESTRAINT

Lateral restraint to segmental paving
Perimeter: Provide edge restraints to bedding and units, where not provided by other structures.

Log edging
General: Excavate to lay logs at least half diameter into the ground. Fix the logs in position by spiking with two 13 mm diameter galvanized mild steel rods per log, penetrating at least 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 edging
General: Set edgings flush with adjoining surfaces to define planting, grass areas or both. Fix to pegs using galvanized nails, two per fixing. 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 the top of the edging.

Curving: If the timber edge is to be curved, space the pegs to hold it to a uniform curve. Reduce edging thickness to 15 mm if required to enable it to be bent.

Sleeper edging
General: Fix sleepers in position by spiking with two 13 mm diameter galvanized mild steel rods per sleeper, penetrating at least 400 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° to the edges.

Concrete edging
General: Place in a shallow trench between timber forms. Wood float finish flush with the adjacent finished grass level. Provide movement joints, filled with resilient bituminous material, at 3 m maximum centres.

3.2 BEDDING SAND

General
Preparation: Remove all loose material from the prepared base.

Spreading: Screed uncompacted sand over prepared base uniformly to achieve a 30 mm thick layer. Maintain sand at a uniform loose density.

3.3 LAYING PAVING

General

Pattern: Lay paving units on the screeded sand bedding to the nominated pattern shown on the drawings.

Joints: 2 – 3 mm gap.

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

If there is a concrete base, provide paving control joints:

- Located over control joints.
- 10 mm wide and filled with bitumen impregnated fibreboard.

3.4 COMPACTION OF BEDDING

General

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

Joint filling: Compact all paving units to design levels prior to the commencement of joint filling.

3.5 JOINT FILLING

General

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

Timing: Fill joints on the same day that pavers are compacted.

3.6 PROTECTION OF THE WORK

General

Protection: Prevent all vehicular and pedestrian traffic from using the pavement until all compaction and joint filling is completed and all edge restraints are in place.

3.7 CLEANING

Cleaning

General: Leave pavements clean on completion.

Final inspection

Cracking in bound pavements: Width $\leq$ 1.5 mm.

Subsidence: Offset under 1.5 m length of the design profile, $\leq$ 15 mm.

Stepping: Between adjacent elements within the pavement area, $\leq$ 5 mm.

Chipping and spalling to pavement units: Maximum 10 per 100 units with chipped or spalled arrises.

Ponding: Maximum 10 mm deep 15 minutes after rain ceases.

Masonry units: Refill joints as required.

0277 PAVEMENT ANCILLARIES

1 GENERAL

1.1 AIMS

Responsibilities
General: Provide channels, kerbs and linemarking.
Selections: Conform to **Execution**.

1.2 CROSS REFERENCES

General
General: Conform to the *General requirements* worksection.

Associated worksections
Associated worksections: Conform to the following:
- *Site management*.
- *Earthwork*.
- *Pavement base and subbase*.

1.3 INTERPRETATION

Definitions
General: For the purposes of this worksection the definitions of AS 1348 and those given below apply.
- Absolute level tolerance: Maximum deviation from design levels.
- Relative level tolerance: Maximum deviation from a 3 m straightedge laid on the surface
- Channels and kerbs: Includes all forms of concrete gutters, dish drains, grated drains and mountable median and barrier kerbing.

1.4 SUBMISSIONS

Linemarking materials
General: Submit NATA Registered Laboratory Test Reports, at least seven days before work is scheduled to commence, on the properties of the materials, including paint.

2 PRODUCTS

2.1 MATERIALS

Concrete
Standard: To AS 1379 – Grade N20.

Pavement marking paint
Standard: To AS 4049.1, AS 4049.3 and AS 4049.4.

2.2 VEHICLE BARRIERS

Precast concrete wheel stops
Material: Precast concrete units with predrilled 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 minimum nominal size DN 100, to AS 1074. Seal free ends with fabricated end caps, spot welded and ground smooth.
Finish: Galvanize after fabrication.

2.3 BICYCLE RACKS

General
Standards: Layout and location to AS 2890.3.

Product: Bespoke Visitors rack (by artist :Richard Coldicutt)
Style:to emultae a bee
Material: Steel
Location: Footpath in front of shops

Product: Proprietory rack
Style:U-bar – 2 bikes per stand
Material: Steel
Location: Bike Store

3 EXECUTION

3.1 LINEMARKING

Setting out
General: Set out the work to ensure that all markings are placed in accordance with the drawings.

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.

Scabbling: Scabble the full area of concrete wearing surfaces to raised pavement markers and remove fine mortar material.

Provision for traffic: Allow for traffic during application and protect pavement markings until the material has hardened sufficiently to carry traffic without damage.

Mixing of paint: Mix all paint in its original container before use and 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. Spray concurrently the two sets of lines forming a one-way or two-way barrier line pattern.

Hand spraying: Hand spray transverse lines, symbols, legends, arrows and chevrons with templates.

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

Pavement markings: Straight or with smooth, even curves where intended.

Edges: Clean with a, sharp cut off. Remove any marking material applied beyond the defined edge of the marking and leave a neat and smooth marking on the wearing surface of the pavement.

Tolerances
Longitudinal line lengths: Do not vary by more than 20 mm from the lengths shown in AS 1742.2.

Longitudinal line widths: Do not vary by more than 10 mm from the widths shown in AS 1742.2.

Transverse line lengths and widths: Do not vary by more than 10 mm from the lengths and widths shown in AS 1742.2.

Dimensions: Do not vary the dimensions of arrows, chevrons, painted medians, painted left turn islands and speed markings by more than 50 mm from the dimensions shown on the drawings or in AS 1742.2 as appropriate. Place arrows and speed markings square with the centreline of the traffic lane.

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

3.2 CHANNELS AND KERBS

Foundation preparation
Foundation material: Shape and compact to form a firm base before placing any kerb and/or gutter.
Construction not on a pavement course: Relative compaction To AS 2876.

Construction on a pavement course: To the requirements of the *Pavement base and subbase* worksection.

Standard: Construct kerb and/or gutters in fixed forms, by extrusion or by slip forming to AS 2876. Foundation, concrete quality, curing and testing details: To AS 2876.

Tolerances

Design level deviation at any point on the surface of gutters: ± 10 mm .

Surface deviation to top or face of kerbs, and to the surface of gutters: 5 mm in 3000 mm.

Design alignment deviation: 25 mm.

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

Joints

Standard: To AS 2876.

Concrete pavement: Where kerbs and/or gutters are cast adjacent with a concrete pavement the same type of contraction, construction and expansion joints specified in the concrete pavement shall be continued across the kerb and/or gutter.

Backfill

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

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

Compaction: Compact backfilling in layers not greater than 150 mm thick, to a relative compaction of 95% when tested in accordance with AS 1289.5.4.1, for standard compactive effort.

Pavement: Backfill pavement material adjacent to new gutter in accordance with the drawings and the *Pavement base and subbase* worksection.

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 600 mm into the ground to finish 25 mm below the top of the wheel stop, or bolt the stop to masonry anchors in concrete slabs. Grout the holes flush to match the concrete finish.

Steel tube bollards

Footing: Encase in a concrete footing at least 600 mm deep x 250 mm diameter.

On slabs: Weld on a 10 mm thick baseplate drilled for 4 bolts, and bolt to masonry anchors.

Filling: Fill the tube with 15 MPa concrete.

0310b CONCRETE – COMBINED

1 GENERAL

1.1 AIMS

Responsibilities

General: Provide cast concrete that:

Has finishes to formed and unformed surfaces which are:

- Appropriate to the importance (visual or physical) of the concrete elements.
- Compatible with following trades and finishes.

Precast concrete: Provide elements that are:

- Undamaged by handling and installation.
- Independently designed and documented.
- Independently certified by a professional engineer for the design and the erected components.

Selections: As documented.

Design

Formwork: The design of the formwork other than profiled steel sheeting composite formwork is the contractor's responsibility.

1.2 CROSS REFERENCES

General requirements

General: Conform to the *General requirements* worksection.

Associated worksections

1.3 STANDARDS

General

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

Plywood formwork: To AS 6669.

Profiled steel sheeting including shear connectors: To AS 2327.1.

Specification and supply of concrete: To AS 1379.

Concrete materials and construction: To AS 3600.

Concrete structures for retaining liquids: To AS 3735.

Methods and equipment

Precast elements: Comply with the recommendations of CIA Z48.

1.4 INTERPRETATIONS

Definitions

General: For the purposes of this worksection the definitions given below apply.

- Concrete class:
  - . Normal: Concrete which is specified primarily by a standard compressive strength grade and otherwise in accordance with AS 1379 clause 1.5.3.
  - . Special: Concrete which is specified to have certain properties or characteristics different from, or additional to, those of normal-class concrete and otherwise in accordance with AS 1379 clause 1.5.4.
- Early age: A mean compressive strength at 7 days exceeding the values shown in AS 1379 Table 1.2.
- Green concrete: Concrete which has set but not appreciably hardened.
- Precast units: Concrete elements manufactured in other than their final position including elements manufactured on site.
- Ambient temperature: The air temperature at the time of mixing and placing of concrete, and the predicted or likely air temperature at any time during the 48 hours following a concrete pour.

- Weather:
  . Cold: Ambient shade temperature < 10°C.
  . Hot: Ambient shade temperature > 32°C.

1.5 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of the following:
- Base or subgrade before covering.
- Membrane or film underlay installed on the base.
- Completed formwork, and reinforcement, cores, fixings and embedded items fixed in place.
- Surfaces or elements to be concealed in the final work before covering.
- Commencement of concrete placing.

For precast concrete:
- Panel edge details, and penetrations.
- Connection materials and inserts in place.
- Evaluation of surface finish.

1.6 TOLERANCES

Surface quality
Formed surfaces: Confirm conformance with the surface finish requirements of AS 3610 for the surface class nominated in the **Formed surface finishes schedule**.

Flatness
Unformed surfaces: Confirm conformance with the **Flatness tolerance classes table** for the class of finish nominated using a straight edge placed anywhere on the surface in any direction.

Flatness tolerance class table

Class	Measurement	Maximum deviation (mm)
A	3 m straight edge	3
B	3 m straight edge	6
C	600 mm straight edge	6

1.7 SHRINKAGE SENSITIVE STRUCTURES

Concrete performance
Drying shrinkage (maximum including tolerances): 650 μm for concrete up to and including strength grade 32; 700 μm for higher strength grades.
- Duration of air drying: 56 days

1.8 SAMPLES AND PROTOTYPES

Precast elements
Conformance: Supply sample panels to AS 3610 and in conformance with the **Sample panels schedule** for the application specified.

Manufacture: Cast the panels using the formwork, concrete, compaction equipment, form release agents, curing and formwork removal methods which are to be used in the final work.

Storage: Once accepted, maintain the panels on site undamaged and protected from the weather, as reference prototypes for future evaluation of completed work.

1.9 SUBMISSIONS

Design documentation
Certification: For other than profiled steel sheeting composite formwork, submit certification by a qualified structural engineer experienced in formwork design verifying conformance of the design.

Precast:
- Veneered fabrication: If veneered fabrication is proposed submit proposals.

- Contractor design: Provide independent verification by a professional engineer of compliance of the design with project criteria.
- Shop drawings: Submit shop drawings of units showing the proposed details for their design, manufacture, assembly, transport and installation, including the following:
  . Project title and manufacturer's name.
  . Shape or profile drawings (submit these before fabrication of moulds and tooling).
  . Calculations showing method of complying with nominated performance requirements.
  . Concrete mix and type of cement if special-class concrete.
  . Veneer details, if applicable.
  . Formwork type.
  . Locations, sizes, details, materials and stress grades of tendons and reinforcement.
  . Locations, sizes, details, materials, corrosion protection and grades of cast-in ferrules, locating plates, bolts, anchors, lifting devices.
  . Details of all joints.
  . Jack clearances, procedures, stressing sequence, initial tensioning forces gauge pressure, and tendon elongation.
  . Surface finish class and surface treatment, if applicable.
  . Curing and protection methods.
  . Marking plan.
  . Equipment and methods for handling, transport and installation, including lifting inserts and pick-up points.
  . Calculated maximum loadings on lifting and bracing inserts and attachments.
  . Evidence of load capacity of lifting and bracing inserts and attachments in the form of test reports or calculations.
  . Specification of plugs for sealing recesses for cast-in fixings.
- Lifting:
  . Early lifting: If it is proposed to lift the units by their designated lifting points before 28 day strength has been achieved, submit evidence to demonstrate that the unit has adequate strength to carry its own weight without damage or residual cracking or deflection on removal of the lifting device.
  . Attachments for handling purposes: If it is proposed to locate lifting attachments, holes and other temporary fixings for handling purposes on visible faces of units, submit proposals.
  . Lifting units: If it is proposed to lift or support units at other than specified points, submit proposals.

Execution – documentation

Certification: Submit certification by a qualified structural engineer experienced in formwork design and construction verifying conformance of the completed formwork, including the suitability of the formwork for the documented surface finish class.

Reshoring: If reshoring is intended, submit proposals.

Product proposals

Curing compounds: If it is proposed to use a liquid membrane-forming curing compound submit the following information:

- Certified test results for water retention to AS 3799 Appendix B.
- Evidence of compatibility with concrete, and with applied finishes including toppings and render, if any, including methods of obtaining the required adhesion.
- For visually important surfaces, evidence that an acceptable final surface colour will be obtained.

Void formers: Submit test certificates to confirm that the formers comply with the following requirements under laboratory conditions, when placed on damp sand and loaded with a mass of wet concrete equal to at least the mass of the beams or slabs they are required to support:

- Deflection during placing and compaction of the concrete is less than the span of the beam or slab divided by 1000.
- Additional deflection between initial set and 7 days does not exceed span/400.

- Collapse and loss of load carrying capacity will occur not more than 48 hours after flooding with water, creating a void at least 60% of the original depth of the void former.

Cores, fixings and embedded items: If the locations of these items are not shown or are shown diagrammatically, submit shop drawings showing the proposed locations, clearances and cover. Indicate proposed repositioning of reinforcement.

Pre-mixed supply

Delivery docket: For each batch, submit a docket listing the information required by AS 1379, and the following information:

- For special class performance concrete, specified performance and type of cement binder.
- For special class prescription concrete, details of mix, additives, and type of cement binder.
- Method of placement and climate conditions during pour.
- Name of concrete delivery supervisor.
- Project assessment carried out each day.
- The amount of water, if any, added at the site.
- The concrete element or part of the works for which the concrete was ordered, and where it was placed.
- The total amount of water added at the plant and the maximum amount permitted to be added at the site.

Subcontractors: Submit names and contact details of proposed pre-mixed concrete suppliers, and alternative source of supply in the event of breakdown of pre-mixed or site mixed supply.

2 PRODUCTS

2.1 POLYMERIC FILM UNDERLAY

Standard

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

2.2 FORMWORK

Form linings and facings

Compatibility: With finishes to be applied to concrete.

Lost formwork

General: Not to contain timber or chlorides and not to impair the structural performance of the concrete members.

Release agents

Compatibility: To be compatible with finishes to be applied to the concrete.

Void formers

Material: To be cardboard or fibreboard, collapsible on absorption of moisture.

2.3 STEEL DECKING

General

Material: Hot-dipped zinc-coated sheet steel to AS 1397, minimum G500-Z350.

Profiled steel sheeting composite formwork

Minimum steel grade: G550.

Corrosion protection: Zinc coating

Accessories: Adopt material and corrosion protection to match the profiled steel sheeting.

2.4 REINFORCEMENT

Fibre reinforcement

Reference: CIA CPN35.

Protective coating

General: For concrete elements containing protective coated reinforcement, provide the same coating type to all that element's reinforcement and embedded ferrous metal items, including tie wires, stools, spacers, stirrups, plates and ferrules, and protect other embedded metals with a suitable coating.

Epoxy coating: To be high build, high solids chemically resistant coating.

- Thickness: 200 µm minimum.

Galvanizing: To AS/NZS 4680:

- Sequence: If fabrication is to occur after galvanizing, submit proposals for galvanizing repair and coating of cut ends.
- Zinc-coating (minimum): 600 g/m^2.

Steel reinforcement

Standard: To AS/NZS 4671.

- Ductility grade: Class N.

Surface condition: Free of loose mill scale, rust, oil, grease, mud or other material which would reduce the bond between the reinforcement and concrete.

Tie wire

General: To be annealed steel 1.25 mm diameter (minimum).

External and corrosive applications: Galvanized.

2.5 PRECAST UNITS

Marking

Identification: Identify units by marks which are as follows:

- Remain legible until after the unit has been fixed in place.
- Are not visible in the completed structure.
- Show the date of casting.
- Show the correct orientation of the unit.
- On other than units manufactured as a standard product, indicate the locations within the structure in accordance with the marking plan.

Tolerances

Fixings and embedded items in precast units: To AS 3610 and AS 3850, as applicable.

Lifting and bracing inserts

Capacity: To AS 3850 clauses 2.4.2 and 2.4.3.

Attachments

Sealing: Recess lifting attachments such as ferrules, or other types of cast-in fixings, and provide plugs for sealing.

Welding of connections

Standard: To AS/NZS 1554.3.

Veneered construction

Method: Use a method which ensures that delamination of the veneer will not occur.

Cover to reinforcement: Excludes applied finish or finishing layer that has thermal or chemical properties different from, and/or lesser water penetration resistance than, the main body of concrete in the unit. Provide clear cover from interface between layers as follows:

3 EXECUTION

3.1 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.

Installation

General: Lay over the base, lap joints at least 200 mm and seal the laps and penetrations with waterproof adhesive tape. Face the laps away from the direction of concrete pour. Take the underlay up vertical faces past the damp proof course where applicable, and tape fix at the top. Patch or seal punctures or tears before pouring concrete. Cut back as required after concrete has gained strength and forms have been removed.

Base preparation

General: According to base type, as follows:

- Concrete working base: Remove projections above the plane surface, and loose material.
- Graded prepared subgrade: Blind with sufficient sand to create a smooth surface free from hard projections. Wet the sand just before laying the underlay.

3.2 FORMWORK

General
General: Conform to the **Formed surfaces schedule**.

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

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

- Face of bevel 25 mm.

Embedments
General: Fix embedments through formwork to prevent movement, or loss of slurry or concrete, during concrete placement.

Openings
General: In vertical forms provide form openings or removable panels for inspection and cleaning, at the base of columns, walls and deep beams.

Access: For thin walls and columns, provide access hatches for placing concrete.

Release agents
Application: Before placing reinforcement, apply a release agent to form linings and facings.

Steel decking
Fixing: If sheeting cannot be fixed to structural steel supports with puddle welds, or with welded shear studs in composite construction, provide details

Steel linings
Rust: Clean off any rust and apply rust inhibiting agent prior to reuse.

Visually important surfaces
General: For concrete of surface finish classes 1, 2 or 3, set out the formwork to give a regular arrangement of panels, joints, bolt holes, and similar visible elements in the formed surface.

Void formers
Use: Cast designated suspended ground floor slabs and beams on void formers.

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

3.3 REINFORCEMENT

Tolerances
Fabrication and fixing: To AS 3600.

Dowels
Fixing: If a dowel has an unpainted half, embed this in the concrete placed first.

Tolerances:

- Alignment: 2 mm in 300 mm.
- Location: ± half the diameter of the dowel.

Grade: 250 N.

Supports
General: Provide proprietary concrete, metal or plastic supports to reinforcement in the form of chairs, spacers, stools, hangers and ties, as follows:

- To be adequate to withstand construction and traffic loads.
- With a protective coating if they are ferrous metal extending to the surface of the concrete, or are used with galvanized or zinc-coated reinforcement.

Minimum spacing:

- Bars: ≤ 60 diameters.
- Fabric: ≤ 800 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
General: If 'starter' or other bars project beyond reinforcement mats or cages, through formwork or from cast concrete, provide a plastic protective cap to each bar until it is incorporated into subsequent work.

Tying
General: Secure the reinforcement against displacement by tying at intersections with either wire ties, or clips. Bend the ends of wire ties away from nearby faces of forms so that the ties do not project into the concrete cover.

Beams: Tie stirrups to bars in each corner of each stirrup. Fix other longitudinal bars to stirrups at 1 m maximum intervals.

Columns: Secure longitudinal column reinforcement to all ties at every intersection.

Mats: For bar reinforcement in the form of a mat, secure each bar at alternate intersections

Tolerances: To AS 3600 Section 19.

Welding
General: If welding of reinforcement is proposed, provide details.

3.4 CEMENT

Bagged cement
Standard: To AS 3972.

- Age: Less than 6 months old.
- Storage: Store cement bags under cover and above ground.

Chemical admixtures
Contents: Free of chlorides, fluorides and nitrates.

3.5 CONCRETE

General
General: Provide concrete in conformance with the **Properties table – performance** in the Selections.

Elapsed delivery time
General: Ensure that the elapsed time between the wetting of the mix and the discharge of the mix at the site is in conformance with the **Elapsed delivery time table**. Do not discharge at ambient temperature below 10°C or above 30°C.

Elapsed delivery time table

Concrete temperature at time of discharge (°C)	Maximum elapsed time (hours)
10 – 24	2.00
24 – 27	1.50
27 – 30	1.00
30 – 32	0.75

Pre- mixed supply
Addition of water: If water is to be added, comply with AS 1379 Section 4.2.3.

Transport: Mode must prevent segregation, loss of material and contamination of the environment, and must not adversely affect placing or compaction.

Site mixed supply
Emergencies: If mixing by hand is carried out, provide details.

Plant: Mix concrete in a plant located on the construction site.

3.6 CORES, FIXINGS AND EMBEDDED ITEMS

Adjoining elements
General: For adjoining elements to be fixed to or supported on the concrete, provide for the required fixings. If required, provide for temporary support of adjoining elements during construction of the concrete.

Corrosion: If in external or exposed locations, galvanize anchor bolts and embedded fixings, or propose alternative materials such as stainless steel.

Position: Fix cores and embedded items to prevent movement during concrete placing. In locating cores, fixings and embedded items, reposition but do not cut reinforcement, and maintain cover to reinforcement.

Isolation: Isolate embedded items so that water cannot track to concrete providing minimum cocver to reinforcement.

3.7 CONCRETE PLACING AND COMPACTION

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 come into contact with set concrete, reinforcement or items including pipes and conduits embedded in concrete. Do not use vibrators to move concrete along the forms. Avoid over-vibration that may cause segregation.

Placing

General: Use placing methods which avoid segregation and loss of concrete, and which minimise plastic settlement. Maintain a generally vertical and plastic concrete edge during placement.

Layers: Place concrete in layers ≤ 300 mm thick, such that each succeeding layer is compacted before previous layer has taken initial set. Compact into previous layer.

Placing records

General: Keep on site and make available for inspection a log book recording each placement of concrete, including the following:

- Date.
- Specified grade and source of concrete.
- Slump measurements.
- The portion of work.
- Volume placed.

Rain

General: During placement and prior to setting, do not expose concrete to rain.

Protection: Protect surface from damage by covering until hardened.

Time between adjacent placements

General: Conform to the **Minimum time delay schedule**.

Vertical elements

General: In vertical elements, limit the free fall of concrete to 1500 mm per 100 mm element thickness, up to a maximum free fall of 3000 mm, using enclosed vertical chutes or access hatches in forms.

3.8 CONCRETE PLACING IN COLD WEATHER

Cement

General: Do not use high alumina cement.

Placing

Concrete: Maintain the temperature of the freshly mixed concrete at ≥ 5°C.

Formwork and reinforcement: Before and during placing maintain temperature at ≥ 5°C.

Severe weather

General: If severe weather conditions are predicted, use high early strength cement.

Temperature control

General: Heat the concrete materials, other than cement, to the minimum temperature necessary to ensure that the temperature of the placed concrete is within the limits specified.

Admixtures: Do not use calcium chloride, salts, chemicals or other material in the mix to lower the freezing point of the concrete.

Frozen materials: Do not allow frozen materials or materials containing ice to enter the mixer, and keep free of frost and ice any forms, materials, and equipment coming in contact with the concrete.

Maximum temperature of water: 60°C when it is placed in the mixer.

Plastic concrete: Prevent plastic concrete from freezing, without using salts or chemicals.

3.9 CONCRETE PLACING IN HOT WEATHER

Handling

General: Prevent premature stiffening of the fresh mix and reduce water absorption and evaporation losses. Mix, transport, place and compact the concrete in conformance with the **Elapsed delivery time table**.

Placing

Concrete: Maintain the temperature of the freshly mixed concrete in conformance with the **Hot weather placing table**.

Formwork and reinforcement: Before and during placing maintain temperature at ≤ 35°C.

Severe weather

General: If ambient shade temperature > 38°C, do not mix concrete.

Temperature control

General: Select one or more of the following methods of maintaining the specified temperature of the placed concrete:

- Cool the concrete using liquid nitrogen injection before placing.
- Cover the container in which the concrete is transported to the forms.
- Spray the coarse aggregate using cold water prior to mixing.
- Use chilled mixing water.

Hot weather placing table

Concrete element	Temperature limit
Normal concrete in footings, beams, columns, walls and slabs	35°C
Concrete in sections ≥ 1 m in all dimensions except for concrete of strength 40 MPa or greater, in sections exceeding 600 mm in thickness	27°C

Evaporation control

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

3.10 CONCRETE CURING

General

Curing: Cure continuously from completion of finishing until the total cumulative number of days or fractions of days, during which the air temperature in contact with the concrete is above 10°C, is at least the following, unless accelerated curing is adopted:

- Fully enclosed internal surfaces/Early age concrete: 3 days.
- Other concrete surfaces: 7 days.

End of curing period: Prevent rapid drying out at the end of the curing period.

Protection: Maintain at a reasonably constant temperature with minimum moisture loss, during the curing period.

Cold weather curing

General: Maintain concrete temperature between 10 – 20°C for curing period.

Curing compounds

Standard: To AS 3799.

Application: Provide a uniform continuous flexible coating without visible breaks or pinholes, which remains unbroken at least for 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.

Self levelling toppings: If used also as curing compounds, confirm compliance with AS 3799.

Visually important surfaces: Apply curing compounds to produce uniform colour on adjacent surfaces.

Hot weather curing

Curing compounds: If it is proposed to use curing compounds, provide details.

Protection: Select a protection method as applicable.

- If the concrete temperature exceeds 25°C or if not protected against drying winds, protect the concrete using a fog spray application of aliphatic alcohol evaporation retardant.
- If ambient shade temperature is > 35°C, protect from wind and sun using an evaporative retarder until curing is commenced.
- Immediately after finishing, either cover exposed surfaces using an impervious membrane or hessian kept wet until curing begins, or apply a curing compound.

Water curing

General: If water is used, pond or continuously sprinkle in such a way as to not cause damage to the concrete surface, for the required curing period.

3.11 JOINTS

Construction joints

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

Finish: Butt join the surfaces of adjoining pours. In visually important surfaces make the joint straight and true, and free from blemishes impermissible for its surface finish class.

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.

3.12 FORMED SURFACES

General

General: Provide formed concrete finishes in conformance with the **Formed surface finishes schedule**.

Damage: Do not damage concrete works through premature removal of formwork.

Curing

General: If forms are stripped when concrete is at an age less than the minimum curing period, commence curing exposed faces as soon as the stripping is completed.

Evaluation of formed surfaces

General: If evaluation of formed surface tolerance or colour is required, complete the evaluation before surface treatment.

Finishing methods

General: If soffits of concrete elements or faces of concrete columns are to have a finish other than off the form, provide details of proposed procedures.

Blasted finishes:

- Abrasive: Blast the cured surface using hard, sharp graded abrasive particles until the coarse aggregate is in uniform relief.
- Light abrasive: Blast the cured surface using hard, sharp graded abrasive particles to provide a uniform matt finish without exposing the coarse aggregate.

Bush hammered finish: Remove the minimum matrix using bush hammering to expose the coarse aggregate, recessing the matrix no deeper than half the aggregate size, to give a uniform texture.

Exposed aggregate finish: Remove the vertical face forms while the concrete is green. Wet the surface and scrub using stiff fibre or wire brushes, using clean water freely, until the surface film of mortar is mechanically removed, and the aggregate uniformly exposed. Do not use acid etching. Rinse the surface with clean water.

Floated finishes:

- Sand floated finish: Remove the vertical face forms while the concrete is green. Wet the surface and rub using a wood float. Rub fine sand into the surface until a uniform colour and texture are produced.
- Grout floated finish: Remove the forms while the concrete is green. Dampen the surface and spread a slurry, using hessian pads or sponge rubber floats. Remove surplus slurry and work until a uniform colour and texture are produced.

Smooth rubbed finish: Remove the vertical face forms while the concrete is green. Wet the surface and rub using a carborundum or similar abrasive brick until a uniform colour and texture are produced.

Surface repairs
Surface repair method: If surface repairs are required, submit proposals.

3.13 UNFORMED SURFACES

General
General: Strike off, screed and level slab surfaces to finished levels, to the tolerance class noted in the **Unformed surface finishes schedule**.

Surface finishes
General: Provide surface finishes in conformance with the **Unformed surface finishes schedule.**

Surface repairs
Surface repair method: If surface repairs are required, submit proposals.

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:

- Use power or handsteel trowels to produce a smooth surface relatively free from defects.
- When the surface has hardened sufficiently, retrowel to produce the final consolidated finish free of trowel marks and uniform in texture and appearance.

Burnished finish: Continue steel trowelling until the concrete surface attains a polished or glossy appearance, uniform in texture, 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 and steel trowelling draw a broom or hessian belt across the surface to produce a coarse even-textured 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 and steel trowelling, obtain an even textured sand finish by wiping the surface using a damp sponge.

3.14 PRECAST UNITS

Handling
Lifting: Lift or support units only at designated or other approved points. Use handling methods which do not overstress, warp or damage the units.

Attachments
Remove temporary attachments after erection. Seal or otherwise make good residual recesses.

Installation
Fixing: Fix the units securely and accurately in their final positions.

Ancillaries: Provide components and materials, including fasteners, braces, shims, jointing strips, sealant, flashings, grout and mortar, necessary for the installation of the units.

Protection
General: Protect the units against staining, discolouration and other damage until they are installed in their final location.

3.15 COMPLETION

Formwork removal
Extent: Remove formwork, other than steel reinforcement decking, including formwork in concealed locations, but excepting lost formwork.

Timing: Do not disturb forms until concrete is hardened enough to withstand formwork movements and removal without damage.

Stripping:

- General: To AS 3600 where it is more stringent than AS 3610.

Loading

General: Do not erect masonry walls or other brittle elements on beams and slabs while they are still supported by formwork.

Unencased reinforcement

General: If ‘starter bars’ and other items project from cast concrete for future additions and are exposed to the weather, provide details of protection.

Protection

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

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

0311b CONCRETE FORMWORK

1 GENERAL

1.1 AIMS

Responsibilities

General: Construct formwork so that the concrete, when cast in the forms, will have the required:

- Dimensions.
- Location.
- Profile.
- Shape.

Allowances: Allow for dimensional changes, deflections and cambers resulting from the following:

- Imposed actions.
- Concrete shrinkage and creep.
- Temperature changes.

Selections: Conform to the **Selections**.

Design

General: The design of the formwork other than profiled steel sheeting composite formwork is the contractor's responsibility.

1.2 CROSS REFERENCES

General

General: Conform to the *General requirements* worksection.

Associated worksections

Associated worksections: Conform to the following:

- *Concrete finishes*.

1.3 STANDARDS

General

Formwork design and construction: To AS 3610.

Reinforced concrete design and construction To AS 3600.

Plywood formwork: To AS 6669.

Profiled steel sheeting including shear connectors: To AS 2327.1.

1.4 INSPECTION

Notice

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

- Completed formwork before concrete placing.

  Used formwork, after cleaning and before reuse.

1.5 SUBMISSIONS

Design documentation

Certification: For other than profiled steel sheeting composite formwork, submit certification by a qualified structural engineer experienced in formwork design verifying conformance of the design.

Execution – documentation

Certification: Submit certification by a qualified structural engineer experienced in formwork design and construction verifying conformance of the completed formwork, including the suitability of the formwork for the documented surface finish class.

Surface repair method: If required, submit details of the proposed method before commencing repairs.

2 PRODUCTS

2.1 MATERIALS

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

Profiled steel sheeting composite formwork
Material: Hot dipped zinc-coated sheet steel to AS 1397, minimum G500-Z350.

Minimum steel grade: G550.

Corrosion protection: Zinc coating

Accessories: Adopt material and corrosion protection to match the profiled steel sheeting.

Void formers
Material: To be cardboard or fibreboard, collapsible on absorption of moisture.

3 EXECUTION

3.1 PREPARATION

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

3.2 CONSTRUCTION

General
General: Conform to the *Concrete finishes* worksection.

Removable bolts: Remove the bolts without causing damage to the concrete.

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

- Face of bevel 25 mm.

Embedments
General: Fix embedments through formwork to prevent movement, or loss of slurry or concrete, during concrete placement.

Openings
General: In vertical forms provide form openings or removable panels for inspection and cleaning, at the base of columns, walls and deep beams.

Access: For thin walls and columns, provide access hatches for placing concrete.

Steel decking
Fixing: If sheeting cannot be fixed to structural steel supports with puddle welds, or with welded shear studs in composite construction, provide details

Steel linings
Rust: Clean off any rust and apply rust inhibiting agent prior to reuse.

Visually important surfaces
General: For concrete of surface finish classes 1, 2 or 3, set out the formwork to give a regular arrangement of panels, joints, bolt holes, and similar visible elements in the formed surface.

Void formers
Use: Cast designated suspended ground floor slabs and beams on void formers.

Protection: If likely to be affected by (rain) water keep void formers dry until use, place them on a firm level surface and place reinforcement and concrete with minimum delay.

3.3 COMPLETION

Formwork removal
Extent: Remove formwork, other than steel reinforcement decking, including formwork in concealed locations, but excepting lost formwork.

Timing: Do not disturb forms until concrete is hardened enough to withstand formwork movements and removal without damage.

Stripping:

- General: To AS 3600 where it is more stringent than AS 3610.
- Vertical forms: Remove formwork that does not support weight of concrete from faces of beams, walls and columns not less than a cumulative 24 hours after placing concrete during which the ambient outdoor temperature has been greater than 10°C.

Loading before stripping

General: Do not erect masonry walls or other brittle elements on beams and slabs while they are still supported by formwork.

0312b CONCRETE REINFORCEMENT

1 GENERAL

1.1 CROSS REFERENCES

General
General: Conform to the *General requirements* worksection.

Associated worksections
Associated worksections: Conform to the following:

- *Concrete in situ*.

1.2 STANDARDS

General
Standard: To AS 3600.

1.3 INSPECTION

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

- Cores and embedments fixed in place.
- Reinforcement fixed in place, with formwork completed.

1.4 SUBMISSIONS

Execution – proposals
Changes: If changes are proposed to reinforcement shown on the drawings, submit details.

Damaged galvanizing: If repair is required, submit proposals to AS/NZS 4680 Section 8.

Provision for concrete placement: If spacing or cover of reinforcement does not comply give notice.

Splicing: If splicing not documented is proposed, submit details.

Welding: Give notice before welding reinforcement.

2 PRODUCTS

2.1 MATERIALS

Protective coating
General: For concrete elements containing protective coated reinforcement, provide the same coating type to all that element's reinforcement and embedded ferrous metal items, including tie wires, stools, spacers, stirrups, plates and ferrules, and protect other embedded metals with a suitable coating.

Epoxy coating: To be high build, high solids chemically resistant coating.

- Thickness: 200 µm minimum.

Galvanizing: To AS/NZS 4680:

- Sequence: If fabrication is to occur after galvanizing, submit proposals for galvanizing repair and coating of cut ends.
- Zinc-coating (minimum): 600 g/m^2.

Steel reinforcement
Standard: To AS/NZS 4671.

- Ductility grade: Class N.

Surface condition: Free of loose mill scale, rust, oil, grease, mud or other material which would reduce the bond between the reinforcement and concrete.

Tie wire
General: To be annealed steel 1.25 mm diameter (minimum).

External and corrosive applications: Galvanized.

3 EXECUTION

3.1 CONSTRUCTION

Dowels

Fixing: If a dowel has an unpainted half, embed this in the concrete placed first.

Tolerances:

- Alignment: 2 mm in 300 mm.
- Location: ± half the diameter of the dowel.

Grade: 250 N.

Supports

General: Provide proprietary concrete, metal or plastic supports to reinforcement in the form of chairs, spacers, stools, hangers and ties, as follows:

- To be adequate to withstand construction and traffic loads.
- With a protective coating if they are ferrous metal extending to the surface of the concrete, or are used with galvanized or zinc-coated reinforcement.

Minimum spacing:

- Bars: ≤ 60 diameters.
- Fabric: ≤ 800 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

General: If ‘starter’ or other bars project beyond reinforcement mats or cages, through formwork or from cast concrete, provide a plastic protective cap to each bar until it is incorporated into subsequent work.

Tying

General: Secure the reinforcement against displacement by tying at intersections with either wire ties, or clips. Bend the ends of wire ties away from nearby faces of forms so that the ties do not project into the concrete cover.

Beams: Tie stirrups to bars in each corner of each stirrup. Fix other longitudinal bars to stirrups at 1 m maximum intervals.

Welding

General: If welding of reinforcement is proposed, provide details.

3.2 COMPLETION

Unencased reinforcement

General: If ‘starter bars’ and other items project from cast concrete for future additions and are exposed to the weather, provide details of protection.

0314b CONCRETE IN SITU

1 GENERAL

1.1 AIMS

Selections: Conform to the **Selections**.

1.2 CROSS REFERENCES

General requirements
General: Conform to the *General requirements* worksection.

Associated worksections
Associated worksections: Conform to the following:

- *Concrete formwork*.
- *Concrete reinforcement*.
- *Concrete finishes*.

1.3 STANDARDS

General
Materials and construction: To AS 3600.

Specification and supply of concrete: AS 1379.

Concrete structures for retaining liquids: To AS 3735.

1.4 INSPECTION

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

- Base or subgrade before covering.
- Membrane or film underlay installed on the base or subgrade.
- Completed formwork, and reinforcement, cores, fixings and embedded items fixed in place.
- Surfaces or elements to be concealed in the final work before covering.
- Commencement of concrete placing.

1.5 SUBMISSIONS

Construction proposals
Concrete: Submit proposals for mixing, placing, finishing and curing concrete including the following:

- Addition of water at the site.
- Changes to the plastic concrete mix.
- Curing and protection methods.

Cutting or coring: If cutting or coring of hardened concrete is proposed, provide details.

Sawn joints: Submit proposed methods, timing and sequence of sawing joints.

Pre-mixed supply
Delivery docket: For each batch, submit a docket listing the information required by AS 1379, and the following information:

- For special class performance concrete, specified performance and type of cement binder.
- For special class prescription concrete, details of mix, additives, and type of cement binder.
- Method of placement and climate conditions during pour.
- The amount of water, if any, added at the site.

2 PRODUCTS

2.1 MATERIALS

Coloured concrete
Standard: To AS 3610.

Polymeric film underlay
Vapour barriers and damp-proofing membranes: To AS 2870.

Chemical admixtures
Contents: Free of chlorides, fluorides and nitrates.

Curing compounds
Standard: To AS 3799.

3 EXECUTION

3.1 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.

Installation
General: Lay over the base, lap joints at least 200 mm and seal the laps and penetrations with waterproof adhesive tape. Face the laps away from the direction of concrete pour. Take the underlay up vertical faces past the damp proof course where applicable, and tape fix at the top. Patch or seal punctures or tears before pouring concrete. Cut back as required after concrete has gained strength and forms have been removed.

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

3.2 CONCRETE

General
General: Provide concrete in conformance with the following in the **Selections**:

- **Properties table – performance**.

Elapsed delivery time
General: Ensure that the elapsed time between the wetting of the mix and the discharge of the mix at the site is in conformance with the **Elapsed delivery time table**. Do not discharge at ambient temperature below 10°C or above 30°C.

Elapsed delivery time table

Concrete temperature at time of discharge (°C)	Maximum elapsed time (hours)
10 – 24	2.00
24 – 27	1.50
27 – 30	1.00
30 – 32	0.75

Pre- mixed supply
Addition of water: If water is to be added, comply with AS 1379 Section 4.2.3.

Transport: Mode must prevent segregation, loss of material and contamination of the environment, and must not adversely affect placing or compaction.

Site mixed supply
Emergencies: If mixing by hand is carried out, provide details.

Plant: Mix concrete in plant located on the construction site.

3.3 CORES, FIXINGS AND EMBEDDED ITEMS

Adjoining elements
General: For adjoining elements to be fixed to or supported on the concrete, provide for the required fixings. If required, provide for temporary support of adjoining elements during construction of the concrete.

Protection
General: Grease threads. Protect embedded items against damage.

Compatibility: Ensure inserts, fixings and embedded items are compatible with each other, with the reinforcement and with the concrete mix to be used.

Corrosion: If in external or exposed locations, galvanize anchor bolts and embedded fixings or propose alternate materials such as stainless steel.

Structural integrity
General: Fix cores and embedded items to prevent movement during concrete placing. In locating cores, fixings and embedded items, reposition but do not cut reinforcement, and maintain cover to reinforcement.

Isolation: Isolate embedded items so that water cannot track to concrete providing minimum cover to reinforcement.

Tolerances
General: Maximum deviation from correct positions:

- Anchor bolt groups for structural steel: To AS 4100.
- Cores and embedded items generally: 10 mm.
- Other fixing bolts: 3 mm.

3.4 PLACING AND COMPACTION

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 come into contact with set concrete, reinforcement or items including pipes and conduits embedded in concrete. Do not use vibrators to move concrete along the forms. Avoid over-vibration that may cause segregation.

Horizontal transport
General: Use suitable conveyors, clean chutes, troughs or pipes.

Placing
General: Use placing methods which avoid segregation and loss of concrete, and which minimise plastic settlement. Maintain a generally vertical and plastic concrete edge at faces during placement.

Layers: Place concrete in layers maximum 300 mm thick, such that each succeeding layer is compacted before previous layer has taken initial set. Compact into previous layer.

Placing records
General: Keep on site and make available for inspection a log book recording each placement of concrete, including the following:

- Date.
- Specified grade and source of concrete.
- Slump measurements.
- The portion of work.
- Volume placed.

Rain
General: During placement and prior to setting do not expose concrete to rain.

Protection: Protect surface from damage by covering until hardened.

Time between adjacent placements
General: Conform to the **Minimum time delay schedule**.

Vertical elements
General: In vertical elements, limit the free fall of concrete to 1500 mm per 100 mm element thickness, up to a maximum free fall of 3000 mm, using enclosed vertical chutes or access hatches in forms.

3.5 PLACING IN COLD WEATHER

Cement
General: Do not use high alumina cement.

Placing
Concrete: Maintain the temperature of the freshly mixed concrete at ≥ 5°C.

Formwork and reinforcement: Before and during placing maintain temperature at ≥ 5°C.

Severe weather
General: If severe weather conditions are predicted, use high early strength cement.

Temperature control
General: Heat the concrete materials, other than cement, to the minimum temperature necessary to ensure that the temperature of the placed concrete is within the limits specified.

Admixtures: Do not use calcium chloride, salts, chemicals or other material in the mix to lower the freezing point of the concrete.

Frozen materials: Do not allow frozen materials or materials containing ice to enter the mixer, and keep free of frost and ice any forms, materials, and equipment coming in contact with the concrete.

Maximum temperature of water: 60°C when it is placed in the mixer.

Plastic concrete: Prevent plastic concrete from freezing, without using salts or chemicals.

3.6 PLACING IN HOT WEATHER

Handling
General: Prevent premature stiffening of the fresh mix and reduce water absorption and evaporation losses. Mix, transport, place and compact the concrete in conformance with the **Elapsed delivery time schedule**.

Placing
Concrete: Maintain the temperature of the freshly mixed concrete in conformance with the **Hot weather placing table**.

Formwork and reinforcement: Before and during placing maintain temperature at ≤ 35°C.

Severe weather
General: If ambient shade temperature > 38°C, do not mix concrete.

Temperature control
General: Select one or more of the following methods of maintaining the specified temperature of the placed concrete:

- Cool the concrete using liquid nitrogen injection before placing.
- Cover the container in which the concrete is transported to the forms.
- Spray the coarse aggregate using cold water prior to mixing.
- Use chilled mixing water.

Hot weather placing table

Concrete element	Temperature limit
Normal concrete in footings, beams, columns, walls and slabs	35°C
Concrete in sections ≥ 1 m in all dimensions except for concrete of strength 40 MPa or greater, in sections exceeding 600 mm in thickness	27°C

3.7 CURING

General
Curing: Cure continuously from completion of finishing until the total cumulative number of days or fractions of days, during which the air temperature in contact with the concrete is above 10°C, is at least the following, unless accelerated curing is adopted:

- Fully enclosed internal surfaces/Early age concrete: 3 days.
- Other concrete surfaces: 7 days.

End of curing period: Prevent rapid drying out at the end of the curing period.

Protection: Maintain at a reasonably constant temperature with minimum moisture loss, during the curing period.

Cold weather curing

General: Maintain concrete temperature between 10 – 20°C for curing period.

Curing compounds

Application: Provide a uniform continuous flexible coating without visible breaks or pinholes, which remains unbroken at least for 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.

Self levelling toppings: If used also as curing compounds confirm compliance with AS 3799.

Visually important surfaces: Apply curing compounds to produce uniform colour on adjacent surfaces.

Hot weather curing

Curing compounds: If it is proposed to use a curing compound provide details.

Protection: Select a protection method as applicable.

- If the concrete temperature exceeds 25°C or if not protected against drying winds, protect the concrete using a fog spray application of aliphatic alcohol evaporation retardant.
- If ambient shade temperature is > 35°C protect from wind and sun using an evaporative retarder until curing is commenced.
- Immediately after finishing, either cover exposed surfaces using an impervious membrane or hessian kept wet until curing begins, or apply a curing compound.

Water curing

General: If water is used, pond or continuously sprinkle in such a way as to not cause damage to the concrete surface for the required curing period.

3.8 CONSTRUCTION JOINTS

Location

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

Finish at construction joints

General: Butt join the surfaces of adjoining pours. In visually important surfaces make the joint straight and true, and free from blemishes impermissible for its surface finish class.

Joint preparation

General: 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.

3.9 EXPANSION JOINTS

Joint filling

Joint filling: Fill with jointing materials. Finish visible jointing material neatly flush with adjoining surfaces.

Preparation: Before filling, dry and clean the joint surfaces, and prime.

Watertightness: Apply the jointing material so that joints subject to ingress of water are made watertight.

Jointing materials

Type: Provide jointing materials compatible when used together, and non-staining to concrete in visible locations.

Bond breaking: Provide back-up materials for sealants, including backing rods, which do not adhere to the sealant. They may be faced with a non-adhering material.

Foamed materials (in compressible fillers): Closed-cell or impregnated types which do not absorb water.

0315b CONCRETE FINISHES

1 GENERAL

1.1 AIMS

Responsibilities

General: Provide finishes to formed and unformed concrete surfaces which are as follows:

- Appropriate to the importance (visual or physical) of the concrete elements.
- Compatible with following trades and finishes.

1.2 CROSS REFERENCES

General

General: Conform to the *General requirements* worksection.

Associated worksections

Associated worksections: Conform to the following:

- *Concrete formwork*.
- *Concrete in situ*.

1.3 STANDARDS

General

Formed surfaces: To AS 3610.

Unformed surfaces: To AS 3600.

1.4 INTERPRETATIONS

Definitions

General: For the purposes of this worksection, the following definition applies:

- Green concrete: Concrete which has set but not appreciably hardened.

1.5 INSPECTION

Notice

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

- Evaluation of the finishes to formwork.

1.6 TOLERANCES

Surface quality

Formed surfaces: Confirm conformance with the surface finish requirements of AS 3610 for the surface class nominated in the **Formed surface finishes schedule**.

Flatness

Unformed surfaces: Confirm conformance with the **Flatness tolerance classes table** for the class of finish nominated using a straight edge placed anywhere on the surface in any direction.

Flatness tolerance class table

Class	Measurement	Maximum deviation (mm)
A	3 m straight edge	3
B	3 m straight edge	6
C	600 mm straight edge	6

2 PRODUCTS

2.1 MATERIALS

Surface hardeners, sealants and protectors
Supply: If required by the project documentation, provide proprietary products in accordance with the manufacturer's written requirements.

3 EXECUTION

3.1 SURFACE MODIFIERS

General
Application: Apply to clean surfaces in accordance with the manufacturer's requirements.

3.2 FORMED SURFACES

General
General: Provide formed concrete finishes in conformance with the **Formed surface finishes schedule**.

Damage: Do not damage concrete works through premature removal of formwork.

Curing
General: If forms are stripped when concrete is at an age less than the minimum curing period, commence curing exposed faces as soon as the stripping is completed.

Evaluation of formed surfaces
General: If evaluation of formed surface tolerance or colour is required, complete the evaluation before surface treatment.

Finishing methods
General: If soffits of concrete elements or faces of concrete column are to have a finish other than off the form, provide details of proposed procedures.

Blasted finishes:

- Abrasive: Blast the cured surface using hard, sharp graded abrasive fine aggregate particles until the coarse aggregate is in uniform relief.
- Light abrasive: Blast the cured surface using hard, sharp graded abrasive fine aggregate particles to provide a uniform matt finish without exposing the coarse aggregate.

Bush hammered finish: Remove the minimum matrix using bush hammering to expose the coarse aggregate, recessing the matrix no deeper than half the aggregate size, to give a uniform texture.

Exposed aggregate finish: Remove the vertical face forms while the concrete is green. Wet the surface and scrub using stiff fibre or wire brushes, using clean water freely, until the surface film of mortar is mechanically removed, and the aggregate uniformly exposed. Do not use acid etching. Rinse the surface with clean water.

Floated finishes:

- Sand floated finish: Remove the vertical face forms while the concrete is green. Wet the surface and rub using a wood float. Rub fine sand into the surface until a uniform colour and texture are produced.
- Grout floated finish: Remove the forms while the concrete is green. Dampen the surface and spread a slurry, using hessian pads or sponge rubber floats. Remove surplus slurry and work until a uniform colour and texture are produced.

Smooth rubbed finish: Remove the vertical face forms while the concrete is green. Wet the surface and rub using a carborundum or similar abrasive brick until a uniform colour and texture are produced.

Surface repairs
Surface repair method: If surface repairs are required, submit proposals.

3.3 UNFORMED SURFACES

General
General: Strike off, screed and level slab surfaces to finished levels, to the tolerance class noted in the **Unformed surface finishes schedule**.

Surface finishes

General: Provide surface finishes in conformance with the **Unformed surface finishes schedule.**

Surface repairs

Surface repair method: If surface repairs are required, submit proposals.

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:

- Use power or handsteel trowels to produce a smooth surface relatively free from defects.
- When the surface has hardened sufficiently, retrowel to produce the final consolidated finish free of trowel marks and uniform in texture and appearance.

Burnished finish: Continue steel trowelling until the concrete surface attains a polished or glossy appearance, uniform in texture, 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 and steel trowelling draw a broom or hessian belt across the surface to produce a coarse even-textured 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 and steel trowelling, produce an even textured sand finish by wiping the surface using a damp sponge.

0316 PRECAST CONCRETE

1 GENERAL

1.1 AIMS

Responsibilities

Provide precast concrete elements that are:

- Independently designed and documented.
- Designed for handling, transport and erection by a professional engineer.
- Independently certified by a professional engineer for the design and the erected components.
- Undamaged by handling and installation.

1.2 CROSS REFERENCES

General

General: Conform to the *General requirements* worksection.

Associated worksections

Associated worksections: Conform to the following:

- *Concrete formwork*.
- *Concrete reinforcement*.
- *Concrete in situ.*
- *Concrete post-tensioned*.
- *Concrete finishes*.

1.3 STANDARDS

Methods and equipment

Precast members: Comply with the recommendations of CIA Z48.

Precast flat panels: To AS 3850.

1.4 INTERPRETATION

Definitions

General: For the purposes of this worksection the definitions given in AS 3850 clause 1.3 and the following apply.

- Precast units: Concrete elements manufactured in other than their final position including elements manufactured on site but excluding tilt-up panels.
- Project design engineer: The engineer responsible for the design of the precast concrete elements as part of the overall design of the complete structure. This design is for in-service conditions and covers the performance of the precast concrete elements as part of the complete structure.
- Erection design engineer: The engineer responsible for the design aspects related to manufacture and construction including the handling, transportation, erection, bracing, and propping and lateral stability of the individual precast concrete elements.

1.5 INSPECTION

Notice

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

- Formwork dimensions and stability.
- Panel edge details and penetrations.
- Connection materials and inserts in place.
- Reinforcement and/or prestressing tendons in place.
- Concreting.
- Stripping and storage.
- Site erection including fixings, in situ topping.

1.6 SUBMISSIONS

Subcontractors
Details: Submit name and contact details of proposed manufacturer of precast concrete units.

Design
Veneered fabrication: If veneered fabrication is proposed submit proposals.

Contractor design: Provide independent verification by a professional engineer of compliance of the design with project criteria.

Shop drawings
General: Submit shop drawings of precast units showing the proposed details for their design, manufacture, assembly, transport and installation, including the following:

- Project title and manufacturer's name.
- Marking plans and elevations referenced to the building grids and floors to locate each precast unit.
- Shape or profile drawings (submit these before fabrication of moulds and tooling).
- Concrete mix and type of cement if special-class concrete.
- Locations, sizes, details, materials and stress grades of tendons and reinforcement.
- Locations, sizes, details, materials, corrosion protection and grades of cast-in ferrules, locating plates and angles, cut outs and openings, bolts, anchors and lifting devices.
- Details of all joints caulking, baffles and waterproofing.
- Jack clearances, procedures, stressing sequence, initial tensioning forces gauge pressure, and tendon elongation.
- Surface finish class and surface treatment, if applicable.
- Curing and protection methods.
- Weights of units.
- Calculated maximum loadings on lifting and bracing inserts and attachments.
- Equipment and methods for handling, transport and installation, including lifting inserts and pick-up points.
- Calculated maximum loadings on lifting and bracing inserts and attachments.
- Evidence of load capacity of lifting and bracing inserts and attachments in the form of test reports or calculations.
- Specification of plugs for sealing recesses for cast-in fixings.

Lifting
Early lifting: If it is proposed to lift the units by their designated lifting points before 28 day strength has been achieved, submit evidence to demonstrate that the unit has adequate strength to carry its own weight without damage or residual cracking or deflection on removal of the lifting device.

Attachments for handling purposes: If it is proposed to locate lifting attachments, holes and other temporary fixings for handling purposes on visible faces of units, submit proposals.

Lifting units: If it is proposed to lift or support units at other than specified points, submit proposals.

1.7 PROTOTYPES

General
Provision: Provide prototypes in accordance with the **Prototypes schedule**.

Storage: Maintain prototypes on site, undamaged and protected from discolouration for comparison with manufactured precast units.

Structural testing
Static load tests: If structural performance requirements are nominated for the precast unit, perform static load tests on the prototype.

Standard: To AS 3600.

Test panels
Make separate test panels for surface finish, colour, or both, in conformance with the **Prototypes schedule**.

2 PRODUCTS

2.1 PRECAST UNITS

Colour

General: Provide details of how selected colour will be achieved including details of the type and colour of the cement, sand and aggregates as well as colouring oxide pigments to be used.

Stockpile: Stockpile sand, cement and aggregates proposed to be used if required for uniform, consistent colour.

Marking

Identification: Identify units by marks which are as follows:

- Remain legible until after the unit has been fixed in place.
- Are not visible in the completed structure.
- Show the date of casting.
- Show the correct orientation of the unit.
- On other than units manufactured as a standard product, indicate the locations within the structure in accordance with the marking plan.
- Show the weight of the unit.

Surfaces bonded to in situ concrete

Surfaces bonded to concrete: Fully scabble and roughen all surfaces required to bond with in situ concrete to achieve a shear plane surface coefficient in accordance with Table 8.4.4 of AS 3600.

Tolerances

General: During manufacture restrict the variation from documented dimensions of a precast member to limits defined in Chapter 4 Tolerances of CIA Z48.

Fixings and embedded items in precast units: To AS 3610.

Lifting devices and bracing inserts

General: Provide proprietary lifting devices with published load data designed specifically for lifting concrete elements. Use face and edge lifters as required.

Requirements: Comply with the following:

- Mark the working load capacities on the exposed face so that it can be identified even after the unit has been cast into concrete.
- Do not use reinforcing bars as lifting hoops.
- Provide hot-dipped galvanizing finish with a coating thickness of 600 gm/m^2 to all cast-in lifting and bracing devices.
- Provide bracing inserts designed by the erection design engineer.

Capacity: To AS 3850 clauses 2.4.2 and 2.4.3.

Attachments for handling

Sealing: Recess lifting attachments such as bracing ferrules, or other types of cast-in fixings, and provides plugs for sealing. Do not place lifting attachments, holes and other temporary fixings for handling purposes on visible faces of units.

Attachments for structural or architectural fixings

Ferrules: Provides ferrules anchored behind the reinforcing as shown on the drawings.

Dowel bars: Provide dowel bars loose, cast in or screwed into a ferrule or coupler and projecting from the precast unit. Alternatively, where dowels are cast into and project from in situ concrete, provide a mating sleeve without tube.

Grout tube: Provide grout tubes as documented, made from thin wall galvanised duct or similar cast into either in situ concrete or the precast unit into which a dowel bar will be grouted.

Cast in plates and bolts: Provide purpose made steel brackets with bars, bolts or studs welded to them.

Support and fixings: Provide supporting brackets (loose or cast in), ferrules, double inserts, bolts, nuts, packers and washers.

Restraint brackets: Provide all support or restraint brackets for the precast units as documented or as required.

Unformed faces
General: Provide a wood float or 'helicopter' travelling machine finish to all uniformed faces such as the rear face of precast units that are not visible in their final state to give a smooth lightly textured surface.

Lifting points
Marking: Clearly mark all lifting points and the positions for temporary bearing for storage and transport. Lift or support members only at specified points. Do not use the fixing devices for lifting or hoisting.

Rejection
Assessment: Set aside for inspection any unit having damage such as cracking or deformation spalling, or exhibiting lack of adequate concrete cover. Repair or recast as instructed.

Welding of connections
Standard: To AS/NZS 1554.3.

3 EXECUTION

3.1 HANDLING

General
Manufacture the precast units so that they can be lifted into position and secured immediately before final adjustment.

Precautions
Lifting: Lift or support units only at designated points. Use handling methods which do not overstress, warp or damage the units.

Attachments
Remove temporary attachments after erection. Seal or otherwise make good residual recesses.

Lifting devices
Capacity: Provide reusable lifting devices with a capacity limit state factor of 5 in relation to the working load limit.

3.2 INSTALLATION

General
Work method statement: Prepare a work method statement specific to the project for the precast erection and submit on request.

Fixing: Fix the units securely and accurately in their final positions.

Ancillaries: Provide components and materials, including fasteners, braces, shims, jointing strips, sealant, flashings, grout and mortar, necessary for the installation of the units.

3.3 PROTECTION

General
General: Protect the units against staining, discolouration and other damage until they are installed in their final location.

0317 TILT-UP CONCRETE

1 GENERAL

1.1 AIMS

Responsibilities
Provide tilt-up concrete elements that are:
- Undamaged by handling and installation.
- Independently designed and documented.
- Independently certified by a professional engineer for the design and the erected components.

1.2 CROSS REFERENCES

General
General: Conform to the *General requirements* worksection.

Associated worksections
Associated worksections: Conform to the following:
- *Concrete formwork*.
- *Concrete reinforcement*.
- *Concrete in situ.*
- *Concrete finishes*.

1.3 STANDARDS

Methods and equipment
Precast concrete (tilt-up) elements: To AS 3850.

1.4 INTERPRETATION

Definitions
General: For the purposes of this worksection the definitions given in AS 3850 clause 1.3 apply.

1.5 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of the following:
- Formwork dimensions and stability.
- Panel edge details and penetrations.
- Connection materials and inserts in place.
- Reinforcement in place.

1.6 SUBMISSIONS

Subcontractors
Details: Submit name and contact details of proposed manufacturer of the tilt-up units.

Design
Veneered fabrication: If veneered fabrication is proposed submit proposals.

Contractor design: Provide independent verification by a professional engineer of compliance of the design with project criteria.

Shop drawings
General: Submit shop drawings of tilt-up units showing the proposed details for their design, manufacture, assembly, transport and installation, including the following:
- Project title and manufacturer's name.
- Marking plans and elevations referenced to the building grids and floors to locate each unit.
- Shape or profile drawings (submit these before fabrication of any moulds and tooling).
- Calculations showing method of complying with nominated performance requirements.
- Concrete mix and type of cement if special-class concrete.

- Veneer details, if applicable.
- Formwork type.
- Locations, sizes, details, materials and stress grades of reinforcement.
- Locations, sizes, details, materials, corrosion protection and grades of cast-in ferrules, locating plates, bolts, anchors and lifting devices.
- Details of all joints.
- Surface finish class and surface treatment, if applicable.
- Curing and protection methods.
- Marking plan.
- Equipment and methods for handling, transport and installation, including lifting inserts and pick-up points.
- Calculated maximum loadings on lifting and bracing inserts and attachments.
- Evidence of load capacity of lifting and bracing inserts and attachments in the form of test reports or calculations.
- Specification of plugs for sealing recesses for cast-in fixings.

Lifting

Early lifting: If it is proposed to lift the units by their designated lifting points before design strength has been achieved, submit evidence to demonstrate that the unit has adequate strength to carry its own weight without damage or residual cracking or deflection on removal of the lifting device.

Attachments for handling purposes: If it is proposed to locate lifting attachments, holes and other temporary fixings for handling purposes on visible faces of units, submit proposals.

Lifting units: If it is proposed to lift or support units at other than specified points, submit proposals.

1.7 PROTOTYPES

General

Provision: Provide prototypes in accordance with the **Prototypes schedule**.

Storage: Maintain prototypes on site, undamaged and protected from discolouration for comparison with manufactured precast units.

Structural testing

Static load tests: If structural performance requirements are nominated for the tilt-up unit, perform static load tests on the prototype.

Standard: To AS 3600.

Test panels

Make separate test panels for surface finish, colour, or both, in conformance with the **Prototypes schedule**.

2 PRODUCTS

2.1 TILT-UP UNITS

Marking

Identification: Identify units by marks which are as follows:

- Remain legible until after the unit has been fixed in place.
- Are not visible in the completed structure.
- Show the date of casting.
- Show the correct orientation of the unit.
- On other than units manufactured as a standard product, indicate the locations within the structure in accordance with the marking plan.

Tolerances

Fixings and embedded items in precast units: To AS 3610 and AS 3850, as applicable.

Lifting and bracing inserts

Capacity: To AS 3850 clauses 2.4.2 and 2.4.3.

Attachments
Sealing: Recess lifting attachments such as ferrules, or other types of cast-in fixings, and provide plugs for sealing.

Welding of connections
Standard: To AS/NZS 1554.3.

3 EXECUTION

3.1 HANDLING

Precautions
Lifting: Lift or support units only at designated points. Use handling methods which do not overstress, warp or damage the units.

Attachments
Remove temporary attachments after erection. Seal or otherwise make good residual recesses.

Lifting devices
Capacity: Provide (reusable) lifting devices with a capacity limit state factor of 5 in relation to the working load limit.

3.2 INSTALLATION

General
Fixing: Fix the units securely and accurately in their final positions.

Ancillaries: Provide components and materials, including fasteners, braces, shims, jointing strips, sealant, flashings, grout and mortar, necessary for the installation of the units.

3.3 PROTECTION

General
General: Protect the units against staining, discolouration and other damage until they are installed in their final location.

0331b BRICK AND BLOCK CONSTRUCTION

1 GENERAL

1.1 CROSS REFERENCES

General
General: Conform to the *General requirements* worksection.

1.2 STANDARD

General
Materials and construction: To AS 3700.

1.3 INSPECTION

Notice
Inspection: Give sufficient notice so that inspection may be made of the following:
- Unit type, colour and texture.
- Bottoms of cavities, after cleaning out.
- Bottoms of core holes, before grouting.
- Reinforcement type and diameter.
- Positioning of reinforcing before grouting.
- Control joints, ready for insertion of joint filler.
- Damp-proof courses, in position.
- Flashings, in position.
- Lintels, in position.
- Structural steelwork, including bolts and shelf angles, in position.

1.4 TOLERANCES

Masonry construction
Conformance: Conform to AS 3700 Table 11.1.

2 PRODUCTS

2.1 MATERIALS

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

Minimum age of clay bricks: 7 days.

Mortar materials
Admixtures:
- Admixtures: To AS 3700 clause 10.4.2.4.

Lime: To AS 1672.1.

Portland cement: To AS 3972.
- Type: GP.

Masonry cement: To AS 1316.

Proportions: Conform to the **Mortar mix table**.

Sand: To be fine aggregate with low clay content and free from efflorescing salts, selected for colour and grading.

Water: To be clean and free from any deleterious matter.

White cement: To have iron salts content ≤ 1%.

Pigment: To BS EN 12878, and as follows:
- Quantity: Less than 10% of the mass of cement in the mix.

For light colours: Use off-white cement in the mix.

Mortar mix table

Mortar class to AS 3700	Cement, lime, sand ratios (by volume)			Water thickener
	Clay	Concrete	Calcium silicate	
Masonry cement				
M3	1:0:4	1:0:4	n/a	No
M4	1:0:3	n/a	n/a	No
Portland cement				
M2	1:2:9	n/a	n/a	No
M3	1:1:6	1:1:6	n/a	Optional
	1:0:5	1:0:5	1:0:5	Yes
M4	1:0.5:4.5	1:0.5:4.5	n/a	Optional
	1:0:4	1:0:4	1:0:4	Yes

2.2 COMPONENTS

Steel lintels

Angles and flats: To AS/NZS 3679.1.

Cold formed proprietary 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: [complete/delete]

Corrosive resistance and durability: In conformance with the **Corrosion resistance and durability table**.

Strength classification:

- Masonry veneer: Light duty.
- Normal cavity construction and at abutments: Medium duty.
- Cavities > 60 and < 200 mm wide: Heavy duty.

Corrosion resistance and durability

Compliance: Conform to the **Corrosion resistance and durability table(s)**, or provide proprietary products with metallic and/or organic coatings of equivalent corrosion resistance and as follows:

- Built-in products: Below damp proof course to be stainless steel 316 or engineered polymer.
- Bricks and blocks: Below damp-proof course, and in external leaves in the High corrosivity category, use 'Exposure' grade to AS/NZS 4455.1 Table 2.3 or AS/NZS 4455.3 Table 2.4 (Salt attack resistance grade).
- Mortar: Below damp-proof course use mortar grade M4 to the **Mortar mix table**.

Corrosion resistance and durability table – Low corrosivity category

Situation	Steel lintels	Wall ties, connectors and other structural steel accessories above damp proof course	Minimum cement content (mortar grade) above damp proof course
Internal	Galvanize after fabrication 300 g/m^2	- Galvanize after fabrication 300 g/m^2 - Metallic-coated sheet Z275/AZ150 - Galvanized wire 300 g/m^2 - In line galvanized sections	M2

Situation	Steel lintels	Wall ties, connectors and other structural steel accessories above damp proof course	Minimum cement content (mortar grade) above damp proof course
		with after fabrication coating repair ILG/150	
External	Galvanize after fabrication 300 g/m^2	- Galvanize after fabrication 300 g/m^2 - Metallic-coated sheet Z600 - Galvanized wire 470 g/m^2	M2

Corrosion resistance and durability table – Medium corrosivity category

Situation	Steel lintels	Wall ties, connectors and other structural steel accessories above damp proof course	Minimum cement content (mortar grade) above damp proof course
Internal	Galvanize after fabrication 300 g/m^2	- Galvanize after fabrication 300 g/m^2 - Galvanized wire 300 g/m^2 - Metallic-coated sheet Z275/AZ150	M2
External	Galvanize after fabrication 600 g/m^2	- Galvanize after fabrication 600 g/m^2 - Galvanized wire 470 g/m^2	M3

Corrosion resistance and durability table – High corrosivity category

Situation	Steel lintels	Wall ties, connectors and other structural steel accessories above damp proof course	Minimum cement content (mortar grade) above damp proof course
Internal	Galvanize after fabrication 470 g/m^2	- Galvanize after fabrication 470 g/m^2	M2
External	- Stainless 316 - Galvanize after fabrication 600 g/m^2 plus organic coating	- Stainless 316 - Engineered polymer	M4

Connectors and accessories

Standard: To AS/NZS 2699.2.

Flexible masonry ties: If accommodation of movement is required at control joints and where masonry abuts structural elements such as column faces and slab soffits, provide details.

Flashings and damp-proof courses

Standard: To AS/NZS 2904.

3 EXECUTION

3.1 GENERAL

Mortar mixing

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

Protection from contamination

General: Protect masonry materials and components from ground moisture and contamination.

Bond

Type: Stretcher bond.

Building in
Embedded items: Build in wall ties and accessories as the construction proceeds. If it is not practicable to obtain the required embedment wholly in the mortar joint in hollow unit brickwork or blockwork, fill appropriate cores with grout or mortar.

Steel door frames: Fill the backs of jambs and heads solid with mortar as the work proceeds.

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:

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

Construction at different rates or times
Monolithic structural action: If two or more adjoining sections of masonry, including intersecting walls, are constructed at different rates or times, rake back or tie the intersections between those sections so that monolithic structural action is obtained in the completed work.

Joining to existing
General: If jointing to existing work is required, provide a straight joint. Do not tooth new masonry into existing work.

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

Face-shell bed hollow units: Fill perpends solid. Cut mortar flush.

Finish:

- 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.
- Thickness: 10 mm.

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

Monolithic structural action
General: Provide brick or block header units, except in stretcher bond facework, to AS 3700 clause 4.11.2.

Spacing: 600 mm maximum.

Location:

- At engaged piers.
- At engagement of diaphragms with the leaves in diaphragm walls.
- At intersections of flanges with shear walls.
- At intersections with supporting walls and buttresses.
- Between leaves in solid masonry construction.

Rate of construction
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.

Weather protection
General: Keep the top surface of brickwork and blockwork covered to prevent the entry of rainwater.

Temporary support
General: If the final stability of the brickwork or blockwork is dependent on (structural) elements to be constructed after the brickwork or blockwork, provide proposals for temporary support or bracing.

3.2 CONTROL OF MOVEMENT

Joints
General: Provide joints as follows:

- Contraction joints for concrete and calcium silicate masonry:
  . Maximum length of continuous wall: 6 m.
  . Minimum width of control joint: 10 mm.
- Expansion joints for clay brickwork:
  . Maximum length of continuous wall: 6 m.
  . Maximum vertical spacing: 8 m.
  . Width of vertical joint: ≥ 10 mm ≤ 20 mm.
  . Width of horizontal joint: ≥15 mm ≤ 20 mm.

3.3 MASONRY DUCT RISERS

Location
General: Build a one-piece corrosion resistant metal tray to the masonry duct risers at roof level.

Installation
General: Cut an opening for the riser. Turn tray edges up 25 mm around the opening 13 mm clear of the walls. Externally turn the tray up 100 mm under the stepped flashing and down 100 mm over the apron flashing. Lap and solder joints.

Weepholes
General: Provide 2 weepholes through the masonry duct riser walls on opposite sides immediately above the tray.

3.4 BRICK BED JOINT REINFORCEMENT

Location
General: Locate as follows:
- In 2 bed joints below and above head and sill flashings to openings.
- In 2 bed joints below and above openings.
- In third bed joint above bottom of wall.
- In second bed joint below top of wall.

Maximum vertical intervals: 500 mm.

Installation
General: Lap 450 mm at splices. Fold and bend at corners so that the longitudinal wires are continuous. Stop 50 mm short of control joints.
- In brickwork: Extend 450 mm beyond each side of openings.

Reinforcement
Material: Galvanized welded wire mesh.

Width: Equal to the width of the leaf, less 15 mm cover from each exposed surface of the mortar joint.

3.5 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 ensure that the grout can be thoroughly compacted to fill all voids and ensure bond between grout and masonry.

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.

3.6 LINTELS

Location

General: Provide 1 lintel to each wall leaf in conformance with the **Lintel schedule**.

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 the long leg vertical.

Minimum bearing each end:

- Span ≤ 1000 mm: 100 mm.
- Span > 1000 mm ≤ 3000 mm: 150 mm.
- Span > 3000 mm: 200 mm.

Propping: To prevent deflection or excessive rotation, temporarily prop lintels until the masonry reaches its required strength.

Protection

Steel lintels: Steel lintels shall be hot dip galvanized (after fabrication).

0341b STRUCTURAL STEEL

1 GENERAL

1.1 CROSS REFERENCES

General
General: Conform to the *General requirements* worksection.

1.2 STANDARDS

General
Materials, construction, fabrication and erection: To AS 4100.

Cold-formed steel: AS/NZS 4600.

1.3 ADJOINING ELEMENTS

General
Fixing: Provide for the fixing of adjoining building elements that are to be connected to or supported on the structural steel.

1.4 INSPECTION

Notice – on site
Inspection: Give notice so that inspection may be made of the following:

- Anchor bolts in position before casting in.
- Steelwork and column bases erected on site, before grouting, encasing, site painting or cladding.
- Tensioning of bolts in categories 8.8/TB and 8.8/TF.
- Reinforcement and formwork in place prior to any encasement.
- After any grouting, encasement, fire protection or site painting is completed.

1.5 SUBMISSIONS

Origin of steel
Requirement: If it is proposed to use steel not of Australian origin, submit documentation which demonstrates that the steel complies with Australian Standards.

Bolts
Compliance: Submit a manufacturer's compliance/test certificate from an accredited testing organization confirming compliance with AS/NZS 1252.

Independent certification: If bolts manufactured from outside Australia, provide a local NATA-accredited laboratory independent compliance certificate based on appropriate testing and verification.

Shop drawings
General: Submit shop drawings showing the following information:

- Identification.
- Steel type and grade.
- Dimensions of items.
- Required camber, where applicable.
- Connection details
- Orientation of members.
- Surface preparation methods and coating system if shop applied.
- Breather holes for hollow sections (with seal plates) being hot-dip galvanized.
- Location of and preparation for site welds.
- Temporary works such as lifting lugs, support points, temporary cleats and bracing which are required for transport and erection of the structural steelwork.
- Required fixings for adjoining building elements.

Materials and components
Concrete or masonry anchors: If masonry anchors other than as shown on the drawings are required or proposed for the support or fixing of structural steel, submit evidence of the anchor capacity to carry the load.

Execution
Splicing: If splicing of structural members is intended, submit proposals.

Distortions: If a member is distorted during the galvanizing process, submit proposals for straightening.

2 PRODUCTS

2.1 STEEL TYPE AND GRADE

Material
Conformance: Steel members and sections shall conform to the **Steel grade (minimum) table.**

Steel grade (minimum) table

Type of steel	**Grade**
Universal beams and columns, parallel flange channels, large angles to AS/NZS 3679.1	300
Flat, small angles, taper flange beams and columns to AS/NZS 3679.1	250
Welded sections to AS/NZS 3679.2	300
Hot rolled plates, floor plates and slabs to AS/NZS 3678	250
Hollow sections to AS 1163: - Circular sections less than 165 mm nominal outside diameter - Sections other than the above	 C250/C350 C350/C450
Cold formed purlins and girts to AS 1397	G450 Z350

2.2 BOLTS

Bolts, nuts and washers
General: Hot-dip galvanized, corrosion-free, coated in oil and in serviceable condition.

3 EXECUTION

3.1 FABRICATION

General
Substitution: If substitution of members is proposed, provide details.

Beam camber
General: If beam members have a natural camber within the straightness tolerance, fabricate and erect them with the camber up.

Straightening
Care: If straightening or flattening members, do not damage.

Work exposed to view
Welds: Grind smooth but do not reduce the weld below its nominal size.

Shearing, flame cutting and chipping: Perform carefully and accurately.

Corners and edges: Grind fair those corners and edges which are sharp, marred, or roughened.

Site work
General: Other than work shown on the shop drawings as site work, do not fabricate, modify or weld structural steel on site.

Identification marks
General: Provide marks or other means of identifying each member compatible with the finish, for the setting out, location, erection and connection of the steelwork.

Monorail beams: Identify and mark rated capacity in accordance with AS 1418.18 clause 5.12.6.

Tolerances
Measurement: Tolerances are to be checked by measurement after fabrication when corrosion protection has been applied.

Conformance: To AS 4100 clause 14.4.

3.2 WELDING

General
Standard: To AS/NZS 1554.1.

Weld category
Weld categories not shown on the drawings: Category GP.

Weld type
Weld type not shown on the drawings: 6 mm continuous fillet weld made using E48XX electrodes or equivalent.

3.3 BOLTING

Connections
Connection type: For connections not shown on the drawings, provide 10 mm plates, 6 mm continuous fillet welds and 2 M20 bolts in 8.8/s bolting category.

Foundation bolts
General: Provide each foundation bolt with 2 nuts and 2 oversize washers and provide sufficient thread to permit the levelling nut and washer to be set below the base plate.

Lock nuts
General: Provide lock nuts for bolts in moving parts or parts subject to vibration and for vertical bolts in tension.

Tensioning of bolting categories 8.8/TB and 8.8/TF
Method: Use part-turn-of-nut or load indicating washers.

3.4 SURFACE PREPARATION AND TREATMENT

General
General: Conform to the *Steel – protective paint coatings* and/or *Steel – hot dip galvanized coatings* worksections as appropriate.

General: Coat structural steelwork not encased in concrete .

Standards: To AS 1627 and AS/NZS 2312 Section 1.

Surface preparation: Class 1 blast.

Coating: Coat prepared steelwork as follows:

- Primer: Zinc phosphate primer.
- Thickness: 70 μm.
- Requirement: Verify and record thickness.
- Concrete encasing: Where members are part concrete encased extend the priming 25 mm into the surface to be encased.
- Inaccessible surfaces: Where surfaces will be in contact or near contact after fabrication or erection, apply the finish and allow it to dry before assembly.

Shop work: Apply the primer coat or protective system to the structural steel before delivery to the site.

Transport and handling: Do not damage the paintwork.

Site work: After erection, repair damage to the shop coating and apply coating omitted at site connections.

3.5 FIRE PROTECTION COATINGS

General
General: Apply fire protection to structural steelwork in conformance with the **Structural Fire protection worksection**.

3.6 ERECTION

Temporary work
General: Provide all necessary temporary bracing or propping.

Temporary connections: If cleats not shown on shop drawings are required, submit details.

Site welds

Completion: Weld only when correct alignment and preset or camber have been achieved.

Overhead welding: If overhead welding is required, submit proposals.

Foundation bolts

General: For each group of foundation bolts provide a template with setting out lines clearly marked for positioning the bolts when casting in.

Grouting at supports

Preparation: Before grouting steelwork to be supported by concrete, masonry and the like, set steelwork on packing or wedges.

Minimum compressive strength (MPa): [complete/delete]

Handling

Care: Handle members or components without overstressing or deforming them.

Protection: Wrap or otherwise protect members or components to prevent damage to surface finishes during handling and erection.

3.7 REPAIRS

General

General: Repair finishes to ensure the full integrity of each phase and each coating.

3.8 COMPLETION

Temporary connections

General: Remove temporary cleats on completion and restore the surface.

0342 LIGHT STEEL FRAMING

1 GENERAL

1.1 AIMS

Responsibilities

General: Provide light steel floor, wall and roof framing that is:

- In conformance with the performance criteria documented.
- Integrated into the building.
- Suitable for the fixing to it of flooring, linings and cladding.
- Independently designed and documented.
- Independently certified by a professional engineer for the design and the erected framing.

1.2 CROSS REFERENCES

General

General: Conform to the *General requirements* worksection.

1.3 STANDARDS

General

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

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

1.4 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of steel framing erected on site before lining or cladding.

1.5 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 and AS/NZS 4600 requirements for span, spacings and loadings.

Shop drawings

General: Submit shop detail drawings certified by a professional engineer stating that the design has been carried out in accordance with documented project and AS/NZS 4600 requirements for the configurations and loadings.

Roof trusses: Prepare drawings to show:

- 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.
- The method of assembly, connection, holding down and bracing.

Wall frames: If wall framing is to be pre-fabricated, prepare drawings to show:

- 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, holding down and bracing.

1.6 TOLERANCES

Walls

To NASH Standard, Appendix D.

2 EXECUTION

2.1 CONSTRUCTION GENERALLY

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: Remove swarf and other debris from cold-formed steel framing immediately.

Site work: Do not fabricate on site where welded connections are required.

Fastening

Type: Select from the following:

- Bolting.
- Self-drilling, self-tapping screws.
- Blind rivets.
- Proprietary clinching system.
- Structural adhesives.
- Welding.

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 storage, transport and erection.

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: Coatings which have been damaged by welding or other causes shall be restored. Thoroughly clean affected areas to base metal and coat with zinc rich organic primer .

Certification

General: For components for which independent design certification has been required, provide independent certification for the erected components confirming compliance with the design intent.

2.2 WALL FRAMING

Wall studs

General: Provide studs in single lengths without splices. Place a stud under, or within 40 mm from, each structural load point from roof or ceiling (except for openings). Provide multiple studs at points of concentrated load.

Maximum stud spacing: 600 mm.

Heads to openings

General: Provide lintels appropriate to load and span.

Additional support

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

Vermin barriers

General: Provide vermin barriers as follows:

- Brick veneer barrier: Close nail 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
General: Provide damp-proof courses under the bottom plate of stud walls built off slabs or masonry dwarf walls, 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 of damp-proofing at junctions of damp-proof courses, sarkings 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.

2.3 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.

Antiponding
Requirement: Fix appropriate members to the tops of framing at the rear of fascias, to prevent sagging of and ponding on the sarking.

Additional support
Provide a frame member behind every joint in fibre cement or plasterboard sheeting or lining.

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

2.4 TRUSSES

Fabrication
Assembly: Factory assemble trusses.

Supports for in roof services
General: If walkways, mechanical plant or other services are to be supported within the roof space, provide support.

Water container and heater: Where a water container or heater is located in the roof space, provide a support platform to AS/NZS 3500.4 clause 5.5.

Marking
General: Permanently mark each truss to show:

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

Installation
General: Fix to support structures, plumb to within H/200, where H is the height at the apex.

Support: Support trusses on 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 equivalence with AS 1684 requirements.

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

2.5 ROOF TRIM

Fascia, valley gutter and barge boards
Requirement: Supply and fix fascia, valley gutter and barge boards in accordance with the manufacturer's requirements.

2.6 COMPLETION

Cleaning
General: On completion of framing remove debris from any gaps between members.

0344b STEEL – HOT DIP GALVANIZED COATINGS

1 GENERAL

1.1 CROSS REFERENCES

General

General: Conform to the *General requirements* worksection.

Associated worksections

Associated worksections: Conform to the following:

- *Structural steel.*

1.2 STANDARDS

General

Coating: Comply with the requirements of AS/NZS 4680.

Durability: Conform to the requirements of AS 2309.

Metal finishing

Methods: To AS 1627.

Coating mass/thickness minima: To AS/NZS 4680.

1.3 INSPECTION

Notice

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

- Coating integrity, at the galvanizing plant.

1.4 SUBMISSIONS

Holes and lifting lugs

General: If holes and lifting lugs are required to facilitate handling, filling, venting and draining during galvanizing, submit details on size and location.

Detailing features

General: If design and fabrication features of the articles to be galvanized may lead to difficulties during galvanizing, identify these and submit details for improvement.

2 EXECUTION

2.1 GENERAL

Care

Dimensional change: If design and fabrication features of articles to be galvanized are likely to lead to dimensional change, identify these and submit proposals for its minimisation.

Embrittlement: If steel is susceptible to embrittlement, take due care in processing in order to avoid this.

Mechanical properties: Avoid mechanical damage. Ensure that mechanical properties of the base metal do not change.

Surface preparation

Surface contaminants and coatings generally: Chemical clean, then acid pickle.

Chemical cleaning: To AS 1627.1.

Acid pickling: To AS 1627.5.

- Acid: Hydrochloric.
- Inhibitor: Required.

Abrasive blast cleaning: To AS 1627.4.

- Abrasive: Chilled shot as per AS 1627.4, Table 2.
- Grade: Sa 2½ to AS 1627.9.
- Type: [complete/delete]

Components in contact with concrete
General: Chromate passivate.

Chromate passivation process: Dip in 0.15 – 0.2% sodium dichromate solution.

Drilling after completion of hot dip galvanizing
Repair: Prime drill hole surfaces to AS/NZS 3750.9 before the surfaces begin to corrode.

Coating
Threaded fasteners: To AS 1214.

Structural sections
Cold worked items: Except for hollow sections, anneal to 650°C before galvanizing.

Hollow sections: Provide seal plates with breather holes.

Surface finish
Coating quality: Coatings shall be continuous, adherent, smooth or evenly textured and uniform, free from defects detrimental to the end use of the finished article, such as lumps, blisters, gritty areas, uncoated spots, acids and black spots, dross and flux.

- Silicon killed steels: Dull grey is acceptable.

Friction-type bolted connections: Treat contact surfaces to achieve the required slip factor.

Contact surface preparation: See INGAL Specifier's Manual Volume 2, Section 4.

Slip factor test: To AS 4100 Appendix J.

Coating repair
Rejection: If uncoated surfaces or areas damaged by handling at the galvanizing plant exceed the limits specified for repair in AS/NZS 4680 clause 8, reject the galvanizing.

Extent and methods: To AS/NZS 4680 clause 8.

Preparation for architectural finishes
Coarse preparation: Remove spikes, and ensure edges are free from lumps and runs.

Light sweep blasting prior to painting: Required.

- Maximum zinc removal: 10 μm.
- Abrasive grade (range): 150 – 180 μm.
- Abrasive type - clean ilmenite or garnet.
- Blasting angle to surface: 45°.
- Blast pressure (maximum): 275 kPa.
- Distance of nozzle from surface (range): 350 – 400 mm.
- Nozzle type: 10 – 13 mm minimum diameter venturi type.

2.2 SITE WORK

Site welding
Grinding of edges: Permitted.

Weld areas: Reinstate coating.

Site coating reinstatement
Extent: Areas damaged by transport, site welding, site flame cutting, site handling, or erection.

- Method: Wire brush or mechanically buff the surface and apply organic zinc-rich primer in two coats each of 75 μm dry film thickness. Stipple edges of the primed area.
- Paint standard: To AS/NZS 3750.9.
- Surface preparation: To AS 1627.2 and Grade St 3 to AS 1627.9.

0345b STEEL – PROTECTIVE PAINT COATINGS

1 GENERAL

1.1 CROSS REFERENCES

General
General: Conform to the *General requirements* worksection.

1.2 STANDARDS

General
Surface preparation and coating: Conform to the recommendations of AS/NZS 2312.

Site testing of protective coatings
Test methods: To AS 3894.

1.3 INTERPRETATIONS

Abbreviations
General: For the purposes of this worksection the abbreviations given below apply.

DFT: Dry Film Thickness.

ITP: Inspection and Test Plan.

µm: micron (10^{-6}m).

Definitions
General: For the purposes of this worksection the definitions given in AS/NZS 2310 and those below apply.

- Coating contractor: The protective coatings application contractor conducting the on or off site coating application works.
- Coating manufacturer: The supplier and/or manufacturer of the protective coating materials used.
- ITP: A series of formal Inspection and Test Plans, prepared by the coating contractor to reflect the specific inspection and testing that will be carried out on the surface preparation, coating application and the record keeping tasks to be undertaken.
- MSDS: The formal Material Safety Data Sheet, prepared in accordance with Worksafe Australia's requirements and distributed by the coating manufacturer to provide information on the safe handling, storage, personal protective equipment requirements, use and disposal of a coating product.

1.4 INSPECTION

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

- Items after fabrication prior to commencing surface cleaning and preparation.
- Surfaces after preparation prior to application of first coating.
- Coating stages:
  . After application of primer or seal coats.
  . After application of each subsequent coat.

1.5 SUBMISSIONS

Detailing of structural steelwork
General: If design and fabrication features of the items to be coated may lead to difficulties, advise prior to commencing surface preparation.

Maintenance paint coating systems
Existing systems: Itemise areas of corrosion, damage, and other degradation.

Recoating systems: Supply coating systems for maintenance painting of previously coated items and structural elements, including surface preparation, to the **Protective paint coating schedule**.

Warranties
General: Submit details of the proposed warranty terms, form and period. If separate warranties are offered by the manufacturer and the applicator, ensure they are interlocking.

1.6 SAMPLES

Painting and coating colour
General: Submit a sample of the finished product for each different coating system.

Size of each sample: 400 x 400 mm.

Retention: Retain half of each sample for comparison during coating application.

2 PRODUCTS

2.1 GENERAL

General
Care: Handle, store, mix and apply all protective coatings strictly in accordance with the manufacturer's instructions.

Original containers: Provide coating products in unopened containers bearing the brand name and name of the manufacturer with a clearly legible batch number.

Ambient temperature range for storage: 15°C to 25°C.

Use-by-date: Use products with limited shelf life before their use-by-date unless written authorisation from the coating manufacturer's technical services section is provided.

Proprietary products
Requirement: Provide all products in the **Protective paint coating schedule** from the one manufacturer's supply.

3 EXECUTION

3.1 GENERAL

General
Product warnings: Conform to the requirements and recommendations of product MSDS's.

3.2 PROTECTION

Surroundings
Protection: Prevent the release of abrasive, overspray or paint waste debris to air, ground or to any watercourse. Repair or clean affected surrounding areas.

Damage: Prevent damage to other assets, services or equipment.

Contamination
Coating contamination: Prevent contamination of coatings contaminated from abrasive or other foreign matter.

Surfaces: Prevent contamination of coated surfaces which are not yet dry from blasting dust, abrasive or surface preparation debris.

Post application care
General: Provide protection to the coating against damage until all components are fully cured.

Care: Stack and handle all coated items using fabric slings or padded chains. Adopt soft packaging, carpet strips or other deformable materials between all coated items.

Water ponding: Stack coated items to prevent water ponding.

3.3 SURFACE PREPARATION

General
Defects: Remove all surface defects, including cracks, laminations, deep pitting, weld spatter slag, burrs, fins, sharp edges and other defects prior to the preparation of the surface to be coated.

Temporary welds: Grind flush temporary welds. Wherever possible avoid site welding. Weld porosity, skip or stich welds are unacceptable and shall be rejected as defective.

Edges: De-burr and round all edges to a 2 mm radius.

Surface contaminants: Remove surface contaminants such as oil, grease, dirt and loose particles, using an alkaline oil emulsifier/ degreaser to AS 1627.1.

Surface preparation: Prepare surfaces to the required finish to AS 1627 Parts 1, 2, 4, 5, 6 and 9.

Surface cleaning: Remove spent abrasive from the surface by blowing with clean, dry air and/or by vacuum cleaning.

Bolts: Provide washers at heads and nuts at replacement bolts.

Surface preparation for atmospheric steel

General: Comply with the following:

- Wash and degrease all surfaces to be coated in accordance with AS 1627.1 with a free-rinsing, alkaline detergent, in strict accordance with the manufacturer's written instructions and all safety warnings.
- Wash with fresh potable water and ensure that all soluble salts are removed in accordance with AS 3894.6 methods A and D.
- Grind all sharp edges with a power tool to a minimum radius of 2 mm.
- Power tool clean welds to AS 1627.2 Class 2 to remove roughness. Remove filings, preferably by vacuum or compressed air.
- Abrasive blast clean all steel surfaces to be painted in accordance with AS 1627.4 to visual standard AS 1627.9 Class 2.5 (equivalent to ISO 8501-1, Sa 2.5: Very Thorough Blast-Cleaning). Use a non-metallic medium that will generate a surface profile of 35 to 65 microns (as tested to AS 3894.5 Method A.).
- Commence application within 4 hours of abrasive blast cleaning or before surface becomes contaminated, otherwise repeat abrasive blasting step.
- Stripe coat welds, bolts, boltholes and all edges with primer before application of full primer coat nominated in the **Protective paint coating systems.**
- Prior to application, ensure that the surface is free of contaminants including oil, grease, dirt, dust, salt and any other deleterious materials that will interfere with coating performance.

Treatment of on site welding: If on site welding is performed, adopt the following procedures:

- Remove weld spatter.
- Power tool clean welds to AS 1627.2 Class 2 to remove roughness. Remove filings, preferably by vacuum or compressed air.
- Prime welds immediately with the nominated primer before contamination can reoccur. Ensure that the primer overlaps the sound adjacent coating by between 25 mm and 50 mm.
- Apply intermediate and topcoats over the primed welds to match the surrounding coating system, overlapping the sound adjacent coating by between 25 mm and 50 mm.

3.4 COATING APPLICATION

General

General: Conform to the Product Data Sheets.

Painting and coating colour: Verify all project finish colours with the retained samples.

Final surface preparation or coating application

Limits: If the following climatic/substrate conditions are present do not apply coating:

- The relative humidity is above 85%.
- The substrate temperature is less than 3C° above the dewpoint.
- The ambient air temperature is below 5°C or above 40°C.
- The substrate temperature is below 10°C or above 45°C.
- The surface to be coated is wet or damp.
- Where the full prime coat application cannot be carried out before the specified cleanliness of the surface deteriorates.
- For external or site applied coatings:
  . The weather is clearly deteriorating or unfavourable for application or curing.
  . High wind conditions.
- The surface preparation standard has not been achieved.

- The time between surface blast cleaning and the commencement of coating exceed 4 hours.
- Visual tarnishing or black spots develop on the surface of the metal.

Exception: Preliminary blast or other surface preparations may be performed in conditions that are outside the limits, providing the final surface preparation and all coating applications are undertaken under the limit conditions.

Prior coating: Prior to the spray application of each coating stripe coat by brush method all edges, welds, seams, rivets bolts and boltholes (including slots). Prime the underlying surfaces of replacement bolting, washers and nuts prior to installation.

Procedure: Conform to the order shown in the **Protective paint coating systems**.

Timing: Conform to the minimum and maximum recoat intervals and curing times.

Detail: Stripe coat all welds, bolt holes, corners and difficult to spray areas by brushing in with the prime coat and intermediate coat material prior to the full coating application.

Subsequent coats: Ensure that before any subsequent coating layer is applied, the surface condition of the preceding coat is complete and correct in all respects, including its DFT achievement, cleanliness, freedom from defects.

Correction: Correct any defect in a coating layer before the subsequent coating layer is applied.

Restrictions

General: Perform all painting under cover and/or protected from rain, condensation, dew, excessive wind, overspray or wind-blown dust.

Period: Continue protection where any of these conditions exist before the coating has cured to a sufficient degree so as to be unaffected.

3.5 COATING REPAIR

Repair of coating damage

Preparation: ‘Feather back’ by hand or machine sanding all leading edges of intact coating adjacent to the repair, to remove any sharp edge.

Surface contamination: Remove by dusting or blowing down before applying the first coat of paint.

Sequence: Apply the repair coating in the same sequence and manner as the original coating.

Areas damaged without exposing the primer: Wash with a proprietary detergent solution and rinse with fresh water, followed by abrading and ensuring that edges of sound paint are feathered. Then coat the area with the appropriate intermediate and finishing coat materials.

Areas damaged to the primer or steel surface: Blast clean to the original standard. Prepare at least 50 mm into the sound coating and to a further feathering zone of approximately 50 mm. Recoat with the specified system to restore the film thickness and integrity over the whole prepared surface including the feathered zone.

Aesthetic reinstatement: If required, repaint to a physical or discernable boundary line.

Defects: If corrosion pitting or areas of significant metal loss and defects are exposed by the blasting process, advise for inspection and have areas passed "fit for service" before proceeding with the coating system.

Timing: Apply the Protective Coating system within 4 hours of blast cleaning or in any case before visual tarnishing of the steel occurs.

3.6 COMPLETION

General

Joints: On completion, seal all joints and mating surfaces with a compatible polyurethane sealant.

Warranty

General: Provide the approved warranty.

3.7 PROTECTIVE PAINT COATING SYSTEMS

Generally

Application: Provide the protective paint coating system nominated in the **Protective paint coating requirement schedule.**

Polyurethane – AS/NZS 2312 Category A and B

Location	Primer	Second Coat	Third Coat
Interior non-decorative	75 µm Epoxy zinc phosphate conforming to AS/NZS 3750.9 Type 2	nil	nil
Internal decorative	75 µm Epoxy zinc phosphate conforming to AS/NZS 3750.13	50 µm High Solids Polyurethane Conforming to AS/NZS 3750.6	nil
External non-decorative conforming to AS/NZS 2312 PUR2	75 µm Epoxy Zinc phosphate conforming to AS/NZS 3750.13	50 µm High Solids Polyurethane Conforming to AS/NZS 3750.6	nil
External decorative conforming to AS/NZS 2312 PUR2	75 µm Epoxy zinc phosphate conforming to AS/NZS 3750.13	50 µm High Solids Polyurethane Conforming to AS 3750.1	nil

Polyurethane – AS/NZS 2312 Category C, D and E

Location	Primer	Second Coat	Third Coat
Interior non-decorative	75 µm Zinc rich epoxy conforming to AS/NZS 3750.9 Type 2	nil	nil
Internal decorative	75 µm Zinc rich epoxy conforming to AS 3750.9 Type 2	75 µm High Solids Polyurethane Conforming to AS/NZS 3750.6	nil
External non-decorative conforming to AS/NZS 2312 EHB4	75 µm Zinc rich epoxy conforming to AS/NZS 3750.9 Type 2	200 µm High-Build Epoxy MIO Conforming to AS/NZS 3750.14	nil
External decorative conforming to AS/NZS 2312 PUR 5	75 µm Zinc rich epoxy conforming to AS/NZS 3750.9 Type 2	200 µm High-Build Epoxy MIO Conforming to AS/NZS 3750.14	75 µm High Solids Polyurethane Conforming to AS/NZS 3750.6

Micaceous Iron Oxide – AS/NZS 2312 Category A and B

Location	Primer	Second Coat	Third Coat
Interior non-decorative	75 µm Alkyd zinc phosphate containing MIO and Aluminium pigment conforming to AS/NZS 3750.19 Type 2	nil	nil
Internal decorative	75 µm Alkyd zinc phosphate containing MIO and Aluminium pigment conforming to AS/NZS 3750.19 Type 2	50 µm Alkyd MIO finish Conforming to AS/NZS 3750.12	nil
External non-decorative conforming to AS/NZS 2312 ALK2	75 µm Alkyd zinc phosphate containing MIO and Aluminium pigment conforming to AS/NZS 3750.19 Type 2	Nil	nil

Location	Primer	Second Coat	Third Coat
External decorative conforming to AS/NZS 2312 ALK6	75 µm Alkyd zinc phosphate containing MIO and Aluminium pigment conforming to AS/NZS 3750.19 type 2	40 µm Alkyd MIO finish Conforming to AS/NZS 3750.12	40 µm Alkyd MIO finish Conforming to AS/NZS 3750.12

Micaceous Iron Oxide – AS/NZS 2312 Category C, D and E

Location	Primer	Second Coat	Third Coat
Interior non-decorative	75 µm Zinc rich epoxy conforming to AS/NZS 3750.9 Type 2	nil	nil
Internal decorative	75 µm Zinc rich epoxy conforming to AS/NZS 3750.9 Type 2	75 µm Epoxy MIO Conforming to AS/NZS 3750.14	nil
External non-decorative conforming to AS/NZS 2312 EHB4	75 µm Zinc rich epoxy conforming to AS/NZS 3750.9 Type 2	200 µm High-Build Epoxy MIO Conforming to AS/NZS 3750.14	nil
External decorative conforming to AS/NZS 2312 EHB6	75 µm Zinc rich epoxy conforming to AS/NZS 3750.9 Type 2	125 µm Epoxy MIO Conforming to AS/NZS 3750.14	125 µm Epoxy MIO Conforming to AS 3750.14

Epoxy Acrylic – AS/NZS 2312 Category A and B

Location	Primer	Second Coat	Third Coat
Interior non-decorative	75 µm Epoxy zinc phosphate conforming to AS/NZS 3750.13	nil	nil
Internal decorative	75 µm Epoxy zinc phosphate conforming to AS/NZS 3750.13	50 µm Epoxy Acrylic Conforming to AS/NZS 3750.5	nil
External non-decorative conforming to AS/NZS 2312 ACC2	75 µm Epoxy zinc phosphate conforming to AS/NZS 3750.13	50 µm Epoxy Acrylic Conforming to AS/NZS 3750.5	nil
External decorative conforming to AS/NZS 2312 ACC2	75 µm Epoxy zinc phosphate conforming to AS/NZS 3750.13	50 µm Epoxy Acrylic Conforming to AS/NZS 3750.5	nil

Epoxy Acrylic – AS/NZS 2312 Category C, D and E

Location	Primer	Second Coat	Third Coat
Interior non-decorative	75 µm Zinc rich epoxy conforming to AS/NZS 3750.9 Type 2	nil	nil
Internal decorative	75 µm Zinc rich epoxy conforming to AS/NZS 3750.9 Type 2	50 µm Epoxy Acrylic Conforming to AS/NZS 3750.5	nil
External non-decorative conforming to AS/NZS 2312 EHB4	75 µm Zinc rich epoxy conforming to AS/NZS 3750.9 Type 2	200 µm High-Build Epoxy MIO Conforming to AS/NZS 3750.14	nil
External decorative	75 µm Zinc rich epoxy	200 µm High-Build	50 µm Epoxy Acrylic

Location	Primer	Second Coat	Third Coat
conforming to AS/NZS 2312 ACC6	conforming to AS/NZS 3750.9 Type 2	Epoxy MIO Conforming to AS/NZS 3750.14	Conforming to AS/NZS 3750.5

Steel protection and decoration for green buildings - AS/NZS 2312 Category A and B

Location	Primer	Second Coat	Third Coat
Interior non-decorative	50 µm waterborne inorganic zinc conforming to AS/NZS 3750.15 Type 3 VOC < 15 g/lt	nil	nil
Internal decorative	50 µm waterborne inorganic zinc conforming to AS/NZS 3750.15 Type 3 VOC < 15 g/lt	40 µm waterborne acrylic Conforming to AS/NZS 3750.16 VOC < 75 g/lt	nil
External non-decorative conforming to AS/NZS 2312 IZS2	75 µm waterborne inorganic zinc conforming to AS/NZS 3750.15 Type 3 VOC < 15 g/lt	Nil	nil
External decorative exceeding AS/NZS 2312 IZS2	75 µm waterborne inorganic zinc conforming to AS/NZS 3750.15 Type 3 VOC < 15 g/lt	40 µm waterborne Acrylic Conforming to AS/NZS 3750.16 VOC < 75 g/lt	nil

Steel protection and decoration for 'green buildings' – AS/NZS 2312 Category C, D and E

Location	Primer	Second Coat	Third Coat
Interior non-decorative	50 µm waterborne inorganic zinc conforming to AS/NZS 3750.15 Type 3 VOC < 15 g/lt	nil	nil
Internal decorative	50 µm waterborne inorganic zinc conforming to AS/NZS 3750.15 Type 3 VOC < 15 g/lt	40 µm waterborne Acrylic Conforming to AS/NZS 3750.16 VOC < 75 g/lt	nil
External non-decorative conforming to AS/NZS 2312 IZS2	75 µm waterborne inorganic zinc conforming to AS/NZS 3750.15 Type 3 VOC < 15 g/lt	Nil	nil
External decorative exceeding AS/NZS 2312 IZS2	75 µm waterborne inorganic zinc conforming to AS/NZS 3750.15 Type 3 VOC < 15 g/lt	50 µm waterborne epoxy Conforming to AS/NZS 3750.13 VOC < 20 g/lt	40 µm waterborne Acrylic Conforming to AS/NZS 3750.16 VOC < 75 g/lt

Industrial silicone enamel – AS/NZS 2312 Category A and B

Location	Primer	Second Coat	Third Coat
Interior non-decorative	75 µm Alkyd zinc phosphate containing MIO and Aluminium pigment conforming to AS/NZS 3750.19 Type 2	nil	nil
Internal decorative	75 µm Alkyd zinc phosphate containing MIO and Aluminium pigment conforming to AS/NZS 3750.19 Type 2	50 µm Silicone Enamel Conforming to AS/NZS 3750.22	nil
External non-decorative conforming to AS/NZS 2312 ALK2	75 µm Alkyd zinc phosphate containing MIO and Aluminium pigment conforming to AS/NZS 3750.19 Type 2	Nil	nil
External decorative conforming to AS/NZS 2312 ALK4	75 µm Alkyd zinc phosphate containing MIO and Aluminium pigment conforming to AS/NZS 3750.19 Type 2	50 µm Silicone Enamel Conforming to AS/NZS 3750.22	nil

3.8 SCHEDULE TO AS/NZS 2312

Protective paint coating requirement schedule

Item	P1	P2	P3
Atmospheric corrosivity category to AS/NZS 2312			
Level/grids/reference			
Description			
System designation			
Chloride level testing			
Colour (AS 2700)			

0346 STRUCTURAL FIRE PROTECTION SYSTEMS

1 GENERAL

1.1 CROSS REFERENCES

General
General: Conform to the *General requirements* worksection.

Associated worksections
Associated worksections: Conform to the following:

- *Fire-stopping.*
- *Painting.*

1.2 STANDARDS

Structural fire protection systems
Materials and components: To BCA Specification A2.3.

Coatings for fire protection of building elements
Standard: AS 3784.1.

1.3 INTERPRETATION

Definition
FRL: Fire resistance level.

1.4 INSPECTION

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

- Substrate preparation completed.
- System support installed.
- Protective system installed.

1.5 SUBMISSIONS

Samples
General: Submit samples of each specified system thickness, density, colour, texture and support type.

Purpose: To be used as quality control references on site.

Substrate
Cleaning: Give notice of surface conditions which cannot be corrected by normal hand tool cleaning methods.

Test results
General: Submit results of thickness and density measurements.

Fire protection systems
Conformance: Submit evidence of conformance with the **Fire resistance level schedule**.

2 PRODUCTS

2.1 SPRAYED FIRE-RESISTANT MATERIALS

Base
General: Either perlite or vermiculite.

Standard: To BS EN 13055-1.

Fillers
General: Either hydrated lime or limestone.

Decorative and protective surface finishes
Compatibility: Conform to AS 3784.1, clause 6.3.

2.2 BOARD FIRE PROTECTION

Grade and thickness
FRL: Provide grade and thickness to achieve the required FRL.

System: Select from the following for building elements to achieve the required FRL or refer to a finishes schedule.

Mineral fibre board

2.3 COMPONENTS

Metal components generally
Corrosion protection: As nominated in the *General requirements* worksection.

Corrosion category: As nominated in the *Adhesives, sealants and fasteners* worksections.

Expanded metal lath
Conformance: To BCA Specification A 2.3 Annexure to Table 1: clause 1.6.

Aperture: 6 – 20 mm.

Self-furring expanded metal lath
Aperture: 6 – 20 mm.

Ribs: V-shaped at 100 – 150 mm intervals.

Steel wire mesh
Finish: Galvanized.

Welded rectangular mesh:

- Keying: 10 – 25 mm.
- Wire diameter: 0.7 – 1.6 mm.

Twisted hexagonal mesh:

- Conformance: To AS 2423.
- Mesh size: Nominally 25 – 32 mm.

Fixings
Screws: Deep threaded self-tapping screws, preferably with ribbed heads.

Staples: Steel wire staples.

Adhesive cement: Fixing cement nominated by the board manufacturer as being part of the complete protection system as tested.

2.4 BOARD FIRE PROTECTION

Fixing
System: Fix the following proprietary systems in accordance with the current written recommendations and instructions of the manufacturer or supplier to achieve the required FRL.

- Mineral fibre board.
- Vermiculite board.
- Gypsum plasterboard.

Joints
General: Make butt joints true and flush. For single layer construction provide 6 mm thick cover strip on the rear face of the joint. For multi-layer systems stagger the joints in the inner and outer layers at least 100 mm.

Access panels
Sealing: Seal joints to the manufacturer's or supplier's details.

2.5 COMPLETION SUBMISSIONS

Certification
Compliance: Submit a Certificate of compliance, in accordance with the recommendations of BCA A2.3.

0382 LIGHT TIMBER FRAMING

1 GENERAL

1.1 AIMS

Responsibilities

General: Provide light timber floor, wall and roof framing as follows:

- In conformance with the performance criteria nominated.
- Integrated into the building.
- Suitable for the fixing to it of flooring, linings and cladding.
- Independently designed and documented.
- Independently certified by a professional engineer for the design and the erected framing.

1.2 CROSS REFERENCES

General

General: Conform to the *General requirements* worksection.

1.3 STANDARDS

General

Framing: To AS 1684 Parts 2, 3 or 4, as appropriate.

Design: To AS 1720.1.

1.4 INSPECTION

Notice

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

- Prefabricated units before installation.
- Fabricated items before priming or water-repellent treatment.
- Bolts after final tightening.
- Timber work after erection but before it is covered.

1.5 SUBMISSIONS

Design

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

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

Floor and wall frame member sizes: Submit a schedule of proposed member sizes, certified as meeting stated project, AS 1684 and AS 1720.1 requirements for span, spacings and loadings.

Shop drawings

General: Submit shop detail drawings certified by a professional engineer stating that the design has been carried out in accordance with documented project, AS 1684 and AS 1720.1 requirements for the configurations and loadings. Also submit the following:

- Species and stress grade.
- Moisture content at time of manufacture.
- Preservative treatment, if any.

Roof trusses: Prepare drawings to show:

- 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.

Wall frames: If wall framing is to be pre-fabricated, prepare drawings to show:

- 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.

Materials

Identification:

- Certification: Submit a supplier's certificate (which may be included on an invoice or delivery docket) verifying that the timber complies with the specification, including moisture content.
- Inspection: Submit the inspection authority's certificate verifying that the timber complies with the specification.

Moisture content: Submit records of moisture content.

Preservative treatment

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

1.6 TOLERANCES

General

Walls: Conform to the **Walls tolerances table**.

Walls tolerances table

Property	Tolerance criteria: Permitted deviation (mm)
Generally: Verticality in 2000 mm	4
Generally: Flatness[1] in 2000 mm	3
Features[2]: Verticality in 2000 mm	2
Features: Horizontality in 2000 mm	2
1. Flatness: Measured under a straightedge laid in any direction on a plane surface.	
2. Features: Conspicuous horizontal or vertical lines including external corners, parapets, reveals, heads, sills.	

2 PRODUCTS

2.1 TIMBER

Structural timber

Natural durability ratings to AS 5604 Table A1 (minimum): Durability class 2, or preservative treated timber of equivalent durability.

Structural timber grading standards

Hardwood: To AS 2082.

Softwood: To AS 2858.

Mechanical stress grading: To AS/NZS 1748.

Machine proof-grading: To AS 3519.

Identification

Method: Identify timber using branding, certification or both.

Branding: Brand structural timber, under the authority of a recognised product certification program applicable to the product. Locate the brand mark on faces or edges which will be concealed in the works. Include the following data for timbers, not covered by branding provisions of Australian standards or regulations for which branding is required.

- Stress grade.
- Method of grading.
- 'Seasoned' or 's'.
- The certification mark of the product certification program.
- The applicable standard.

Recognised product certification programs:

- Pine framing: Plantation Timber Certification.

- Finger jointed structural timber: Plantation Timber Certification.

Certification:

Inspection: If neither branding nor certification is adopted, have an independent inspecting authority inspect the timber.

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2.2 SHEET PRODUCTS

Structural plywood
Standard: To AS/NZS 2269.0.

Bond: Type A.

Veneer quality to visible surfaces: C (minimum).

Identification:

- Method: Identify plywood using branding, certification or both.
- Branding: Brand structural plywood, under the authority of a recognised product certification program applicable to the product. Locate the brand mark on faces or edges which will be concealed in the works. Include the following data:
  . Stress grade.
  . Method of grading.
  . The certification mark of the product certification program.
  . The applicable standard.
- Recognised product certification programs:

Plywood: Engineered Wood Products Association of Australasia (EWPAA) Quality Control and Product Certification Scheme.

Blockboard: Engineered Wood Products Association of Australasia (EWPAA) Quality Control and

Wet-processed fibreboard (including hardboard)
Standard: To AS/NZS 1859.4.

Hardboard bracing
Classification: General-purpose.

2.3 COMPONENTS

Nail plated joined beams
Standard: To AS 4446.

Type: Proprietary composite member made up by butt and horizontally joining timber with pressed in nail plates.

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.

2.4 FINGER JOINTED STRUCTURAL TIMBER

General
Standard: To AS 5068.

3 EXECUTION

3.1 GENERAL

Protection from weather
General: 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: Locate joints only over supports:

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

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

Joist restraint:

- Unseasoned timber: If joist timber is unseasoned, the span ≥ 3000 mm, and there is no ceiling lining, provide solid blocking between each joist in rows at 1800 mm centres.
- Deep joists: If the joist depth:width ratio is ≥ 4, restrain joists at the ends of the joists over supports and at ≤ 1800 mm centres using either of following as appropriate:
  . Continuous trimming joists.
  . Solid blocking or herringbone strutting.
- Trimmers or blocking dimensions:
  . Depth: Joist depth less 25 mm.
  . Width: ≥ 25 mm.
- Herringbone strutting dimensions: ≥ 38 x 38 mm.

Tolerance
Floors: Construct floors to a tolerance of 5 mm maximum deviation in 3 mm measured under a straight edge placed anywhere on the surface in any direction.

3.3 WALL FRAMING

Wall framing
Bracing material: galvanised strip

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

Maximum spacing of noggings: 1350 mm centres.

Vermin barriers
General: Provide vermin barriers as follows:

- Brick veneer barrier: Close nail 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
General: Provide damp-proof courses under the bottom plate of stud walls built off slabs or masonry dwarf walls, 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 of damp-proofing at junctions of damp-proof courses, sarkings 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.

3.4 ROOF AND CEILING FRAMING

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

Nailing plates
General: Where timber joists, rafters or purlins bear on or into steel members, provide 50 mm thick nailing plates bolted to the steel member at 500 mm maximum centres.

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 nailed to each rafter.

Supports for water containers
General: Where 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/NZS 4200.2.

3.5 TRUSSES

Supports for water containers
General: Where a water container or heater is located in the roof space provide a support platform to AS/NZS 3500.4 clause 5.5.

Installation
Standard: To AS 4440.

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

Plumb: Within H/200, where H is the height.

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

3.6 COMPLETION

Tightening
General: Tighten bolts, screws and other fixings so that joints and anchorages are secure at practical completion.

0383 FLOORING AND DECKING

1 GENERAL

1.1 CROSS REFERENCES

General
General: Conform to the *General requirements* worksection.

1.2 STANDARD

General
Flooring and decking: To AS 1684 Parts 2, 3 or 4, as appropriate.

1.3 INSPECTION

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

- Substrate before laying flooring, decking or underlay.

1.4 TOLERANCES

Tolerances
General: Maximum deviation of the finished floor surface under a 3 m straight edge laid in any direction: 3 mm.

2 PRODUCTS

2.1 GENERAL

Storage
General: Deliver timber decking to site and store so that its moisture content is not adversely affected. Do not store on the sub-floor until the moisture content of the sub-floor is suitable for the installation of the floor.

2.2 DECKING

Recycled timber decking
Type or species: Jarrah

Source: from original building –stored at 83 Angove Street

Appearance: To be re-sawn and finished to eliminate weathering stains and expose fresh timber.

New timber decking
Standard:

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

3 EXECUTION

3.1 PREPARATION

Substrates
General: Ensure support members are in full lengths without splicing.

Flatness: < 3 mm deviation of the substrate under a 3 m straight edge laid in any direction with no abrupt variations greater than 1 mm over 250 mm.

Battens on concrete slabs
Framing fixed direct: Fix seasoned battens to the concrete slab in conformance with the **Battens table** so that their top surfaces are aligned.

- Spacing of fasteners: < 600 mm.

Moisture content
General: Do not commence installation of flooring unless:

- Concrete substrate: The moisture content of the concrete has been tested to AS/NZS 2455.1 Appendix C and values obtained as follows:
  . ≤ 5.5% when tested by the electrical resistance test.
  . ≤ 70% when tested by the hygrometer test.
- Plywood underlays or timber flooring products: The moisture content has been tested to AS 1080.1 and values obtained as follows:
  . Airconditioned buildings: 8 to 10%.
  . Intermittently heated buildings: 10 to 12.5%.
  . Unheated buildings: 12 to 15%.

Acclimatisation: If the timber moisture content values are not achieved acclimatise the timber flooring products.

Decking on steel joists

General: Screw fix seasoned battens to the steel joists in conformance with the **Battens table** so that their top surfaces are aligned.

Battens table

Decking timber (average species density)	**Standard**	**Flooring thickness**	**Batten spacing for flooring type**	
			Butt jointed	**End matched**
Cypress	AS 1810	20	450	450
Hardwood density 560 kg/m^3 or more	AS 2796.1	19	600	450
		25	600	450
		30	600	600
Hardwood density less than 560 kg/m^3	AS 2796.1	19	450	390
		25	600	450
		30	600	600
Softwood density 560 kg/m^3 or more	AS 4785.1	19	450	450
		35	600	450
Softwood density less than 560 kg/m^3	AS 4785.1	19	450	390
		35	600	450

3.2 FIXING

Adhesive

General: Use a urethane elastomer adhesive in addition to nails as follows:

- Continuously supported flooring: 4 mm beads at 300 mm spacing at right angles to run of flooring.
- Intermittently supported flooring: 6 mm bead along each joist or batten.

Nailing

General: Ensure the boards are in contact with the joists at the time of nailing, particularly where boards are machine nailed. Skew nail in a uniform pattern**.** If nails are to be less than 10 mm from ends of sheets or boards, pre-drill nail holes 0 – 1 mm undersize.

Sinking: Punch nails 3 mm below finished surfaces and fill the sinking flush with a material tinted to match the flooring which is compatible with the floor finish.

Top nailing: For boards more than 65 mm cover width, use two nails skewed 10° in opposite directions.

Platform flooring

Installation: Lay the length of the sheets at right angles to the supports. Stagger the end joints and locate them centrally over joists. If panels are not tongue and grooved provide noggings or trimmer joists to support the edges.

Sheet flooring fixing centres: Maximum 300 mm on each support.

- Fibre-cement flooring: Fix sheeting to the supports with adhesive and non-corrosive countersunk screws. Fill the screw holes with sealant before fixing. After fixing, stop the screw heads with the same sealant, finished slightly below the sheet surface.
- Particleboard and plywood flooring: Fix sheeting to the supports with adhesive and nail.

Membranes: If sheet flooring is the substrate for a wet area membrane or an external roofing membrane, fix with stainless steel countersunk head screws.

Timber decking

Installation: Lay in long lengths (minimum 3 spans) double nailed at each bearing with fixings finished flush. Stagger joints and make them over joists. Leave 4 mm between edges of boards.

Arrises: Chamfered or rounded.

Finishing: Apply the first 2 coats all round before fixing.

0411b WATERPROOFING – EXTERNAL AND TANKING

1 GENERAL

1.1 AIMS

Responsibilities
Conform to the **Selections**. Provide roof and deck waterproofing systems to substrates which are:

- Waterproof under five minutes duration rainfall of an intensity which has an average recurrence interval of 100 years.
- Graded to falls to dispose of stormwater without ponding above the depth of lapped seams.
- Able to accommodate anticipated building movements.
- Able to accommodate its own shrinkage over the warranty life of the roofing system.

1.2 CROSS REFERENCES

General
Conform to the *General requirements* worksection.

1.3 INTERPRETATIONS

Definitions
General: For the purposes of this worksection the definitions given below apply.

- Substrates: The surfaces on which membrane systems are laid.
- Bitumen: A viscous material from the distillation of crude oil comprising complex hydrocarbons, which is soluble in carbon disulphide, softens when it is heated, is waterproof and has good powers of adhesion. It is produced as a refined by-product of oil.
  - . SBS bitumen: Bitumen modified with Styrene Butadiene Styrene, a thermoplastic rubber, that undergoes a phase inversion at elevated temperature and converts to an elastomeric material. The membrane is reinforced with fibreglass or non-woven polyester (NWP).
  - . APP bitumen: Bitumen modified with Atactic (meaning non-crystalline or amorphous) polypropylene wax to form a plastomeric sheet. The membrane is reinforced with fibreglass or non-woven polyester (NWP).
- Bond breakers: Layers, which prevent membranes from bonding to the substrates.
- Membranes: Impervious barriers to liquid water which may be:
  - . Liquid applied: Membranes applied in liquid or gel form and air cured to form a seamless film.
  - . Sheet applied: Membranes applied in sheet form with joints lapped and bonded.
- Membrane systems: Combinations of membranes, flashings, drainage and accessories which form waterproof barriers and which may be:
  - . Loose-laid.
  - . Bonded to substrates fully or partially.
  - . Fixed mechanically to substrates.
  - . Protected either by ballast or an external insulation, also known as inverted membrane roof assembly (IRMA), or by both.
  - . Trafficable, which may be for maintenance, pedestrians or vehicles.
- Plasticised PVC: Rigid PVC made flexible with plasticisers to form a plastic sheet membrane (vinyl).
- Seamless membranes: Membranes applied in liquid or gel form and air cured to form a seamless film.
- Slip sheets: Are used to isolate the membrane system from the supporting substrate or from the topping or mortar bedding above and are sometimes referred to as cleavage membranes and are similar to bond breakers. The most common material is polyethylene sheeting.

1.4 STANDARDS

Stormwater drainage
Standard: To AS/NZS 3500.3.

1.5 INSPECTION

Notice

Inspection: Give notice so that inspection may be made as follows:

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

1.6 SUBMISSIONS

Execution records

Placing records: Photographically record the application of membranes and information as follows:

- Date.
- Portion of work.
- Substrate preparation.
- Weather during application and curing.
- Protection provided from traffic and weather.

2 PRODUCTS

2.1 MEMBRANES

Membrane systems

To be proprietary membrane systems having one of the following certifying that the system is suitable for the intended external waterproofing, as follows:

- A current Australian Building Product and Systems Certification Scheme certificate issued by ABCB (Australian Building Codes Board).
- A current appraisal report issued by either CSIRO Building Products and Systems Appraisals.
- A current BRANZ Appraisal Certificate.

2.2 ACCESSORIES

Internal roof outlets for membrane roof

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

Flashing

as required – to be certiified and warrantied by installer

3 EXECUTION

3.1 PREPARATION

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 all traces of a concrete curing compound if used.
- Remove deleterious and loose material.
- Leave the surface free of contaminates, clean and dust free.

Moisture content

Concrete substrates: Cure for > 21 days.

Moisture content: Verify that the moisture content of the substrate is compatible with the water vapour transmission rate of the membrane system by testing to AS/NZS 2455.1 Appendix B.

Test type: select from the following:

- Hygrometer test: Seal a hygrometer to the substrate for > 16 hours and measure the relative humidity of the air between the instrument and the slab.
- Electrical resistance test: Connect a resistance meter to the slab and read the moisture content.

Falls
Verify that falls in substrates are >1.5%.

Joints and fillets
Internal corners: Provide 45° fillets 50 x 50 mm.

External corners: Round or arris edges.

Movement control joints: Prepare all substrate joints to suit the membrane system.

Priming
If required, prime the substrates with compatible primers to ensure adhesion of membrane systems.

3.2 APPLICATION

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

Sheet joints
Bituminous sheet membranes:

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

Synthetic rubber membranes:

- Factory–vulcanized laps > 40 mm.
- Field side laps > 50 mm for side laps.
- Field end-laps > 100 mm for end laps.

PVC (Polyvinyl chloride) membranes:

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

Curing of liquid applied systems
General: To the manufacturers' instructions.

Movement control joints
General: Locate over movement control joints in the substructure.

Fillets and bond breakers: Provide of sufficient dimension to allow the membrane to accommodate the movement.

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

Membrane terminations
Edge protection: 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 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.

Membrane vertical penetrations

Pipes, ducts, and vents: Provide separate sleeves for all pipes, ducts, and vents and have them fixed to the substrate.

Membrane horizontal penetrations

Sleeves: Provide a flexible flange for all penetrations, bonded to the penetration and to the membrane.

Balcony membrane about doors and windows

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

Membrane upturn:

- Sheltered areas: 40 mm above the finished external floor surface or overflow level, whichever is the higher.
- Exposed areas: 150 mm upturn from the finished external floor level or overflow level, whichever is the higher.

Membrane around skylights and hatches

Install membranes to upstands prior to the installation of the skylight or hatch.

Upstand height above roof surface: 75mm minmum

Overlaying finishes on membranes

Compatibility: If a membrane is to be overlayed with another system such as tiles, pavers, ballast, insulation, soil, and the like, 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 movement joints in the topping or bedding mortar to reduce the movement over the membrane.

Double 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, ensure compatibility with the membrane.

3.3 FLOOD TEST

General

Application: Perform a flood test prior to the installation of surface finishes.

Set-up:

- Measure for dryness the wall/floor junction of adjacent spaces to the slab soffit below using the electrical resistance test.
- Record the result for each area.
- Dam the access openings and seal drainage outlets to allow 50 mm water level but no higher than 25 mm below the weir level of the perimeter flashings.
- Provide temporary overflows of the same capacity as the roof outlets to maintain the flood level.
- Fill space with clean water and leave overnight.

Evaluation:

- Make a visual inspection of the wall/floor junction of adjacent spaces and of the slab soffit below for obvious water or moisture.
- Test the same areas for dryness using the moisture meter, and compare the results to the measurements taken prior to flooding.

Compliance:

- Evidence of water from the visual test: Failure.
- No visual evidence of water: Proceed with the moisture meter test.
- Increase in test results before and after flooding: Failure.

Records: Submit records of all flood tests.

3.4 DRAINAGE CELL PANELS

Walls
Location: Planter boxes on level 3

Planter bases
Filter: Geotextile fabric on drainage cell

3.5 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 – COMBINED

1 GENERAL

1.1 AIMS

Responsibilities
Provide a roofing system and associated work which:
- Satisfies the product performance requirements.

1.2 CROSS REFERENCES

General
General: Conform to the *General requirements* worksection.

1.3 PERFORMANCE CRITERIA

Ambient climatic conditions
Design rainfall intensity (mm/h) to AS/NZS 3500.3

1.4 INSPECTION

Notice
Inspection: Give sufficient notice so that inspection may be made of:
- Roof supports.
- Those parts of the roofing, sarking, vapour barrier, insulation and roof plumbing installation which will be covered up or concealed.

1.5 SUBMISSIONS

Tests
Submit results of type tests as follows:
- Metal roofing general tests: Roof sheeting and fastenings to AS 1562.1 for resistance to concentrated load and to wind pressure.
- Metal roofing in cyclonic regions AS/NZS 1170.2: Roof sheeting and fastenings to AS 1562.1 clause 5.6.
- Fibre cement roofing: Type test the roof sheeting and fixings to AS/NZS 1562.2 for resistance to wind forces.

Internal downpipes: Submit results of site tests to each stack hydrostatically in stages 2 storeys high for two hours. Remedy defects and retest if necessary.

Samples
Submit samples of the following showing the range of variation available:
- Sheet metal finishes showing the range of variation available.
- Custom profiled flashings and cappings.
- Tiles.
- Slates.
- Bedding and pointing mortar.
- Shingles or shakes.
- Pre weathered finish to sheet metal.

Installation
Seamed roofing: Submit evidence of experience with non-ferrous roof installation.

Shop drawings
General: Submit shop drawings showing the following information:trusses and all rpe formed members – independent engineer to “sigh off” any detail changes

2 PRODUCTS

2.1 COMPONENTS

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

Fastenings to timber battens: Provide fastenings just long enough to penetrate the thickness of the batten without piercing the underside.

Profiled fillers
Provide: Purpose-made closed cell polyethylene foam profiled to match the roofing profile.

Locate profiled fillers under flashings to:

- Ridges.
- Eaves.
- Lapped joints in roof sheeting.

Safety mesh
Standard: To AS/NZS 4389.

2.2 SHEET METAL ROOFING

Standards
Design and installation: To AS 1562.1.

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

Roofing product
Product brand: Kingspan

Profile: KS100W (trapezoidal roof sheet)

Product material type: insulated sandwich panel roofing

Colour: to match zinc

Location: rear roof and top roof (refer plans)

Product brand: VM Zinc

Profile: Standing Seam

Product material type: Zinc cladding on ly substrate

Colour: Pigmento Green

Location: Front elevation

2.3 SEAMED SHEET METAL ROOFING

Type
Seamed sheet metal roofing laid on flush finished continuous plywood decking over an underlayer and separation layer.

Plywood decking
Grading: DD to AS/NZS 2269.0, Bond Type A.

Thickness: 19 mm.

Underlayer
Self-adhesive, rubberized asphalt/polyethylene waterproofing membrane.

Separation layer
Fire resistant mat of a nylon core of fused entangled filaments.

Roof sheeting
Product brand: VM Zinc

Profile: Standing Seam

Product material type: Zinc cladding on ly substrate

Colour: Pigmento Green

Location: Front elevation

Profile: Roll form sheeting into pan profiles for forming into seamed joints.

Accessories
Solder: 40% tin, 60% lead soft solder.

Flux: Z-04-S.

Sealant: 100% natural cure non-acid based silicone rubber to match roofing.

Fixings: Provide starter clips, fixing clips and fastenings as recommended by the roofing system supplier.

2.4 ROOF PLUMBING

General
Standard: To AS/NZS 3500.3.

General: Provide the flashings, cappings, gutters, rainwater heads, outlets and downpipes necessary to complete the roof system.

Materials
Metal rainwater goods: To AS/NZS 2179.1.

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

Proprietary flashings and cappings
Standard: To AS/NZS 2904.

Material and colour: Match roof sheeting.

Rib notching: Match roof sheeting.

Proprietary ridge and barge cappings
Material and colour: Match roof sheeting.

Eaves gutters
Material and colour: Match roof sheeting.

Matching fascia/barge: If the selected eaves gutter is a proprietary high front pattern forming part of a combined system of gutter, fascia and barge, provide the matching proprietary fascias and barge cappings to roof verges and edges.

2.5 ROOF ACCESS SAFETY SYSTEM

Description
General: A complete proprietary roof access safety system.

3 EXECUTION

3.1 INSTALLATION

Protection
General: Keep the roofing and rainwater system free of debris and loose material during construction, and leave them clean and unobstructed on completion. Repair damage to the roofing and rainwater system.

Touch up: If it is necessary to touch up minor damage to prepainted metal roofing, do not overspray onto undamaged surfaces.

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

Pan type sheets
Removal: Capable of being de-indexed and removed without damage.

Curved corrugated sheet
General: Form by rolling from material recommended for curving or bullnosing. Minimise crimping or creasing across the face of the sheet. Trim off crimped or creased edges and ends.

Metal separation
Prevent direct contact between incompatible metals, and between green hardwood or chemically treated timber and aluminium or coated steel, by either:

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

Tolerances
Conform to the **Tolerances table**.

Tolerances table

Property	Tolerance criteria: Permitted deviation (mm)
Spacing of supporting members	± 5 mm on the nominated support member spacing
Vertical or horizontal misalignment at the abutting ends of sheets	≤ 2 mm
Tops of supporting members in a plane parallel to the nominated roof slope	≤ 7 mm smooth deviation per metre length of supporting member

3.2 SHEET METAL ROOFING

Roof sheet installation
Eaves: Treat ends of sheets as follows:
- Generally: Close off ribs at tops and bottoms of sheets by mechanical means or with purpose-made fillers or end caps.
- At gutters: Project sheets 50 mm into gutters.

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

Accessories: Provide material with the same finish as roofing sheets.

3.3 BUILDING ELEMENTS

Ridges and eaves
Treat ends of sheets 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 where necessary.
- Close off ridges with purpose-made ridge fillers of closed cell polyethylene.

Ridge and barge
Capping: Finish off along ridge and verge lines with purpose-made ridge capping or barge rolls.

Sprung curved ridge
General: Lay the roofing sheets in single lengths from eaves to eaves by naturally curving the sheets over the ridge.

Ridge: Seal side laps at the ridge and extend the sealant to the point where the roof pitch equals the recommended pitch of the roofing profile.

End laps
General: Where end laps are unavoidable, and the sheet profile is not suitable for interlocking or contact end laps, construct a stepped type lap.

3.4 TILING

Installation
Standard: To AS 2050.

Setting out: Set out the roof to give an even tile gauge in each course, with full or saw cut tiles at verges.

Bedding and pointing: Bed and point accessories, including ridges, hips and verges, in coloured mortar.
- Colour: To match the tiles and accessories.

Tile verge: Finish the verge with cover tiles pointed to the roof tiles. Screw fix to the barge board with round head galvanized screws.

Pointed verge: Bed and point tiles on 100 x 5 mm fibre cement pointing strip.

3.5 SLATE ROOFING

Installation
Standard: To AS 4597.

3.6 FIBRE CEMENT CORRUGATED ROOFING

Installation
Standard: To AS/NZS 1562.2.

3.7 FIBRE CEMENT SHINGLE ROOFING

Installation
Standard: To AS 4597.

Bottom course: Overhang 50 mm into eaves gutter.

Verges: Overlap barge boards minimum 35 mm.

3.8 TIMBER SHINGLE AND SHAKES ROOFING

Installation
Timber shingles: To AS 4597.

3.9 SEAMED SHEET METAL ROOFING

Plywood decking
Installation: Lay the length of the sheets at right angles to the supports. Stagger the end joints and locate them centrally over framing members. If panels are not tongue and grooved provide noggings or trimmer joists to support the edges.

Fixing, 300 mm centres to each support:

- Timber: Adhesive and nail.
- Steel: Metal coated self drilling/tapping screws with the heads finishing below the surface.

Movement control joints: 12 mm gap at abutting building elements.

Fabrication
Off site: Basic trays.

Minimum bending radius: 1.75 mm.

Fixing
Fix pans to the deck with concealed clips at 250 mm maximum centres.

Seams
Roof pitch< 25°: Double standing seam.

Walls and roof pitches > 25°: Roll cap seam.

Method: Mechanically form and welt seal in situ using a self propelled seaming machine, to stand 25 mm high on completion. Dress seams flat at gutters, ridges and hips, and fold both pan and seam down into gutters and up to form stop ends at ridges and hips.

Ridge and hip capping
Lock welt to the upturn of the roofing.

3.10 ROOF PLUMBING

Jointing sheet metal rainwater goods
Butt joints: Make joints over a backing strip of the same material.

Soldered joints: Do not solder aluminium or aluminium/zinc-coated steel.

Sealing: Seal fasteners and mechanically fastened joints. Fill the holes of blind rivets with silicone sealant.

Flashings
Installation: Flash roof junctions, upstands, abutments and projections through the roof. Preform to required shapes where possible. Notch, scribe, flute or dress down as necessary to follow the profile of adjacent surfaces. Mitre angles and lap joints 150 mm in running lengths. Provide matching expansion joints at 6 m maximum intervals.

Upstands: Flash projections above or through the roof with two part flashings, consisting of a base flashing and a cover 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.

- 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.
- In concrete: Turn 25 mm into joints or grooves, wedge at 200 mm centres with compatible material and point up.

Fixing to masonry or concrete: Step in courses to the roof slope. Interleave with damp proof course, if any.

Fixing to pipes: Solder, or seal with neutral cured silicone rubber and either of the following:

- Secure with a clamping ring.
- Provide a proprietary flexible clamping shoe with attached metal surround flashing.

Gutters

General: Prefabricate box gutters. Form stop ends, downpipe nozzles, bends and returns. Dress downpipe nozzles into outlets. Provide overflows to prevent back-flooding.

Gutter and sump support: Provide framing and lining to support valley gutters, box gutters and sumps. Line the whole area under the gutters and sumps.

Valley gutters: Profile to suit the valley boarding. Turn back both edges 180° x 6 mm radius. Nail or screw to the valley boarding at the top end to prevent the gutter creeping downwards.

Expansion joints: Provide expansion joints in guttering longer than 30 m:

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.

Access cover: Provide a removable watertight access cover at the foot of each downpipe stack.

Downpipe support: Provide supports and fixings for downpipes.

Internal downpipes

Access: Provide access openings as follows:

- At each junction and bend.
- At the foot of each stack.
- At every second floor level.

Sound insulation: Mineral fibre pipe insulation 50 mm thick, spirally bound on with 1.5 mm wire at 150 mm pitch.

Building in: Where pipes are built into masonry or concrete, spiral wrap the pipe (and insulation, if any) with building paper.

3.11 ROOF ACCESS SAFETY SYSTEM

Shop drawings

Submit shop drawings noting the following:

- Evidence of compliance with the relevant WorkCover authority.
- Certification from a professional engineer to confirm the proposed structural assembly will be stable and safe.
- Roof plan and layout of all elements of the system.

3.12 COMPLETION

Warranties

Roofing materials: Submit the manufacturer’s published product warranties.

Maintenance manual

On completion submit a manual of recommendations from the roof manufacturer or supplier for the maintenance of the roofing system including, frequency of inspection and recommended methods of access, inspection, cleaning, repair and replacement.

0431b CLADDING – COMBINED

1 GENERAL

1.1 AIMS

Responsibilities
General: Provide lightweight external wall cladding and associated work which is as follows:
- Satisfies the product performance requirements.

1.2 CROSS REFERENCES

General
General: Conform to the *General requirements* worksection.

1.3 INSPECTION

Notice
Inspection: Give sufficient notice so that the framing, sarking, vapour barrier and insulation may be inspected before they are covered up or concealed.

2 PRODUCTS

2.1 SHEET METAL CLADDING

General
Type: Provide a proprietary system of preformed sheet and purpose-made accessories.
Pre-painted and organic film/metal laminate products: To AS/NZS 2728.

3 EXECUTION

3.1 TOLERANCES

Tolerances
Conform to the following to the **Tolerances table**:

Tolerances table

Property	Tolerance criteria: Permitted deviation (mm)
Spacing of supporting members	± 5 mm on the nominated support member spacing
Vertical or horizontal misalignment at the abutting ends of cladding	≤ 2 mm

3.2 CONSTRUCTION GENERALLY

Substrates or framing
Before fixing cladding check and, if necessary, adjust the alignment of substrates or framing.

Fixing
Nail to timber framing, screw to steel framing.

Accessories and trim
Provide accessories and trim necessary to complete the installation.

Fixing eaves and soffit lining
Nailing: 150 mm centres to bearers at maximum 450 mm centres.

Metal separation
Prevent direct contact between incompatible metals, and between green hardwood or chemically treated timber and aluminium or coated steel, by either:
- Applying an anti-corrosion, low moisture transmission coating to contact surfaces.
- Inserting a separation layer.

3.3 PROPRIETARY SYSTEMS OR PRODUCTS

Fixing
Fix the following proprietary systems in accordance with the current written recommendations and instructions of the manufacturer or supplier:

- Hardboard plank cladding.
- Fibre cement plank cladding.
- Composite sandwich panels.
- Fibre cement cladding.
- Compressed fibre cement cladding.
- Complete cladding systems.
- Sandwich panel cladding systems.
- Louvre sunscreens.

3.4 SHEET METAL CLADDING

Sheet installation
Accessories: Provide material with the same finish as roofing sheets.

Corner flashing
Finish off at corners with purpose-made folded flashing strips.

0451b WINDOWS AND GLAZED DOORS

1 GENERAL

1.1 AIMS

Responsibilities
Conform to the **Selections**.

Maintenance
Product design: Provide windows with sashes capable of being opened to satisfy the documented maintenance requirements.

1.2 CROSS REFERENCES

General
General: Conform to the *General requirements* worksection.

1.3 STANDARDS

General
Selection and installation: To AS 2047.

Glazing
Glass type and thickness: To AS 1288, where no glass type or thickness is nominated.

Materials and installation: To AS 1288.

Quality requirements for cut-to-size and processed glass: To AS/NZS 4667.

Terminology for work on glass: To AS/NZS 4668.

1.4 INSPECTION

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

- Openings prepared to receive windows (where windows are to be installed in prepared openings).
- Fabricated window assemblies at the factory ready for delivery to the site.
- Fabricated window assemblies delivered to the site, before installation.
- Commencement of window installation.

1.5 SUBMISSIONS

Samples
Submit samples of window and door framing as follows:

- Accessory and hardware items documented descriptively or by performance (i.e. not documented as proprietary items) including locks, latches, handles, catches, sash operators, anchor brackets and attachments, masonry anchors and weather seals (pile or extruded).
- Colour samples of prefinished production material (e.g. anodised or organic coated extrusions and sheet) showing the limits of the range of variation in the selected colour.
- Joints made by proposed techniques.
- Sections proposed to be used for frames, sashes, louvres and slats.
- Label each sample, giving the Series code reference and date of manufacture.

Submit samples of glazing materials, each at least 200 x 200 mm, showing documented visual properties and the range of variation, if any, for each of the following types of glass or glazing plastics:

- Tinted or coloured glass or glazing plastics.
- Surface modified or surface coated glass.
- Patterned or obscured glass or glazing plastics.
- Ceramic coated glass.
- Wired glass.
- Mirror glass.

Shop drawings
Submit shop drawings showing the following information:
- Full size sections of members.
- Hardware, fittings and accessories including fixing details.
- Junctions and trim to adjoining surfaces.
- Layout (sectional plan and elevation) of the window assembly.
- Lubrication requirements.
- Methods of assembly.
- Methods of installation, including fixing, caulking and flashing.
- Provision for vertical and horizontal expansion.
- Method of glazing, including the following:
  . Rebate depth.
  . Edge restraint.
  . Clearances and tolerances.
  . Glazing gaskets and sealant beads.

Certification: Submit an engineers' certificate confirming compliance with AS 2047.

Subcontractors
General: Submit names and contact details of proposed manufacturers and installers. Have windows and glazed doors installed by their manufacturer or by a subcontractor recommended by the manufacturer.

Type-test reports
General: Submit type-test reports verifying conformance to AS 2047 and the **Window and glazed door performance schedule** as follows:
- Fire resistance level: To AS 1530.4.
- Weighted sound reduction index: To AS/NZS 1276.1 or AS/NZS ISO 717.1.

Opacified glass
General: Submit a statement by the manufacturer certifying that the proposed method of opacifying the glass will not be detrimental to the glass or detract in any way from the glass product warranty.

2 PRODUCTS

2.1 GENERAL

Standards
Flashings: To AS/NZS 2904.

Aluminium extrusions: To AS/NZS 1866.

2.2 GLASS

Glass types and quality
Standard: To AS/NZS 4667.

Glazing plastics
General: Free from surface abrasions, and warranted by the manufacturer for 10 years against yellowing or other colour change, loss of strength and impact resistance, and general deterioration.

Safety glasses
Standard: To AS/NZS 2208.

Certification: Required.

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

***

Type: Grade A when used in curtain walls.

Heat soaking: Required for toughened glass in curtain walls.

Ceramic coated glass
Heat strengthened or toughened glass with a coloured ceramic coating fused to and made an integral part of the surface: To ASTM C1048, Condition B.

Opacified glass
Glass with an opacifier permanently bonded to the inner face.

Unacceptable blemishes in heat-treated flat glass (including tinted and coated glass)
Standard: To AS/NZS 4667.

Insulating glass units (IGU's)
Selection and installation: To AS/NZS 4666.

2.3 GLAZING MATERIALS

General
Glazing materials (including putty, glazing compounds, sealants, gaskets, glazing tapes, spacing strips, spacing tapes, spacers, setting blocks and compression wedges): Appropriate for the conditions of application and the required performance.

Jointing materials
Provide recommended jointing and pointing materials which are compatible with each other and with the contact surfaces and non staining to finished surfaces. Do not provide bituminous materials on absorbent surfaces.

Priming
Apply the recommended primer to the surfaces in contact with sealant materials.

Movement joints
Depth of elastomeric sealant: One half the joint width, or 6 mm, whichever is the greater.

Foamed materials (in compressible fillers and backing rods): Closed-cell or impregnated types which do not absorb water.

Bond breaking: Provide backing rods, and other back-up materials for sealants, which do not adhere to the sealant.

2.4 GLASS IDENTIFICATION

Safety glazing materials
Identify each piece or panel, to AS 1288.

Noise reducing glazed assemblies
Label each panel with a legible non-permanent mark, self-destroying when removed, stating and certifying the R_w rating, and identifying the testing authority. Remove when directed.

2.5 LOUVRE WINDOW ASSEMBLIES

General
Description: 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
Description: 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.

2.6 VENTILATING LOUVRE ASSEMBLIES

General
Description: Provide metal 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.

Expansion joints
Provide for expansion and contraction in continuous sections (e.g. continuous louvres, interlocking mullions) at spacings not exceeding those recommended by the manufacturer, or 6 m, whichever is the lesser.

Adjustable louvres
Description: 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.

Framed adjustable louvres
Description: Provide louvre blades beaded into steel blade surround frames (sash) pivoted to pressed steel main frames, linked together in banks, each bank controlled by a proprietary sash operator.

Fixed metal louvres
Provide metal louvre blades mounted in a metal surround frame or subframe, installed as for metal window installations.

Screens
Provide metallic coated steel wire or UPVC mesh screens behind louvres to prevent the entry of vermin, birds, rodents and wind blown leaves and papers.

2.7 INSECT SCREENS

Aluminium framed 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.

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.

2.8 BUSHFIRE SCREENS AND SEALS

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

Standard: To AS 3959.

2.9 SECURITY WINDOW GRILLES

General
Description: Provide proprietary metal security grille screens, or operable screen and frame, fixed to the building structure with tamper resistant fastenings.

Security window grilles: To AS 5040.

Installation: To AS 5039.

2.10 ALUMINIUM FRAME FINISHES

Powder coatings
Standard: To AS 3715.

Grade: Architectural coating.

3 EXECUTION

3.1 GLASS PROCESSING

General

Processing: Perform required processes on glass, including cutting, obscuring, silvering and bending. Form necessary holes, including for fixings, equipment, access holes and speaking holes. Process exposed glass edges to a finish not inferior to ground arrised.

3.2 INSTALLATION

Glazing

General: Install the glass so that:

- Each piece is held firmly in place by permanent means which enable it to withstand the normal loadings and ambient conditions at its location without distortion or damage to glass and glazing materials.
- Building movements are not transferred to the glass.
- External glazing is watertight and airtight.

Temporary marking: Use a method which does not harm the glass. Remove marking on completion.

Toughened glass: Do not cut, work, or permanently mark after toughening. Use installation methods which prevent the glass making direct contact with metals or other non-resilient materials.

Heat absorbing glass: In locations exposed to direct sunlight, provide wheel cut edges free from damage or blemishes, with minimum feather.

Preglazing

Window assemblies and glazed doors: Supply inclusive of glazing, shop preglazed.

Site glazing

External timber framed glazing: Glaze with putty.

Windows and glazed doors

General: Install windows and glazed doors so that the frames:

- Are plumb, level, straight and true within acceptable building tolerances.
- Are fixed or anchored to the building structure in conformance with the wind action loading requirements.
- Will not carry any building loads, including loads caused by structural deflection or shortening.
- Allow for thermal movement.

Weatherproofing

Flashing and weatherings: Install flashings, weather bars, drips, storm moulds, caulking and pointing so that water is prevented from penetrating the building between the window frame and the building structure under the prevailing service conditions, including normal structural movement of the building.

Fixing

Fasteners and fastener spacing: Conform to the recommendations of the manufacturer.

Fasteners: Conceal fasteners.

Packing: Pack behind fixing points with durable full width packing.

Prepared masonry openings: If fixing of timber windows to prepared anchorages needs fastening from the frame face, sink the fastener heads below the surface and fill the sinking flush with a material compatible with the surface finish.

Joints

General: Make accurately fitted tight joints so that neither fasteners nor fixing devices such as pins, screws, adhesives and pressure indentations are visible on exposed surfaces.

Sealants: If priming is recommended, prime surfaces in contact with jointing materials. If frames are powder coated, apply a neutral cure sealant.

Operation

General: Ensure moving parts operate freely and smoothly, without binding or sticking, at correct tensions or operating forces and are lubricated.

Protection

Removal: Remove temporary protection measures from the following:

- Contact mating surfaces before joining up.
- Exposed surfaces.

In situ touch up
Polyester or fluoropolymer coatings: Contact supplier for approval to apply touch up products otherwise replace damaged material.

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.

3.3 LOUVRE ASSEMBLIES

Installation
General: Screw fix stiles and mullions to the building structure. Provide weather strips to heads and sills.

Framed adjustable louvres
Installation: Screw fix the main frame to the building structure with monel or stainless steel screws or masonry anchors of the type recommended by the louvre manufacturer.

Metal louvres
General: Provide metal louvre blades mounted in a metal surround frame or subframe, installed as for metal window installations.

3.4 COMPLETION

Trade clean
Method: Clean with soft clean cloths and clean water, finishing with a clean squeegee. Do not use abrasive or alkaline materials.

Extent: All frames and glass surfaces inside and out.

Maintenance manual
General: Submit the window and glazed door manufacturer’s published instructions for operation, care and maintenance.

and maintenance.

Warranties
Window and door assemblies: Submit the manufacturer’s published product warranties.

0452b WINDOW HARDWARE

1 GENERAL

1.1 AIMS

Responsibilities
Provide window hardware in conformance with the **Selections**.

1.2 CROSS REFERENCES

General
General: Conform to the *General requirements* worksection.

2 PRODUCTS

2.1 HARDWARE

Hardware documented generically
Provide hardware of sufficient strength and quality to perform its function, appropriate to the intended conditions of use, suitable for use with associated hardware, and fabricated with fixed parts firmly joined.

Locks and latches
Standard: To AS 4145.3.

Window catches: Provide 2 catches per sash to manually latched awning or hopper sashes over 1000 mm wide.

3 EXECUTION

3.1 INSTALLATION

Fasteners
Materials: Use 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.
- Exposed fixings: Match exposed fixings to the material being fixed.

Support: Provide appropriate back support (for example lock stiles, blocking, wall noggings and backing plates) for hardware fixings.

- Hollow metal sections: Provide backing plates drilled and tapped for screw fixing, or provide rivet nuts with machine thread screws. Do not use self tapping screws or pop rivets.

Window hardware
Proprietary window systems: Provide the standard hardware and internal fixing points for personnel safety harness attachment, where required by and complying with the governing regulations.

Operation
Ensure working parts are accurately fitted to smooth close bearings, without binding or sticking, free from rattle or excessive play, lubricated where appropriate.

Supply
Delivery: Deliver window hardware items, ready for installation, in individual complete sets for each window set.

- Clearly labelled to show its intended location.
- In a separate dust and moisture proof package.
- Including the necessary templates, fixings and fixing instructions.

3.2 COMPLETION

Adjustment

Leave the hardware properly adjusted with working parts in working order, and clean, undamaged, properly adjusted, and lubricated where appropriate.

Keys

Contractor's keys: Immediately before practical completion, replace cylinders to which the contractor has had key access during construction with new cylinders which exclude the contractor's keys.

Keys: For locks keyed to differ and locks keyed alike, verify quantities against key records, and deliver to the contract administrator at practical completion.

Key codes: Submit the lock manufacturer's record of the key coding system showing each lock type, number and type of key supplied, key number for re-ordering, and name of supplier.

0453b DOORS AND HATCHES

1 GENERAL

1.1 AIMS

Responsibilities
General: Provide doors, frames, doorsets, security screen doors and fire doorsets as scheduled in **Selections**.

1.2 CROSS REFERENCES

General
General: Conform to the *General requirements* worksection.

1.3 INTERPRETATION

Definitions
General: For the purposes of this worksection the definitions given below apply.

- Balanced construction: A construction of flush doors in which the facings on one side of the core are essentially equal in thickness, grain direction, properties and arrangement to those on the other side of the core. It is such that uniformly distributed changes in moisture content will not cause warpage.
- Door frame: Includes jamb linings.
- Doorset: An assembly comprising a door or doors and supporting frame, guides and tracks including the hardware and accessories necessary for operation.
  - . Fire-doorset: A doorset which retains its integrity, provides insulation and limits, if required, the transmittance of radiation in a fire.
  - . Smoke-doorset: A doorset which restricts the passage of smoke.
- Flush door: A door leaf having two plane faces which entirely cover and conceal its structure. It includes doors with intermediate rail, cellular, blockboard and particleboard cores.
  - . Solid core door: A flush door with a solid core continuous between stiles and rails or edge strips and fully bonded to the faces.
- Joinery door: A door leaf having either stiles and rails, or stiles, rails and muntins, framed together. A joinery door may also incorporate glazing bars.
  - . Louvred door: A joinery door in which the panel spaces are filled in with louvre blades.
  - . Panelled door: A joinery door with spaces filled in with panels including glass.

1.4 INSPECTION

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

- Door frames in place before building in to masonry.
- Door frames installed before fixing trim.

1.5 SUBMISSIONS

Type tests
General: Submit type-test certification complying with the following standards to verify conformance with the **Doorsets performance schedule**:

- Fire and smoke doors: To AS 1905.1 and BCA Spec C3.4.
- Weighted sound reduction index (R_w): To AS/NZS 1276.1 or ISO 71-1.

2 PRODUCTS

2.1 FRAMES

Aluminium frames

General: Assembled from aluminium sections, including necessary accessories such as buffers, pile strips, strike plates, fixing ties or brackets and cavity flashing, with suitable provision for fixing nominated 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.

Steel frames

General: Continuously welded from metallic-coated steel sheet sections, including necessary accessories such as buffers, strike plates, spreaders, mortar guards, switch boxes, fixing ties or brackets, and cavity flashing with suitable provision for fixing hardware and electronic security assemblies, and prefinished with a protective coating.

Finish: Grind the welds smooth, cold galvanize the welded joints and shop prime.

Hardware and accessories: Provide for fixing hardware including hinges and closers, using 4 mm backplates and lugs. Screw fix the hinges into tapped holes in the back plates.

Base metal thickness:

- General: ≥ 1.1 mm.
- Fire rated doorsets: ≥ 1.4 mm.
- Security doorsets: ≥ 1.6 mm.

Metallic-coated steel sheet: To AS 1397.

- Metallic-coating: Zinc-iron.

2.2 DOORS

Standards

Materials: To the following:

Decorative laminated sheets: To AS/NZS 2924.1.

- Wet processed fibreboard (including hardboard): To AS/NZS 1859.4.
- Dry processed fibreboard (including medium density fibreboard): To AS/NZS 1859.2.
- Particleboard: To AS/NZS 1859.1.
- Plywood and blockboard for interior use: To AS/NZS 2270.
- Plywood and blockboard for exterior use: To AS/NZS 2271.
- Seasoned cypress pine: To AS 1810.
- Timber – hardwood: To AS 2796.1.
- Timber – softwood: To AS 4785.1.

Certification

General: Brand panels under the authority of a recognised certification program applicable to the product. Locate the brand on faces or edges which will be concealed in the works.

Certification programs:

- Plywood and blockboard: Engeineered Wood Products Association of Australia (EWPAA) Quality Control and Product Certification Scheme.

- Wet processed fibreboard, dry processed fibreboard, particleboard and decorative overlay wood panels: Australian Wood Panels Association AWPA JAS-ANZ Scheme.

General
Doors: Proprietary products manufactured for interior or exterior applications and for the finish required.

Flush doors
General: Of balanced construction.

Cellular core and intermediate rail core flush doors:

- Provide a subframe of 25 mm minimum width timber around openings for louvres and glazing.
- Provide additional material to take hardware, fastenings and grooves.
- Cut outs: If openings are required in flush doors (e.g. for louvres or glazing) make the cut outs not closer than the width of the styles at the edges of the doors.

Solid core: Solid flush doors as follows:

- Flush door with blockboard: Core plate of timber strips laid edge to edge, fully bonded to each other and to facings each side of no less than two sheets of timber veneer.
- Single thickness of moisture resistant general purpose medium density fibreboard.

Smoke doors: Solid core ≥ 35 mm thick.

Construction
Adhesives:

- Internal: To AS/NZS 2270.
- External: To AS/NZS 2271.

Door thickness:

- General: 35 mm.
- External doors and doors over 900 mm wide: 40 mm.

Edge strips: Fix to stiles. Minimum thickness 10 mm. Increase overall thickness to > 15 mm to accommodate the full depth of the rebate in rebated doors. Form rebates to suit standard rebated hardware. Bevel square edged doors as necessary to prevent binding between the leaves.

Louvre grilles: Construct by inserting the louvre blades into a louvre frame, and fix the frame into the door.

Double doors
Rebated meeting stiles: Provide rebated meeting stiles or fix equivalent metal ‘T’ stop to one leaf unless the doors are double acting. Chamfer square edged doors as necessary to prevent binding between the leaves.

Tolerance
Squareness: The difference between the lengths of diagonals of a door: ≤ 3 mm.

Twist: The difference between perpendicular measurements taken from diagonal corners: ≤ 3 mm.

Nominal size (mm):

- Height: + 0, - 2.
- Width: + 0, - 2.

2.3 DOORSETS

Automatic sliding door assemblies
Standard: To AS 5007.

Arrangement: Conform to the **Automatic door schedule**.

Control systems: Refer to *Door hardware*.

Duct hatches
General: Proprietary products comprising metal-faced doors side hung to steel door frames, inclusive of the necessary hardware and accessories including hinges and lock and lugs or other suitable means for installation.

Fire-resistant doorsets
Standard: To AS 1905.1 and BCA Spec C3.4.

Floor hatches
Frame: Weld from 50 x 50 x 6 mm angle, with two 40 mm cogged fixing lugs each side and shop prime.

Covers: 6.5 mm chequer plate, with 40 x 40 x 6 mm angle frame welded on all round and 32 x 6 mm diagonal stiffening flats. Cut, radius and grind off 100 x 25 mm lifting slots in each end of covers.

Revolving doorsets
Standard: To AS 5007.

Arrangement: Conform to the **Automatic door schedule**.

Control systems: Refer to *Door hardware*.

Security screen doorsets
Standard: To AS 5039.

Arrangement: Conform to the **Security screen doors construction schedule**.

Bushfire screens and doors
Standard: To AS 3959.

Protection: Protect openings from the ingress of embers.

2.4 ANCILLARY MATERIALS

Trims
Timber: Solid timber at least 19 mm thick, mitred at corners.

Extruded gaskets and seals
General: Non cellular (solid) elastopressive seals as follows:

- Flexible polyvinyl chloride (PVC): To BS 2571, 100% solids with high consistency, ultra-violet stabilised.
- Rubber products (neoprene, ethylene propylene diene monomer (EPDM) or silicone rubber): To BS 4255.1.

Flashings
General: Corrosion resistant, compatible with the other materials in the installation, and coated with a non-staining compound where necessary.

Standard: To AS/NZS 2904.

Jointing materials
General: Compatible with each other and with the contact surfaces and non staining to finished surfaces. Do not provide bituminous materials on absorbent surfaces.

Nylon brush seals
General: Dense nylon bristles locked into galvanized steel strips and fixed in a groove in the edge of the door or in purpose-made anodised aluminium holders fixed to the door with double sided PVC foam tape.

Pile weather strips
General: Polypropylene or equivalent pile and backing, low friction silicone treated, ultra-violet stabilised.

Standard: To AAMA 701/702.

Weather bars
General: Provide a weather bar under hinged external doors, locate under the centres of closed doors.

3 EXECUTION

3.1 FRAMES

General
Frames: Install so that the frames are as follows:

- Plumb, level, straight and true.
- Adequately fixed or anchored to the building structure.
- Will not carry any building loads, including loads caused by structural deflection or shortening.

Aluminium frames
Building in to 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.

Frame fixing
Brackets: Metallic-coated steel:

- Width: ≥ 25 mm.
- Thickness: ≥ 1.5 mm.

Depth of fixing for building into masonry:

- Brackets: ≥ 200 mm.
- Expansion anchors: ≥ 50 mm.
- Plugs: ≥ 50 mm.
- Rods: ≥ 60 mm.

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.

Jamb fixing centres: ≤ 600 mm.

Joints
General: Make accurately fitted joints so that no fasteners, pins, screws, adhesives and pressure indentations are visible on exposed surfaces.

Steel frames
Building in to masonry: Attach galvanized steel rods to jambs, build in and grout up.

Fixing to masonry openings: Build in hairpin anchors and install locking bars, or use proprietary expansion anchors and screw twice through jambs at each fixing.

Fixing to stud frame openings: Attach galvanized steel brackets to jambs and screw twice to studs at each fixing.

Timber frames
Building in to 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.

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.

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.

3.2 DOORS

Priming
General: Prime timber door leaves on top and bottom edges before installation.

3.3 DOORSETS

Security screen doorsets
Standard: To AS 5040.

3.4 COMPLETION

Operation
General: Ensure moving parts operate freely and smoothly, without binding or sticking, at correct tensions or operating forces and that they are lubricated where appropriate.

Protection
Temporary coating: On or before completion of the works, or before joining up to other surfaces, remove all traces of temporary coatings used as a means of protection.

0455 DOOR HARDWARE

1 GENERAL

1.1 AIMS

Responsibilities

General: Provide door hardware in conformance with **Selections**.

Handing: Before supply, verify on site, the correct handing of hardware items.

Hardware **specified generically**: Provide hardware of sufficient strength and quality to perform its function, appropriate to the intended conditions of use, suitable for use with associated hardware, and fabricated with fixed parts firmly joined.

Operation: Ensure working parts are accurately fitted to smooth close bearings, without binding or sticking, free from rattle or excessive play, lubricated where appropriate.

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, fixings and fixing instructions.

1.2 CROSS REFERENCES

General

General: Conform to the *General requirements* worksection.

1.3 INTERPRETATIONS

Abbreviations

General: To AS 4145.1 Appendix D.

Definitions

Glossary of terms: To AS 4145.1 Section 2.

Lock functions: To AS 4145.1 Appendix E.

1.4 SUBMISSIONS

Samples

Generic items: Submit samples of hardware items offered as meeting the description of items not specified as proprietary items.

Key control System

New works: Submit details of the proprietary key control security system proposed by the lock manufacturer for locks required to accept a group key (master, grandmaster).

Alterations and additions: Submit details to extend the existing key control security system for locks required to accept a group key.

Subcontractors

Automatic door operators: Submit names and contact details of proposed supplier and installer.

Pressure floor mat: Submit names and contact details of proposed supplier and installer.

Record documents

Door hardware schedule: Submit an amended schedule, prepared by the door hardware supplier, showing changes to the contract door hardware schedule caused as follows:

- By the approval of a hardware sample.
- By the acceptance of an equivalent to a specified proprietary item.
- By a contract variation to a door hardware requirement.

Keys

Key codes: Submit the lock manufacturer’s record of the key coding system showing each lock type, number and type of key supplied, key number for re-ordering, and name of supplier.

Keys: For locks keyed to differ and locks keyed alike, verify quantities against key records, and deliver to the contract administrator at practical completion.

2 PRODUCTS

2.1 HINGES

Butt hinge sizes

Conform to tables as follows:

- Timber doors in timber or metal frames: **Hinge table A**.
- Aluminium framed doors in aluminium frames: **Hinge table B**.
- Cupboard doors: Not included in hinge tables.

General: Length (l) is the dimension along the knuckles, not including hinge tips, if any, and width (w) is the dimension across both hinge leaves when opened flat.

Doors fitted with closers: Provide low friction ball bearing hinges.

Fire doors: To AS 1905.1.

Power transfer hinges: Ensure they do not assume any load and are installed with other compatible hinges.

2.2 HINGE TABLES

Hinge table A

Application: Solid core doors and can be used to determine the quantity of hinges required for the nominated door leaf sizes and weights only. For door leaf sizes not specified or with applied finishes use the weight of the door to determine the quantity of hinges required. For door leafs over 80 kg, nominate pivot hinges.The size of the hinge is determined by the door leaf thickness:

- 35 - 43 mm thick door: 100 x 75 mm # butt hinges with a minimum thickness of 2.5 mm.
- 44 - 55 mm thick door: 100 x 100 mm # butt hinges with a minimum thickness of 2.5 mm.
- > 55 mm thick door: Refer to the door by door hardware schedule.

Hinge pin: The symbol # refers to the pin type. Supply fixed pins to doors opening out or designated as a security doors.

Wide throw: If necessary, provide wide throw hinges to achieve the required door swings in the presence of obstacles such as nibs, deep reveals and architraves.

Nominal door leaf size l x w x th (mm)	Door leaf weight (kg - approx)	Number of hinges
2040 x 400 x 35	≤ 19	2
2040 x 600 x 35	≤ 29	2
2040 x 720 x 35	≤ 35	3
2040 x 820 x 35	≤ 39	3
2040 x 920 x 35	≤ 44	3
2040 x 1020 x 35	≤ 49	4
2040 x 720 x 40	≤ 37	3
2040 x 820 x 40	≤ 42	3
2040 x 920 x 40	≤ 48	3
2040 x 1020 x 40	≤ 52	4
2040 x 720 x 50	≤ 45	3
2040 x 820 x 50	≤ 50	3
2040 x 920 x 50	≤ 57	3
2040 x 1020 x 50	≤ 68	4
2400 x 720 x 40	≤ 50	4
2400 x 820 x 40	≤ 52	4
2400 x 920 x 40	≤ 55	4
2400 x 1020 x 40	≤ 60	4

Nominal door leaf size l x w x th (mm)	Door leaf weight (kg - approx)	Number of hinges
2400 x 1220 x 50	≤ 72	5
2040 x 920 x 70	≤ 88	Nominate pivot hinges

Hinge table B
Application: Aluminium hinges for aluminium doors, or for doors of other materials in aluminium frames.

Nominal hinge size l x w x t (mm)	Door leaf weight (kg – approx))	Minimum construction	
		Knuckles	Screws/hinge leaf
100 x 70 x 3	≤ 30	3	3
100 x 80 x 3.5	≤ 50	5	4
130 x 50 x 3.4	≤ 75	Interfold	3

2.3 DOOR HANGING SYSTEMS

General
General: Provide sliding door tracks in conformance with the **Sliding track schedule**.
***

2.4 ANCILLARIES

Bolts
General: Provide bolts including barrel bolts, flush bolts and tower bolts with keepers, including lock plates, staples, ferrules or floor sockets.

Mortar guards
General: For steel door frame installations, provide mortar guards designed to enable the full extension of the lock tongue or similar devices and the correct operation of the locking mechanism.

Rebated doors
General: For mortice locks or latches to rebated doors, provide purpose-made rebated pattern items.

Strike plates
General: Use strike plates provided with the locks or latches. Do not provide ‘universal’ strike plates.

2.5 DOOR CONTROLLERS

General
Performance: Provide door controllers, pivots, flow or overhead door closers, and automatic door operators, which are suitable for the door type, size, weight and swings required and the operating conditions, including wind pressure.

Automatic door operators
Description: Provide complete automatic door operators for opening and closing doors, including door hanging (hinges, pivots or sliding gear) and electrical connection to distribution board.

Installation: Provide necessary recesses and cores, grout in components where required, and make good. Provide cover plates for access to units in door heads, frames or transoms.

Automatic adjustable function: If the door opening angle or width is manually set below the maximum possible, under conditions of continuous traffic the doors must automatically creep to full opening, returning to reduced opening on the next cycle.

Radio remote door controllers: Provide a device, comprising a radio receiver and separate transmitter, for activating a motorised door operator so as to open and close the door by remote radio signal.

Key switch: If there is no separate access to the enclosure, provide a key switch mounted externally for opening and closing the door from outside the enclosure without the transmitter. Provide two keys.

Light: Provide an internal light which any signal to the receiver also switches on and which remains on for not less than 2 minutes and switches off automatically.

Receiver: House within a wall unit incorporating a push-button switch permanently illuminated. Mount within the enclosure and connect to power.

Transmitter: Portable battery-powered unit sending a coded signal effective up to not less than 12 m from the receiver.

Pressure floor mats: Automatic door activating system consisting of a mat which when deflected by foot pressure operates a switch which activates the door or doors.

Closers

Hinged and pivot doors:

- Fire rated doors: Provide closers tested and certified for use as components of fire door assemblies:
  . Standard: To AS 1905.1.

2.6 ELECTRONIC CONTROL DEVICES

General

General: Provide electric strikes, electric locks, drop bolts, or similar devices to suit door construction and hardware.

Fail-safe: Connect door control devices in a fail-safe mode to permit egress in the event of power failure.

Authorised products: Provide equipment listed in the CSIRO CMSE ActivFire Register of Fire Protection Equipment.

Glass doors: Provide tumbler, drop bolts or magnetic holders.

Double leaf doors (solid frame): Provide an electric strike or lock on the fixed leaf, connected to the door frame by concealed flexible wiring.

Activation

Activation device: Provide keypads, card readers or other activation devices, and locate next to entry points.

External: Provide weatherproof (IP56) hoods or housings for external units.

Mounting height: 1200 mm from floor level.

2.7 KEYING

Contractor's keys

Alternatives:

- Loan cylinder.
- Construction keyed master key cylinder.

Delivery of keys

Great grandmaster, grandmaster and master keys: Arrange for the manufacturer or supplier to deliver direct to the principal.

Number of keys: Conform to the **Number of keys table**.

Group keying

Keying system: Provide a group keying system in conformance with the **Key codes schedule**.

Existing system: Obtain the details of existing group or master key systems to which a new system is required to be an extension.

Future extensions: Provide master and grandmaster group keying systems which are capable of accommodating future extensions.

- Extensions to existing system: [complete/delete]

Keying control security system: If cylinder or pin-tumbler locks accept a group key (e.g. master key, maison key) provide to those locks a proprietary keying control security system.

Stamping: Stamp keys and lock cylinders to show the key codes and/or door number as scheduled.

Identification

General: Supply each key with a purpose-made plastic or stamped metal label legibly marked to identify the key, attached to the key by a metal ring.

Key material

Lever locks: Malleable cast iron or mild steel.

Pin tumbler locks: Nickel alloy, not brass.

Number of keys table

Code	Key type	Minimum number of keys

Code	Key type	Minimum number of keys
GGMK	Great grandmaster keys	2
GMK	Grandmaster keys	2
MK	Master keys	2 per code group
KD	Locks keyed to differ	2 per lock
KA	Locks keyed alike:	
	-2 locks in code group	4
	-3 to10 locks in code group	6
	-11 to 40 locks in code group	10
	-41 and over locks in code group	1 per 4 locks or part thereof

3 EXECUTION

3.1 INSTALLATION

Mounting height
Locks and latches: Centreline of the door knob or lever spindle above finished floor: 1050mm

Door stops
Fixing: Fix on the floor, skirting or wall, as appropriate, to prevent the door or door furniture striking 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 and on the inside faces of internal doors to lockable rooms.

Support: Provide appropriate back support (for example lock stiles, blocking, wall noggings and backing plates) for hardware fixings.

- Hollow metal sections: Provide backing plates drilled and tapped for screw fixing, or provide rivet nuts with machine thread screws. Do not use self tapping screws or blind rivets.

Floor springs
General: Form a recess in the floor slab for the floor spring box and grout the box in place so that the cover plate is flush with the finished floor.

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.

3.2 COMPLETION

Adjustment
General: Leave the hardware properly adjusted with working parts in working order, and clean, undamaged, properly adjusted, and lubricated where appropriate.

Automatic door operators: Maintain and adjust the system throughout the defects liability period.

Keys
Contractor's keys: Immediately before practical completion, replace or reset cylinders to which the contractor has had key access during construction and ensure the exclusion of the contractor's keys.

Maintenance
Automatic door operators: Submit the installer's proposal for continuing maintenance after completion on an annual renewal basis.

Manual: Submit the manufacturer's published recommendations for use, care and maintenance of the hardware provided.

Product warranties

Warranty: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the manufacturer or distributor and the applicator.

Automatic door operators: Submit a warranty (or interlocking warranties) from the supplier and installer for the system and its installation, for a period of at least twelve months from the date of practical completion.

Padlocks

Standard: To AS 4145.4.

4

-0457 EXTERNAL SCREENS

1.1 AIMS

Responsibilities

General: Provide external screens that are:

- Plumb, level, straight and true within the building tolerances of the structural system.
- Undamaged and free of surface defects or distortions.
- Adequately fixed or fastened to the building structure.
- Able to resist wind and other actions without vibration or permanent distortion.

Selections: As documented.

1.2 CROSS REFERENCES

General

General: Conform to the *General requirements* worksection.

1.3 STANDARDS

General

Aluminium framed sunscreens, awnings and shutters:

- Stress analysis of members: To AS/NZS 1664.1 or AS/NZS 1664.2.

Horizontal screen loadings: To AS/NZS 1170.1 Table 3.2.

Electrically operated external louvres and blinds:

- Drive motors: To AS/NZS 60335.2.97.

Access for maintenance: To AS 1657.

Glazing

Glass type and thickness: To AS 1288, where no glass type or thickness is nominated.

Other glazing materials: To AS 1288.

Installation: To AS 1288.

Quality requirements for cut-to-size and processed glass: To AS/NZS 4667.

1.4 INTERPRETATION

Definitions

General: For the purposes of this worksection, the definitions given below apply.

- Screen: The term ‘screen’ is used generically in this worksection to include sunscreens, trafficable sunscreens, external louvres and blinds, shutters, awnings and pergolas fixed to building facades or openings to control sunlight and/or provide privacy, to screen plant and equipment, or to provide an architectural feature. It applies to fixed, adjustable, operable and automatically controlled types.
- Louvres:
  - . Horizontal: Louvres that span between frame stiles, mullions or supports.
  - . Vertical: Louvres that span between frame heads and sills, or horizontal supports.
  - . Continuous: Louvres that run continuously past, and are supported by, concealed framing or brackets.
- Membrane: A thin and flexible sheet of fabric material.
- Shade cloth: A knitted or woven fabric designed for external use with a weave designed to provide a specified amount of shade.
- Tensioned membrane: A thin cloth or sheet that is held in a predetermined 2- or 3-dimensional shape, under permanent tension.

Abbreviations

BMS: Building Management Systems.

PVC: Polyvinylchloride.

UV: Ultra Violet.

1.5 INSPECTION

Notice

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

- Prototypes constructed and ready for inspection.
- Fabricated screen assemblies at the factory ready for delivery to the site.
- Fabricated screen assemblies delivered to the site, before installation.
- Commencement of installation of screen assemblies.
- Completion of installation.

1.6 SUBMISSIONS

Samples

General: Submit samples of the following:

- Sections proposed for frame members, louvres, accessories, cover panels and trim.
- Joints made, using proposed techniques.
- Colour samples of prefinished production material (e.g. anodised or organic coated extrusions or sheet, glazing, infill panel material or fabric), each at least 200 x 200 mm, showing the limits of the range of variation in the selected colour, if any, for each component of the screens specified.
- Accessory and hardware items specified descriptively or by performance (i.e. not specified as proprietary items). Include handles, operators, controls, switches, sensors, motors, fixing clips, anchor brackets and attachments, fixings, gaskets and weather seals.

Labelling: Label each sample, giving the brand and product name, manufacturer's code reference, date of manufacture and intended building location.

Sealant compatibility

Compatibility statements: Submit statements from all parties to the installation that certify the compatibility of sealants with screen components, finishes and all substrates.

Type-test reports

General: Submit type-test reports for the following:

- High performance glass.
- Ceramic-coated infill glass: Submit a report certifying that the glass meets the Fallout Resistance Test requirements of ASTM C1048.
- Opacified glass: Submit a statement by the manufacturer certifying that the proposed method of opacifying the glass will not be detrimental to the glass or detract in any way from the glass product warranty.

Prototypes

Sample installations: Install the designated typical screens in their final position incorporating at least one example of each component in the system, including attachments to the structure, flashing, caulking, sealing, infill materials, operating hardware and controls.

Samples in prototypes: If approved, incorporate required samples into prototypes.

Shop drawings

Submit shop drawings, calculations and specifications conveying the following information:

- Layout of the screen assembly (sectional plans, vertical sections, and elevations of each building face where screens are to be installed).
- Full size sections of typical members including mullions, transoms, subheads, sills, subsills, louvres, infill panel material or fabric, beads, bearings, linkages, exposed fixings, sealant beads, glazing gaskets, splice plates, trays and cover strips, with notes specifying the proposed materials.
- Lubrication requirements for adjustable or operable screens.
- Method of assembly, including isometric or axonometric and exploded views of typical framing junctions, showing panel to panel joints (for modular systems).
- Method of installation, including the following:
  - . Location and magnitude of reactions to be accommodated by the support structure.
  - . Type and location of fasteners and other attachments to be cast or otherwise built into the building structure.
  - . Erection tolerances.

  - . Accurate locations and full size details of machined slots, keyholes and other penetrations in frame extrusions for lifting and installing the units.
  - . Junctions and trim to adjoining surfaces.
  - . Caulking and flashing.
  - . Locations of visible heads of fasteners.
- Provision for differential vertical or horizontal movements, including the following:
  - . Thermal expansion and contraction.
  - . Frame deflections.
- Details of motor and operating mechanism enclosures.
- Method of draining the assembly, including details showing the following:
  - . Pressure equalised drained joints.
  - . Location, number and size of weepholes.
- Connection points to rainwater or stormwater systems.
- Hardware, fittings and accessories including window cleaning restraints and visible heads of fasteners.
- Infill panel stiffening.
- Location and power requirements of motors, sensors and controls.
- Wiring diagrams of control systems and how they connect to BMS.
- Scale drawings, descriptions and statements of the prototype sunscreen.

Subcontractors
General: Submit names and contact details of the proposed manufacturers and, if the manufacturer is not the installer, the installers recommended by the manufacturers.

2 PRODUCTS

2.1 MATERIALS GENERALLY

Structural steel
Design and materials: To AS 4100.

Welding: To AS/NZS 1554 series.

Galvanizing: To AS/NZS 4680.

Cables
Requirement: Preload cables by cyclic loading to achieve a uniform modulus of elasticity and to ensure a linear stress/strain relationship within the working range. Employ a swaging system to achieve a breaking strength of terminals not lower than the minimum design strength of the cable system.

Materials: Stainless steel Grade 316 or galvanized steel.

Fabric
Supply: Supply fabric by a single manufacturer as part of a single batch.

Inspection: Check each roll of material for flatness, faults in the woven fabric and the coatings, where present, by visual inspection in directional sunlight at a distance of 4 m and by passing the membrane over a uniformly illuminated surface.

Stitching: Use UV stabilised polyester thread with a minimum tensile strength of 180 N. Incorporate lock type stitching with a twin needle machine.

Perimeter reinforcing: Reinforce the perimeter of each with UV stabilised polyester, coated with PVC and incorporating pockets for the tension cables.

2.2 FINISHES

Surface preparation
Standard: To AS 1627.

Anodised
Standard: To AS 1231.

Thickness: ≥ 15 microns to 20 microns.

Hot dip galvanizing
Coating mass/thickness minima: To AS/NZS 4680.

Powder coating
Standard: To AS 3715.

Grade: Architectural coatings.

2.3 FIXED PANEL TYPE SCREENS

General
Requirement: Provide weatherproof infill panel materials mounted in a metal perimeter frame or subframe which will:

- Withstand imposed actions and wind actions for the location without failure or permanent distortion, and without panel flutter.
- Shed water without pooling.

Expansion joints
Requirement: Provide for expansion and contraction in continuous sections at spacings not exceeding those recommended by the manufacturer, or 6 m, whichever is the lesser.

Fixing: Provide a fixing system appropriate to the panel material that will retain the panel without distortion or dislocation.

Framing materials
Requirement: Provide frames fabricated from solid or hollow metal sections. Fix to fastener brackets or arms mounted on the face of the building, and brace as necessary with stays, including tensile elements such as wire cables and turnbuckles.

2.4 LOUVRE TYPE SCREENS

General
Requirement: Provide metal louvre blades mounted in a metal perimeter 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.

Expansion joints
Requirement: Provide for expansion and contraction in continuous sections (e.g. continuous louvres, interlocking mullions) at spacings not exceeding those recommended by the manufacturer, or 6 m, whichever is the lesser.

Fixed metal louvres
Requirement: Provide metal louvre blades mounted in a metal perimeter frame or subframe, or on carrier frames, installed horizontally or vertically. Blades can be rolled or extruded metal, or extruded metal blades swaged together with cross bars to form self supporting panels.

Adjustable louvres
Requirement: Provide an adjustable louvre system comprising louvre blades clipped or fixed into blade holders pivoted to stiles or coupling mullions, linked together in banks, installed horizontally or vertically.

Operation: Provide an operating system, incorporating a locking or latching device for each bank of louvres.

Pergolas
Support wide horizontal louvre assemblies on posts mounted on terraces and balconies to form pergolas. Maintain the integrity of waterproofing membranes, when fixing posts or brackets to terraces and balconies.

2.5 EXTERNAL FABRIC BLINDS

Roll up blinds
Requirement: Provide a retractable roller blind comprising a weatherproof fabric blind mounted in front of windows, inclined glazing systems, or balconies. Fit a tubular rail at the bottom of the blind. Fix a glider clip to each end of the bottom rail, and fit gliders into side guide channels. If cables are used to guide the blind, fit plastic eyelets to the holes where the cables pass through the bottom rail to reduce friction, wear and noise caused by operation and movement of the blind.

Pelmet: Fit a pelmet at the top of the blind to cover it in, when raised.

Operation: Provide a retraction system including roller drum, nylon bearings, tension spring and positive self-locking device.

Constraint: Constrain fabric against movement, flutter and vibration by means of guide cables or side guide channels, and by maintaining sufficient tension on the whole blind throughout its range of movement.

2.6 EXTERNAL LOUVRE BLINDS

Aluminium framed blinds

General: Provide extruded aluminium sections mitred, staked and screwed at corners.

Adjustable louvre blinds

Requirement: Provide an adjustable louvre blind comprising rolled or extruded metal louvre blades in a perimeter frame mounted in front of windows, inclined glazing systems, or balconies. Fix end plates or clips incorporating an axle to each end of the blades. Fit axles into bushes or bearings set into the side sections.

Operation: Link blades together in banks with operating arms or ties.

Retractable louvre blinds

Requirement: Provide a retractable louvre blind comprising rolled or extruded metal louvre blades mounted in front of windows, inclined glazing systems, or balconies. Fix end plates or clips incorporating a glider clip to each end of the blades, and fit gliders into side guide channels.

Pelmet: Fit a pelmet at the top of the blind to cover it, when raised.

Operation: Retract blades by means of lifting tapes that pass through the centreline of the blades and connect to an extruded metal bottom rail. Fit plastic eyelets to the holes where the lifting tapes pass through the louvre blades to reduce friction, wear and noise caused by operation and movement of the blinds. Adjust the tilt of louvre blades by means of ladder type tilting tapes fixed to their front and rear edges.

Constraint: Constrain louvre blades against movement, flutter and vibration by means of guide cables or side guide channels, and by maintaining sufficient tension on the whole blade assembly throughout its range of movement.

2.7 FIXED AND ADJUSTABLE AWNINGS

Fixed metal awnings

Requirement: Provide a fixed awning comprising folded metal slats or cladding panels supported on a metal subframe and fixed to the wall adjacent to the windows.

Fixed fabric awnings

Requirement: Provide a fixed awning comprising weatherproof fabric supported on a metal subframe and fixed to the wall adjacent to the windows.

Adjustable metal awnings

Requirement: Provide an adjustable awning comprising metal interlocking slats attached to a roller at the top and rail at the bottom, and guided throughout its range of movement by guide rails mounted on each side.

Pelmet: Fit a pelmet over the roller to cover the slats, when retracted.

Operation: Provide retraction of the awning by means of a cord, tape, crank or electric motor.

Adjustable fabric awnings

Requirement: Provide an adjustable awning comprising weatherproof fabric attached to a roller at the top and rail at the bottom, and guided throughout its range of movement by guide rails mounted on each side.

Pelmet: Fit a pelmet over the roller to cover the awning, when raised.

Operation: Provide retraction of the awning by means of a cord, tape, crank or electric motor.

2.8 RETRACTABLE AWNINGS

Folding arm awnings

Requirement: Provide a folding arm awning comprising weatherproof fabric fixed between a roller attached to the face of the building and a rail supported on pivoted, cantilevered arms.

Cassette: Provide a cassette to conceal and protect the awning, when retracted.

Operation: Provide an operating mechanism that extends and retracts the awning while maintaining sufficient tension on the fabric to keep it taut throughout its range of movement.

2.9 EXTERNAL SHUTTERS

Aluminium framed shutters
Requirement: Provide aluminium extruded or folded box frame sections, mitred, staked and screwed at corners, and shutter blades.

Fixed shutter blades
Requirement: Fix shutter blades to the frames with concealed fixings.

Adjustable shutter blades
Requirement: Provide adjustable shutter blades to the frames, complete with operating bar or mechanism that rotates individual blades to the same angle and constrains them in the desired position.

Hinged shutters
Requirement: Hinge shutters at the top or side. Provide a latch or lock on the frame opposite the hinge side.

Sliding shutters
Requirement: Provide matching aluminium head guide, sill runner, and frame stile sections.

- Hardware: Nylon slide runners and finger pull handle. Provide pile strip closers against sash where necessary to close gaps.

3 EXECUTION

3.1 FABRICATION

Aluminium fabrication and construction
Standard: To AS/NZS 1664.1 or AS/NZS 1664.2.

Fasteners
Requirement: Provide fasteners of sufficient strength and quality to perform their required function.

Joints
Requirement: Make accurately fitted tight joints by methods such that neither fasteners nor fixing devices such as pressure indentations are visible on exposed faces. Where heads of fasteners are unavoidably visible, finish them to match the adjacent finished surface.

Protection
Corrosion protection: Provide protection against corrosion which may be caused in metals by products or processes normally employed on a building site or by normal atmospheric or other ambient conditions and by-products including rainwater, potable and non potable water, airborne salt and airborne pollution.

Durability: Provide materials resistant to exposure to weather and UV radiation so that their colour, surface finish, flexibility and water resistance are maintained.

Temporary measures: Do not use adhesive tape, film or paper, or applied coatings liable to bond to the substrate, when exposed to sunlight or weather, as temporary measures to protect screen components during the course of the works. Where temporary measures are used, remove all traces, particularly from contact mating surfaces before joining up.

Operation
Requirement: Provide moving parts which operate freely and smoothly, without vibration, rattling, binding or sticking, and at correct tensions or operating forces. Lubricate where appropriate.

3.2 WELDING

General
Quality: Provide finished welds descaled and free of surface and internal cracks, slag inclusion and porosity. All welding is to be continuous, unless permanently concealed.

Restrictions: Do not weld as follows:

- On site.
- On finished surfaces.
- Next to a finished surface or glass, unless the adjacent surface is adequately protected from damage.

3.3 EMBEDDED FIXINGS

General

Fixing: Fix screens to the building structure by one of the following methods, and in accordance with the **Fastener fixing schedule**.

- Fasteners cast into the concrete of the building structure. Do not displace reinforcement, when locating embedded items.
- Chemical fixings, expanding bolt sockets.
- Bolting or welding to brackets or structural framing.

Submission: If other methods of fixing (e.g. preformed pockets or explosive tools) are proposed, submit details.

Standard for embedment

For concrete: To AS 3600.

For masonry: To AS 3700.

Fixing brackets

Requirement: Fasteners and other methods of attachment of the screens to the structure: Provide the following characteristics:

- Three-way adjustment to accommodate fabrication and construction tolerances.
- Provision for building movements while fixing the screens in their correct positions.
- Adequacy for structural design actions.
-

Protection

Cast-in items: Prevent the entry of concrete slurry into bolt holes, channels, and other openings for the fasteners. Fill the openings using an easily removed water repellent material before casting in.

Tolerance on placement

Fasteners generally:

- Maximum deviation from correct position: ± 13 mm.

Fastener channels embedded parallel or perpendicular to the edge of a concrete structural member:

- Minimum length of embedded anchor: 200 mm.
- Minimum distance from the concrete edge to the nearest part of the anchor: 100 mm.

3.4 INSTALLATION

Installation tolerance limits

Alignment:

- Maximum deviation of any member from its true alignment (plumb, level, or line of slope): 1 mm per metre of member length, up to a maximum of 9 mm in a continuous run of members in one direction.
- Maximum misalignment between adjoining members: 1 mm.

Position:

- Maximum deviation of any part from its true position: 9 mm

Marking

Requirement: Before the separate parts of the screens are delivered to the site, provide suitable and sufficient marks or other means for identifying each part, and for showing its correct location and orientation, when installed.

Reference lines and marks

Requirement: Provide on each floor, in agreed locations, accurate perimeter offset reference lines, plumb with corresponding lines on other floors, and height benchmarks.

Cleaning

Requirement: During erection promptly remove foreign matter from the screens without damage to finishes. Do not use abrasive cleaners or acid.

3.5 COMPLETION

Cleaning

Method: Clean all visible surfaces with soft clean cloths and clean water or approved cleanser, finishing with a clean cloth. Do not use abrasive or alkaline materials.

Maintenance manual

Requirement: Submit the screen manufacturer's published instructions for operation, care and maintenance.

Warranties

Screens: Submit the manufacturer's published product warranties.

0461b GLAZING

1 GENERAL

1.1 CROSS REFERENCES

General
General: Conform to the *General requirements* worksection.

1.2 STANDARDS

Glazing
Glass type and thickness: To AS 1288, where no glass type or thickness is nominated.
Materials and installation: To AS 1288.
Insulating Glass Units: To AS/NZS 4666.
Quality requirements for cut-to-size and processed glass: To AS/NZS 4667.
Terminology for work on glass: To AS/NZS 4668.

2 PRODUCTS

2.1 GENERAL

Performance
Thermal qualities: U value and Solar heat gain coefficient to SELECTIONS.

Heat soaking
Requirement: All toughened glass products.

Heat strengthening
Requirement: Heat strengthen all glass that requires extra strength and thermal resistance.

2.2 GLASS

Glass types and quality
Standard: To AS 1288 and AS/NZS 4667.

Glass and glazing materials
Glass and glazing materials generally: Free from defects which detract from appearance or interfere with performance under normal conditions of use.
Glazing plastics: Free from surface abrasions, and warranted by the manufacturer for 10 years against yellowing or other colour change, loss of strength and impact resistance, and general deterioration.

Safety glasses
Standard: To AS/NZS 2208.
Certification: Required.
Certification provider: An organisation accredited by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ).
***
Type: Grade A when used in curtain walls.
Heat soaking: Required for toughened glass in curtain walls.

Insulating glass units (IGU's)
Manufacture and installation: To AS/NZS 4666.
Glass thickness selection: To AS 1288.

2.3 GLAZING MATERIALS

General
Glazing materials (including putty, glazing compounds, sealants, gaskets, glazing tapes, spacing strips, spacing tapes, spacers, setting blocks and compression wedges): Appropriate for the conditions of application and the required performance.

Jointing materials
Compatability: Provide recommended jointing and pointing materials which are compatible with each other and with the contact surfaces and non staining to finished surfaces. Do not provide bituminous materials on absorbent surfaces.

Glazing tapes
Standards: To AAMA 800, Products coded 804.3, 806.3, 807.3, as applicable.

Elastomeric sealants
General: Provide elastomeric sealants in conformance with the **Elastomeric sealant schedule.**

Sealing compound (polyurethane, polysulphide, acrylic):

- Single component: Type II, Class A.
- Multi component: To ASTM C920.

Sealing compound (silicone):

- Single component: Class A.
- Multi component: To ASTM C920.

Sealing compound (butyl): To ASTM C1311.

Glazing compounds: To AAMA 802.3 (Types I or II), or 805.2, as applicable.

Narrow joint seam sealer: To AAMA 800, Products coded 803.3.

Exterior perimeter sealing compound: To AAMA 800.

Non drying sealant: To AAMA 800.

Expanded cellular glazing tape: To AAMA 800.

Very high bond pressure sensitive tapes: To ASTM D897, ASTM D1002, ASTM D3330M, ASTM D3652M, ASTM D3654M, and ASTM D3715M.

Elastomeric sealants schedule

Sealant type	Material	Location or function

Pile weather strips
Standard: To AAMA 701/702.

Materials: Polypropylene or equivalent pile and backing, low friction silicone treated, ultra violet stabilised.

Finned type: A pile weather seal with a central polypropylene fin bonded into the centre of the backing rod and raised above the pile level.

Extruded gaskets and seals
Type: Non cellular (solid) elastopressive seals.

Material:

- Rubber products (neoprene, ethylene propylene diene monomer (EPDM) or silicone rubber): To BS 4255-1.
- Flexible polyvinyl chloride (PVC): To BS 2571, E type compounds, colour fastness grade B.

Priming
Compatibility: Apply the recommended primer to the surfaces in contact with sealant materials.

Movement joints
Depth of elastomeric sealant: One half the joint width, or 6 mm, whichever is the greater.

Foamed materials (in compressible fillers and backing rods): Closed-cell or impregnated types which do not absorb water.

Bond breaking: Provide backing rods, and other back-up materials for sealants, which do not adhere to the sealant.

2.4 GLASS IDENTIFICATION

Safety glazing materials
Identification: Identify each piece or panel, to AS 1288.

Noise reducing glazed assemblies
Identification: Label each panel with a legible non-permanent mark, self-destroying when removed, stating and certifying the R_w rating, and identifying the testing authority. Remove when directed.

3 EXECUTION

3.1 GLASS PROCESSING

General
Processing: Perform required processes on glass, including cutting, obscuring, silvering and bending. Form necessary holes, including for fixings, equipment, access holes and speaking holes. Process exposed glass edges to a finish not inferior to ground arrised.

3.2 INSTALLATION

Glazing
General: Install the glass so that:

- Each piece is held firmly in place by permanent means which enable it to withstand the normal loadings and ambient conditions at its location without distortion or damage to glass and glazing materials.
- Building movements are not transferred to the glass.
- External glazing is watertight and airtight.

Temporary marking: Use a method which does not harm the glass. Remove marking on completion.

Toughened glass: Do not cut, work, or permanently mark after toughening. Use installation methods which prevent the glass making direct contact with metals or other non-resilient materials.

Heat absorbing glass: In locations exposed to direct sunlight, provide wheel cut edges free from damage or blemishes, with minimum feather.

Preglazing
Window assemblies and glazed doors: Supply inclusive of glazing, shop preglazed.

Curtain walls: Supply inclusive of glazing, shop preglazed.

Site glazing
Minimum dimensional requirements (mm):

External timber framed glazing: Glaze with putty.

3.3 COMPLETION

Trade clean
Method: Clean with soft clean cloths and clean water, finishing with a clean squeegee. Do not use abrasive or alkaline materials.

Extent: All frames and glass surfaces inside and out.

Warranties
General: Submit a warranty, signed by the glazing subcontractor, undertaking to repair or replace glass and glazing materials which, within the warranty period, become defective or prove unsuitable for the specified application; provided that the manufacturers' recommendations for the maintenance of the material have been followed during the warranty period.

Glass manufacturer's warranty: An undertaking, conditional only on compliance with the manufacturer's recommendation for installation and maintenance, to supply replacement glass units to the site for replacement of defective units defined as follows:

- IGU units: Units in which the hermetic seal has failed as evidenced by intrusion of foreign matter, or internal condensation at temperature above 2°C.
- Coated glass units (including coated SIG units): Units in which the metallic coating shows evidence of manufacturing defects, including but not necessarily limited to cracking or peeling, as determined in accordance with ASTM C1048.

Toughened glass warranty: The manufacturer's warranty certifying that toughened glass supplied for use in curtain walls has been subjected to a heat soaking process which has converted at least 95% of the nickel sulphide content to the stable beta-phase.

Maintenance manual

Submit manufacturers' published recommendations for service use.

Cleaning

Replace damaged glass and leave the work clean, polished, free from defects, and in good condition.

0467 GLASS COMPONENTS

1 GENERAL

1.1 CROSS REFERENCES

General
General: Conform to the *General requirements* worksection.

1.2 STANDARDS

Quality requirements for cut-to-size and processed glass: To AS/NZS 4667.

Terminology for work on glass: To AS/NZS 4668.

1.3 INSPECTION

Notice
Inspection: Give notice so that the glass products may be inspected before they are installed.

1.4 SUBMISSIONS

Samples
Submit samples, each at least 200 x 200 mm, showing specified visual properties and the range of variation, if any, for each of the following types of glass or glazing plastics:

- Mirror glass.

Balustrade design
Certification: Submit a professional engineers' certificate confirming compliance with clause 3.6. of AS/NZS 1170.1.

Shop drawings
Method of glazing, including the following:

- Rebate depth.
- Edge restraint.
- Clearances and tolerances.
- Glazing gaskets and sealant beads.
- Pocket fixing details for frameless glass balustrades.

Installation
Glazing: Submit statements from the fabricator, certifying that the method of glazing, the selection of sealant systems, and conditions next to the glass comply with the following:

- Will not be detrimental to the long term structural performance, weathering capabilities and visual qualities of the glass.
- Will not cause delamination or other impairment to laminated glass during the service life of the curtain wall system.

Sealant compatibility
Compatibility statements: Submit statements from all parties to the installation that certify the compatibility of sealants and glazing systems to all substrates.

2 PRODUCTS

2.1 GLASS

Glass and glazing materials
Glass and glazing materials generally: Free from defects which detract from appearance or interfere with performance under normal conditions of use.

Materials and installation: To AS 1288.

Quality requirements for cut-to-size and processed glass: To AS/NZS 4667.

Terminology for work on glass: To AS/NZS 4668.

Safety glasses
Standard: To AS/NZS 2208.

Certification: Required. Identify each piece or panel, to AS 1288.

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

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Type: Grade A when used in curtain walls.

Glass tolerances
Size, squareness and flatness: To AS/NZS 2208.

Plate and sheet (i.e. not patterned):

- Roller wave: Maximum 0.15 mm.

Processed glasses schedule

Generic term	Glass type (base glass) and other properties	Location(s)
Mirrors	Clear float, silvering quality	
Mirrors, venetian silvered	Clear float, silvering quality	
Toughened safety	Base glass	
	Base glass colour	
	% reflectance	

Fabricated glass units schedule

Generic term	Glass types (constituent glasses) and other properties	Location
Laminated safety glass	External sheet	
	Internal sheet	
	Intermediate sheet (if any)	
	Interlayer type	
	Interlayer thickness	

2.2 GLAZING MATERIALS

General
Glazing materials (including putty, glazing compounds, sealants, gaskets, glazing tapes, spacing strips, spacing tapes, spacers, setting blocks and compression wedges): Appropriate for the conditions of application and the required performance.

Jointing materials
Provide recommended jointing and pointing materials which are compatible with each other and with the contact surfaces and non staining to finished surfaces. Do not provide bituminous materials on absorbent surfaces.

Glazing tapes
Standards: To AAMA 800, Products coded 804.3, 806.3, 807.3, as applicable.

Elastomeric sealants
Sealing compound (polyurethane, polysulphide, acrylic):

- Single component: Type II, Class A.
- Multi component: To ASTM C920.

Sealing compound (silicone):

- Single component: Class A.
- Multi component: To ASTM C920.

Sealing compound (butyl): To ASTM C1311.

Glazing compounds: To AAMA 802.3 (Types I or II), or 805.2, as applicable.

Narrow joint seam sealer: To AAMA 800, Products coded 803.3.

Exterior perimeter sealing compound: To AAMA 800.

Non drying sealant: To AAMA 800.

Expanded cellular glazing tape: To AAMA 800.

Very high bond pressure sensitive tapes: To ASTM D897, ASTM D1002, ASTM D3330M, ASTM D3652M, ASTM D3654M, and ASTM D3715M.

MIRRORS

Reflective surface

Type: Silver layer deposited on the glass or glazing plastic.

Protective coatings: Copper free coating, at least 5 μm thick, and 2 coats of mirror backing and edge sealing paint having a total dry film thickness of at least 50 μm.

Venetian silvered mirror (one way vision glass): 15 mm wide silvered strips alternating with 3 mm wide clear strips.

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.

2.3 SHOWER SCREENS

Type

Proprietary system comprising frames of extruded aluminium, stainless steel, or PVC, assembled around safety glass to form fixed panels and sliding, hinged or pivoted doors.

Shower screen systems

General: Conform to **SELECTIONS.**

2.4 GLASS BALUSTRADES

Glass balustrade systems

General: Conform to **SELECTIONS.**

3 EXECUTION

3.1 GLASS PROCESSING

General

Processing: Perform required processes on glass, including cutting, obscuring, silvering and bending. Form necessary holes, including for fixings, equipment, access holes and speaking holes. Process exposed glass edges to a finish not inferior to ground arrised.

3.2 INSTALLATION

General

General: Install the glass so that:

- Each piece is held firmly in place by permanent means which enable it to withstand the normal loadings and ambient conditions at its location without distortion or damage to glass and glazing materials.
- Building movements are not transferred to the glass.

Temporary marking: Use a method which does not harm the glass. Remove marking on completion.

Toughened glass: Do not cut, work, or permanently mark after toughening. Use installation methods which prevent the glass making direct contact with metals or other non-resilient materials.

Frameless installations: Join the vertical edges of adjacent glass panels with silicone jointing compound.

3.3 FIXING MIRRORS

Vinyl backed Grade A Safety mirrors and solid backed 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 to prevent contact between screw and glass. Do not over-tension the screws.

Frame fixing: Proprietary aluminium frames to mirror perimeter, corners mitred. If unbacked, bed glass edges in a continuous resilient gasket. Attach the frame to the substrate with concealed screw fixings. Seal the frame to the substrate with paintable sealant which will not react with the mirror coating. Do not allow the sealant to contact the mirror back.

Bead fixing: Rebated timber beads to mirror perimeter, corners mitred. If unbacked, bed glass edges in a continuous resilient gasket. Screw fix the beads to the substrate.

Clip fixing: Fix direct to wall plugs with chromium-plated fixed clip and spring clip fixings at 900 mm maximum centres around perimeter. If unbacked, provide polyethylene or cork washers to prevent contact between clips and mirror back.

3.4 GLAZED SHOWER SCREENS

Water shedding

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.

3.5 GLASS BALUSTRADES

Standard

Glass balustrades: To AS 1288, Section 7.

3.6 COMPLETION

Trade clean

Method: Clean with soft clean cloths and clean water, finishing with a clean squeegee. Do not use abrasive or alkaline materials.

Extent: All frames and glass surfaces inside and out.

Warranty

Shower screens: Manufacturer’s warranty:

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

0471 INSULATION AND SARKING MEMBRANES

1 GENERAL

1.1 AIMS

Responsibilities

General: Provide insulation and sarking membrane systems:

- Complete for their function.
- Conforming to the detail and location drawings.
- Firmly fixed in position.
- Maintain their performance for the life of the building.

1.2 CROSS REFERENCES

General

General: Conform to the *General requirements* worksection.

Associated worksections

Associated worksections: Conform to the following: Precast Concrete, Tilt Up concrete, Cladding

1.3 STANDARDS

Installation of mineral wool insulation

Comply with the ICANZ Industry Code of Practice for the Safe Use of Glass Wool and Rock Wool Insulation.

Marking: Deliver mineral wool products to site in packaging labelled FBS-1 BIO-SOLUBLE INSULATION.

1.4 INTERPRETATION

Definitions

General: For the purposes of this worksection the definitions given below apply.

- Terminology: To AS/NZS 4859.1.
- Fire hazard properties: Means the average specific extinction area, critical radiant flux, Flammability index, Smoke-Developed Index, smoke growth rate index, smoke development rate or Spread-of-Flame Index of a material or assembly that indicate how they behave under specific fire test conditions.
- Sarking membrane: Flexible membrane material normally used for waterproofing, vapour proofing or thermal reflectance.
- FBS-1 Glass wool: Spun fibres of molten glass, utilizing up to 60% recycled waste glass, thermally bonded to form batts, blankets and sheets for thermal and acoustic insulation.
- FBS-1 Rock wool: Spun fibres of molten rock thermally bonded to form batts and blankets for thermal and acoustic insulation.
- Polyester insulation: Polyester fibres thermally bonded to form batts and blankets.
- Vapour barrier: A material or system that adequately impedes the transmission of water vapour under specified conditions.
- Breathable (vapour permeable) membrane: A flexible membrane material normally used for secondary waterproofing that adequately allows for the transmission of water vapour and has a vapour resistance not more than 0.5 MNs/g.

1.5 SUBMISSIONS

Fire hazard properties

General: Submit evidence of conformance with the following:

- Fire hazard indices for all materials when tested in conformance with AS/NZS 1530.3, including, if the material has a reflective facing, scoring and blackening to AS/NZS 1530.3 clause A6:
  - . Spread of flame index: 0.
  - . Smoke developed index: $\leq$ 3.

- Facing materials: Flammability index < 5 when tested in conformance with AS 1530.2.
- Combustibility of insulation materials and facing: Not deemed combustible as determined by AS 1530.1.

Thermal properties
General: Submit evidence of conformance with AS/NZS 4859.1.

1.6 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of the sarking, vapour barrier and insulation before they are covered up or concealed.

2 PRODUCTS

2.1 INSULATION MATERIALS

Fire hazard properties
General: Fire hazard indices for all materials when tested in conformance with AS/NZS 1530.3:

- Spread of flame index: 0.
- Smoke developed index: ≤ 3.
- Materials with reflective facing: Test to AS/NZS 1530.3 clause A6.

Facing materials: Flammability index < 5 when tested in conformance with AS 1530.2.

Combustibility of insulation materials and facing: Not deemed combustible as determined by AS 1530.1.

Bulk and reflective 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 sheets RC/PIR): To AS 1366.2.

Polystyrene (extruded rigid cellular sheets RC/PS-E): To AS 1366.4.

Polystyrene (moulded rigid cellular sheets): To AS 1366.3.

Polyurethane (rigid cellular sheets): To AS 1366.1.

Polyurethane (sprayed): To ASTM D6694.

Reflective insulation: To AS/NZS 4859.1 Section 9.

Wet processed fibreboard (including softboard): To AS/NZS 1859.4.

Wool: To AS/NZS 4859.1 Section 6.

Certification: Required.

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

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Sarking membranes
Standard: To AS/NZS 4200.1.

Thermal performance: To AS/NZS 4859.1 Section 9.

Breathable (vapour permeable) membrane: Vapour resistance of not more than 0.5 MNs/g when tested to AS/NZS 4200.1

Fasteners and supports
General: Metallic-coated steel.

Mesh support to roof insulation
Metallic-coated steel wire netting: To AS 2423 Section 4.

- Size: 45 mm mesh x 1 mm diameter.

Welded safety mesh: To AS/NZS 4389.

3 EXECUTION

3.1 GENERAL

Framed wall thermal break strips
Product type: Proprietary item.

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

R-value: ≥ 0.2.

Screw fixing: Button head screws at 1 m centres.

Adhesive fixing: Wallboard adhesive ‘walnuts’ at 1 m centres.

Bulk insulation
Installation: To AS 3999 and BCA clause J1.2.

General: Ensure batts or blankets are firmly butted with no gaps except as follows:

- Access holes and vents: Do not obstruct.
- Light fittings and metal flues: Leave a 25 mm gap.
- Electrical cables: Ensure 5 mm of free air movement.

Sarking membrane
Standard: To AS/NZS 4200.2.

3.2 FLOOR INSULATION

Bulk installation
Product type: Fibre batts.

Batts: Fit tightly between framing members. If support is not otherwise provided, staple nylon twine to the framing and stretch tight.

Reflective sarking membrane
Fixing: Install as follows:

To timber: Proprietary fixings or metallic-coated clouts or staples at 300 mm maximum centres.

To steel: Tek screw with either 20 mm diameter washers or fixed through hardboard strips.

Overlap (minimum): 150 mm and adhesive tape fix.

Support mesh: 300 x 150 mm mesh size of 2 mm wire gauge to AS 1639.

3.3 WALL INSULATION

Bulk installation
Product type: Polyester Batts or Certified panel system (eg multi board) Additioanl R Value to be minimum R1.2

Batts: Friction fit between framing members. If support is not otherwise provided, staple nylon twine to the framing and stretch tight.

Retrofit masonry walls – internal face
Product type: Rigid cellular extruded sheets.

Preparation: Ensure substrates have:

- Any deposit or finish which may impair adhesion cleaned off.
- Excessive projections hacked off and voids and hollows filled with plaster.
- Tolerance: 6 mm in 2400 mm.

Substrate correction: Skim plaster.

Installation: Apply boards horizontally with staggered vertical joints, all close butted and without crushing.

Fixing: Proprietary adhesive compatible to both the membrane and the rigid cellular extruded sheets . Apply sufficient pressure to ensure even adhesive distribution.

Final finish: Apply plasterers scrim to all joints and prepare the surface as required by the manufacturer of the final finish.

Vapour permeable wall wrap
Application: Provide wall wrap behind cladding which does not provide a permanent weatherproof seal 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.
- Behind external cladding in bushfire prone areas to AS 3959.
- Masonry veneer.

Installation: Fix wall wrap to all framing members after being pulled taught over the framing. Apply to run horizontally to the outer face of external stud walls from the bottom plate up, over the flashing. Seal across the wall cavity at the top.

Horizontal laps: At least 150 mm wide with the direction of the lap ensuring that water is shed to the outer face of the membrane.

End or vertical overlaps laps: At least 150 mm wide made over framing.

Run the wall wrap over openings and leave covered until fenestrations are to be installed. Cut the membrane on a 45 degree diagonal from each corner of the opening and fold the flaps inside and fix to the inside frame of the opening.

If the membrane is used to provide a continuous air tight layer, seal all joints with pressure sensitive adhesive tape.

Fixing to timber frames: Metallic-coated clouts, 20 mm long 6-8 mm staples or punched multi-point metallic-coated steel brads.

Fixing to steel or aluminium: Tek screw with either 20 mm diameter washers or through hardboard strips.

Fixing to plywood: Alternatives:

- Metallic-coated clouts, 20 mm long 6-8mm staples or punched multi-point metallic-coated steel brads. Fixing centres: At least 300 mm.
- Water based contact adhesive with a 50% adhesive cover.

3.4 ROOF INSULATION

Mesh support to roof insulation

Locations: Provide support to the following:

- Sarking, vapour barrier or reflective thermal insulation membranes laid over roof framing members which are spaced at more than 900 mm centres.
- Blanket type thermal insulation laid over roof framing members as sound insulation to metal roofing.

Installing wire netting: Lay over the roof framing providing sufficient slack or sag between members to suit the application.

Fixing wire netting: Staple to timber frame, wire to steel frame.

Installing welded safety mesh: To AS 4389.

Bulk insulation – metal roofs

Batts: Fit tightly between framing members.

Blanket for sound insulation: Install over the roof support frame, reflective thermal insulation (if any), and mesh support, so that the blanket is in continuous contact with the underside of the metal roofing sheets.

Waterproof membrane roofs – IRMA/PMR types

Product type: Rigid cellular extruded sheets.

Preparation: Ensure membrane is clean and free of loose material.

Separation layer: Lay over membrane with edges lapped 300 mm and turned up at upstands and penetrations.

Installation: Lay insulation boards in brick pattern with shiplap edges pushed together firmly , cut neatly around penetrations and extended up upstands.

3.5 COMPLETION

Warranties

Insulation: Submit the manufacturer’s published product warranties.

4 SELECTIONS

4.1 WALL INSULATION

Bulk thermal insulation to 35 mm furring channels
Product: Multi board / Multi Panel

R-value: 1.2

Location: External Tilt UP / Pre cast walls

Masonry veneer cavity walls
Product:Air Cell

R-value: 0.5

Location: behind terracade

Wall wrap (wall sarking)
Type: Aircell

Duty to AS/NZS 4200.1:

Vapour barrier classification to AS/NZS 4200.1:

Emittance classification to AS/NZS 4200.1:

Location: behind zinc face walls

4.2 ROOF INSULATION

General
Location: The whole of the roof area including rooflight shaft walls, except the following:

- Eaves, overhangs, rooflights, vents and openings.
- Roofs to outbuildings, garages, and semi-enclosed spaces such as verandahs, porches and carports.

Framed roof thermal break strips
Product: as per BCA

Separate bulk insulation blanket and foil
Bulk insulation: Green Stuf Batts

- R-value: 3.0
- Duty to AS/NZS 4200.1:
- Vapour barrier classification to AS/NZS 4200.1: High.
- Emittance classification to AS/NZS 4200.1: Reflective (single sided).
- Location: Under Zinc rood panels (front facade)

0472 ACOUSTIC INSULATION

1 GENERAL

1.1 AIMS

Responsibilities

General: Provide insulation systems:

- Complete for their function.
- Conforming to the requirements of the BCA for sound insulation.
- Conforming to the detail and location drawings.
- Firmly fixed in position.
- Maintain their performance for the life of the building.

Selections: Conform to the **Selections**.

1.2 CROSS REFERENCES

General

General: Conform to the *General requirements* worksection.

Refer Acoustic Report/Soecification by Lloyd George Acoustics

Associated worksections

Associated worksections: Conform to the following: Cladding, Precast Concrete, Tilt Up

1.3 STANDARDS

Installation of mineral wool insulation

Comply with the ICANZ Industry Code of Practice for the Safe Use of Glass Wool and Rock Wool Insulation.

Marking: Deliver mineral wool products to site in packaging labelled FBS-1 BIO-SOLUBLE INSULATION.

1.4 INTERPRETATIONS

Definitions

General: For the purposes of this worksection the definitions given below apply:

- Acoustic insulation: (a) Reduction of sound energy passing through building elements. (b) Materials or methods of construction to reduce the transmission of air-born and structure-born sound through walls, floors or other enclosing elements in buildings.
- Acoustic material: Building material with specific acoustic properties to achieve:
  - . Sound transmission loss.
  - . Sound absorption.
  - . Damping of resonance.
  - . Resilience against impact noise.
- Fire hazard properties: Means the average specific extinction area, critical radiant flux, Flammability index, Smoke-Developed Index, smoke growth rate index, smoke development rate or Spread-of-Flame Index of a material or assembly that indicate how they behave under specific fire test conditions.
- Mineral wool (including glasswool and rockwool): Entangled mat of fibrous non-crystalline material derived from inorganic oxides or minerals, rock, slag or glass, processed at high temperatures from a molten state.

1.5 INSPECTION

Notice

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

- Insulation installed before it is covered up or concealed.

2 PRODUCTS

2.1 INSULATION MATERIALS

Fire hazard properties

General: Fire hazard indices for all materials when tested in conformance with AS/NZS 1530.3:

- Spread of flame index: 0.
- Smoke developed index: ≤ 3.

Facing materials: Flammability index < 5 when tested in conformance with AS 1530.2.

Bulk insulation

Cellulosic fibre (loose fill), mineral wool blankets and cut pieces, polyester Section 7, polyisocyanurate, polyurethane, wet processed fibreboard, wool and jute: Proprietary items.

Board insulation

Polystyrene (extruded rigid cellular sheets), polystyrene (moulded rigid cellular sheets), polyurethane (rigid cellular sheets), compressed glasswool rigid panels, recycled rubber and composite plasterboard panels: Proprietary items.

Flexible sheet insulation

Loaded vinyl: Proprietary item.

Fasteners and supports

Cavity Walls with steel stud framing lined one side: Increase stud base metal thickness to 1.15 mm.

Furring channels to masonry walls: as required

Resilient clip fixings: as required

Fixing:

- Clips: 600 mm horizontally x 1200 mm vertically and a row 100 mm from the top and bottom at 1200 mm c/c.
- Vertical furring channels: 600 mm centres.

Sealants

Acoustic sealant: Non-hardening sealant compatible with the materials to be sealed and rated to R_w 65.

Fire rated: Non-hardening sealant compatible with the materials to be sealed and having a fire rating equal to that of the partition it seals.

Sealant strips: Closed cell resilient foam.

3 EXECUTION

as per Lloyd George Report / Specification

0511b LINING

4 GENERAL

4.1 AIMS

Responsibilities
General: Provide internal lining systems to the **Selections**.

4.2 CROSS REFERENCES

General
General: Conform to the *General requirements* worksection.

4.3 INSPECTION

Notice
Inspection: Give sufficient notice so that inspection may be made of substrate or framing before installation of linings.

4.4 TOLERANCES

Surface
Flatness, twist, winding and bow: ≤ 1.5 mm deviation from a 1.5 m straightedge placed in any position.

5 PRODUCTS

5.1 MATERIALS AND COMPONENTS

Plasterboard
Standard: To AS/NZS 2588.

Fibre cement
Standard: To AS/NZS 2908.2.

Wall and ceiling linings: Type B category 2.

Minimum thickness: 4.5 mm.

Plywood and blockboard
Interior use: To AS/NZS 2270.

Exterior use: To AS/NZS 2271.

Visible surfaces with a clear finish: Veneer quality A.

Other visible surfaces: Veneer quality B.

Back/face veneer: Veneer quality C or D.

Bond: Type A.

Presealed plywood: Plywood pre-sealed both sides and edges with a machine applied sealer.

Wet processed fibreboard (including hardboard)
Standard: To AS/NZS 1859.4.

Dry-processed fibreboard (including medium density fibreboard)
Standard: To AS/NZS 1859.2.

Melamine overlaid medium density fibreboard: Medium density fibreboard (STD MDF) overlaid on both sides with low pressure melamine.

Decorative overlaid wood panels
Standard: To AS/NZS 1859.3.

Certification
General: Brand panels under the authority of a recognised certification program applicable to the product. Locate the brand on faces or edges which will be concealed in the works.

Certification programs:

- Plywood and blockboard: Engineered Wood Products Association of Australia (EWPAA) Quality Control and Product Certification Scheme.

- Wet processed fibreboard, dry processed fibreboard, particleboard and decorative overlay wood panels: Australian Wood Panels Association AWPA JAS-ANZ Scheme.

High pressure decorative laminate sheet
Standard: To AS/NZS 2924.1.

Coated steel
Standard: To AS 1397.

Fasteners
Steel nails: Hot dip galvanized.

Adhesives
For wallboards: Gunnable synthetic rubber/resin based mastic contact adhesive formulated for bonding flooring and wallboards to a variety of substrates.

Sealants
Fire rated sealant: Non-hardening sealant compatible with the materials to be sealed and having a fire rating equal to that of the partition it seals.

Acoustic sealant: Non-hardening sealant compatible with the materials to be sealed and having a specific gravity of not less than 1.5 gm/cubic centimetre and of 100% polyurethane mastic.

6 EXECUTION

6.1 CONSTRUCTION GENERALLY

Conditions
Do not commence lining work until such time as the building or zone in question is enclosed and weathertight and all wet trades have been completed.

Substrates or framing
General: Before fixing linings check and, if necessary, adjust the alignment of substrates or framing.

Battens
General: Fix at each crossing with structural framing members, or direct to solid walls or ceilings. Provide wall plugs in solid backgrounds.

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 necessary to complete the installation.

Adhesives
General: Provide adhesives of types appropriate to their purpose, and apply them so that they transmit the loads imposed, without causing discolouration of finished surfaces.

6.2 PLASTERBOARD LINING

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.

Transverse walls: Locate noggings as follows:

- At least 150 mm from the horizontal joint.
- Ensure that noggings do not protrude beyond the face of studs.

Installation
Gypsum plasterboard and fibre reinforced gypsum lining: To AS/NZS 2589.

Wet areas: Do not use adhesive fixing alone.

Multiple sheet layers
Application: Fire rated and acoustic rated walls.

Joints: Fill and flush up all joints and fixings in each layer and caulk up perimeters and penetrations before commencing succeeding layers. Stagger all sheet joints by minimum 200 mm.

Joints

Flush joints: Provide recessed edge sheets and finish flush using perforated paper reinforcing tape.

Butt joints: Make joints over framing members or otherwise provide back blocking.

External corner joints: Make joints over metallic-coated steel corner beads.

Dry joints: Provide square edged sheet and finish with a UPVC joining section.

Control joints: Install purpose-made metallic-coated control joint beads at not more than 12 m centres in walls and ceilings and to coincide with structural movement 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.

6.3 FIBRE CEMENT LINING

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.

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: 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.

Masonry wall construction:

- Fix using adhesive direct to masonry, but do not fix direct to masonry as a substrate for tiled finish.
- Fix to furring channels using screw or screw and adhesive.

Ceilings: Fix using screw or screw and adhesive to ceiling furring members. Do not fix sheets to the bottom chords of trusses.

Wet areas: Do not use adhesive fixing alone.

Multiple sheet layers

Application: Fire rated and acoustic rated walls.

Joints: Fill and flush up all joints and fixings in each layer and caulk up perimeters and penetrations before commencing succeeding layers. Stagger all sheet joints by minimum 200 mm.

Joints

Flush joints: Provide recessed edge sheets and finish flush using perforated paper reinforcing tape.

- Movement joints in walls: Position a stud parallel to the joint on each side.
- Movement joints in ceilings and soffits: Provide movement joints to divide ceilings into bays not larger than 10.8 x 7.2 m and soffit linings into bays not larger than 4.2 x 4.2 m or 5.4 x 3.6 m. Provide framing parallel to the joint on each side. Do not fix the lining to abutting building surfaces.

External corner joints: Make joints over metallic-coated steel corner beads.

Dry joints: Provide square edged sheet and finish with a UPVC joining section.

Control joints: Provide purpose-made metallic-coated control joint beads at ≤ 7.2 m centres in walls and ceilings and to coincide with structural movement 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.

- Movement joints: 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.

6.4 CEILING ACCESS

General

Location: Provide personnel access ways to each separate ceiling space.

Material: Match adjacent ceiling.

Opening size: Maximise the space available within a 600 x 600 mm ceiling grid.

Types

Trimmed personnel access ways: Plain cover supported on all sides by timber trim fixed to underside of ceiling.

Flush personnel access ways: Cover fitted with rebated frame and set flush with the surrounding ceiling.

6.5 TRIM

General

General: Provide trim such as beads, mouldings and stops to make neat junctions between lining components, finishes and adjacent surfaces.

Timber trim

Hardwood: AS 2796.1.

Cypress pine: AS 1810.

Softwood: To AS 4785.1.

- Grade: To AS 4785.2.

0531b SUSPENDED CEILINGS – COMBINED

1 GENERAL

1.1 AIMS

Responsibilities
General: Provide suspended ceilings to the **Selections** and as follows.
- Consistent in finish treatment.

1.2 CROSS REFERENCES

General
General: Conform to the *General requirements* worksection.

1.3 STANDARDS

General
Suspended ceilings: To AS/NZS 2785.
Luminaire and air diffuser interface: To AS 2946.

1.4 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of:
- The suspension system before the installation of ceiling tiles or panels.
- The ceiling assembly before the installation of fittings and site painting, if applicable.
- The completed ceiling.

1.5 SUBMISSIONS

Samples
General: Submit samples as follows:
- Suspension system: Sections proposed for the suspension system, including wall angles and trim.
- Ceiling material: Sheet, panel, tile and strip, with insulation, showing the extremes and mean of variation in colour, pattern, or texture of the proposed finish.
- Methods: Methods of jointing, fixing, height adjustment, retaining and removing panels.

2 PRODUCTS

2.1 SUSPENSION SYSTEM

Proprietary system
General: Provide in conformance with the **Proprietary suspended system schedule**.

2.2 CEILING TILES

Tiles
General: Provide in conformance with the **Ceiling tile schedule**.

2.3 LININGS

Plasterboard
Standard: To AS/NZS 2588.

Fibre cement
Standard: To AS/NZS 2908.2.
Wall and ceiling linings: Type B category 2.
Minimum thickness: 4.5 mm.

Sealants
Fire rated sealant: Non-hardening sealant compatible with the materials to be sealed and having a fire rating equal to that of the partition it seals.

Acoustic sealant: Non-hardening sealant compatible with the materials to be sealed and rated to R_w 65.

3 EXECUTION

3.1 SUSPENSION SYSTEM

Alterations
General: Dismantle and re-use ceiling suspension system members and supplement them with compatible members as required.

Ceiling grid
General: Set out the ceiling grid so that tile or panel joints and centrelines of visible suspension members coincide with grid lines shown on the drawings. If not otherwise shown, set out so that opposite margins are equal.

Suspension system
Failure: Provide a ceiling system such that failure of any one suspension point does not cause a progressive failure of the ceiling.

Height adjustment: Provide height adjustment by means of a length adjustment device at each suspension point, permitting length variation of at least 50 mm.

Grid members: If required, notch grid members at the junction with the perimeter trim to ensure the panels lie flat on the perimeter trim.

Restriction: Do not attach the suspension system to the lip of purlins.

Services
Support: Space the support members as required by the loads on the system and the type of ceiling, and allow for the installation of services and accessories, including ductwork, light fittings and diffusers. Provide additional back support or suspension members for the fixing of such items to ensure that distortion, overloading or excessive vertical deflection is prevented. Do not fix suspension members to services (e.g. ductwork) unless the service has been designed to accept the ceiling load. In locations where services obstruct the ceiling supports, provide bridging and suspension on each side of the services. Do not support services terminals on ceiling tiles or panels.

Partitions
General: If partitions are attached to the underside of the ceiling systems include the partition mass in the seismic mass of the ceiling.

Protection
General: Protect existing work from damage during the installation.

Stability
General: Install the ceilings level; and fix so that under normal conditions there is no looseness or rattling of ceiling components.

Structure-borne sound
General: Provide a ceiling system which does not amplify structure-borne sound. Provide suitable proprietary products or systems for reducing contact vibrations between structure and ceiling.

Bracing
General: Provide bracing to prevent lateral movement and to resist the imposed horizontal seismic force.

Bulkheads
General: Construct bulkheads and other similar ceiling formations as an integral part of the ceiling structure. Brace bulkheads to prevent lateral movement. If the ceiling is terminated at a bulkhead, provide for seismic requirements.

External suspended soffits
General: Support external suspended soffits on rigid members capable of carrying the imposed loads. Install members to minimise any eccentricity, and ensure that the upward and downward wind loads are carried through to the supporting structure.

Fasteners
General: Install fasteners so that they are not visible in the finished ceiling. Do not use screw fasteners in materials supporting hangers less than 3 mm thick.

Movement joints
Abutments: Install the ceiling to allow for differential movement at abutting surfaces.

Alignment: Install the ceiling with control joints to correspond in location and direction to those in the structural frame. Do not bridge any control joint in the structural frame.

Prefinishes
General: Repair damaged prefinishes by recoating.

Curtain recesses
General: Provide curtain recesses, including:

- Lining.
- Curtain track support.
- Accommodation for motors and cabling.

3.2 TILES

Alterations
General: Re-use existing tiles and supplement them with new ceiling tiles to suit the suspension system as required.

General
Fitting: Fit tiles accurately and neatly, free from air leakage and staining.

Lock clips: If tiles are exposed to wind loads or if required for security, insert lock clips at the junction of carrier rails and tiles.

Pattern and texture: Set out patterned or heavily textured materials to give consistency in direction of pattern or texture.

Service penetrations
General: Provide openings for, and fit the ceiling up to, all services elements such as light fittings, ventilation outlets, detectors, sprinklers and loudspeakers.

Cut tile edges
General: Conceal, or finish to match prefinished edges.

3.3 PLASTERBOARD LINING

Installation
Gypsum plasterboard and fibre reinforced gypsum plaster: To AS/NZS 2589.

Suspended flush ceilings: Fix using screw or screw and adhesive to ceiling members or support frame.

Multiple sheet layers
Application: Fire rated and acoustic rated walls.

Joints: Fill and flush up all joints and fixings in each layer and caulk up perimeters and penetrations before commencing succeeding layers. Stagger all sheet joints by minimum 200 mm.

Joints
Flush joints: Provide recessed edge sheets and finish flush using perforated paper reinforcing tape.

Butt joints: Make joints over framing members or otherwise provide back blocking.

External corner joints: Make joints over metallic-coated steel corner beads.

Control joints: Install purpose-made metallic-coated control joint beads at not more than 12 m centres in walls and ceilings and to coincide with structural movement joints.

Wet areas: Install additional supports, flashings, trim and sealants as required.

3.4 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.

Suspended flush ceilings: Fix using screw or screw and adhesive to ceiling members or support frame.

Wet areas: To AS 3740.

Multiple sheet layers
Application: Fire rated and acoustic rated walls.

Joints: Fill and flush up all joints and fixings in each layer and caulk up perimeters and penetrations before commencing succeeding layers. Stagger all sheet joints by minimum 200 mm.

Joints

Flush joints: Provide recessed edge sheets and finish flush using perforated paper reinforcing tape.

Movement joints in ceilings and soffits: Provide movement joints to divide ceilings into bays not larger than 10.8 x 7.2 m and soffit linings into bays not larger than 4.2 x 4.2 m or 5.4 x 3.6 m. Provide framing parallel to the joint on each side. Do not fix the lining to abutting building surfaces.

External corner joints: Make joints over metallic-coated steel corner beads.

Dry joints: Provide square edged sheet and finish with a UPVC joining section.

Control joints: Provide purpose-made metallic-coated control joint beads at ≤ 7.2 m centres in walls and ceilings and to coincide with structural movement joints.

Wet areas: Provide additional supports, flashings, trim and sealants as required.

3.5 ACCESS PANELS

Finish

General: Match the access panels to the ceiling in appearance and performance.

Identification

General: Provide each access panel with an identification mark.

Non-demountable ceilings

General: Provide access panels supported and anchored to permit ready removal and refixing.

Reinforcement

General: Reinforce the back of the access panel to prevent warping and facilitate handling.

3.6 TRIM

General

General: Provide trim such as beads, mouldings and stops to make neat junctions between lining components, finishes and adjacent surfaces.

Control joints

Location: Provide for control joints in sheet finishes where required by the *Lining* worksection. Where possible, position joints to intersect lighting fixtures, vents or air diffusers.

Type: Form movement joints with purpose-made control joint beads.

Plasterboard cornices

Fixing: Adhesive fix with the supplier's cornice cement. Pin in place at cornice edges until adhesive sets, remove pins and fill holes.

Fibrous plaster cornices and roses

Accessible ceiling spaces: Pin or prop in place and fix with wet plaster of Paris and scrim straps over framing members.

Fire rated walls

Seal to soffit with sealant of matching fire rated level prior to fixing decorative cornices.

3.7 COMPLETION

Maintenance manual

General: On completion, submit a manual of recommendations for the care and maintenance of the ceiling, and operating instructions for demounting if applicable.

Spares

General: Supply spare matching lining units and accessories of each type for future replacement purposes. Store the spare materials on site where directed.

Supporting system: One spare supporting member (hanger or framework member) for every 100 members (or part thereof) of the same type installed in the ceiling.

Lining units: One spare unit for every 50 units (or part thereof) installed in the ceiling.

0551 JOINERY

1 GENERAL

1.1 AIMS

Responsibilities
General: Fabricate and install joinery items to backgrounds undamaged, plumb, level, straight and free of distortion and to the **Tolerances table**.

Tolerances table

Property	Tolerance criteria
Plumb and level	1 mm in 800 mm
Offsets in flush adjoining surfaces	< 0.5 mm
Offsets in revealed adjoining surfaces	< 2 mm
Alignment of adjoining doors	< 0.5 mm
Difference in scribe thickness for joinery items centred between walls	< 2 mm
Doors centred in openings	zero
Joints in finished surfaces	zero

1.2 CROSS REFERENCES

General
General: Conform to the *General requirements* worksection.

1.3 INSPECTION

Notice
Inspection: Give sufficient notice so that inspection may be made of the following:
- Shop fabricated or assembled items ready for delivery to the site.
- Openings prepared to receive assemblies.
- Site erected assemblies on completion of erection, before covering up by cladding and encasing.
- Surfaces prepared for, and immediately before, site applied finishes.
- Completion of installation.

1.4 SUBMISSIONS

Samples generally
General: Submit samples to the **Sample table.**

Sample table

Description	No. of samples
Each type of board to be used complete with finish and edge stripping	2
Each type of joint	2
Typical item of hardware indicating each finish	2
Samples of the selected stone cladding showing the maximum expected variation	2 x 3 variants
Samples of the selected timber veneer showing the maximum expected variation	2 x 3 variants
Patch of each nominated fabric	2
The finish to all stainless steel items	2
Complete timber bench cupboard door, including hardware	1
Complete drawer front, including hardware	1

Clear finished samples
Initial submission:

- Veneered board: Three samples each 600 x 600 mm for each species.
- Solid timber: Three samples each 40 x 19 x 600 mm for each species.

Control sample: The approved selection from the initial submission.

Finished sample: Cut the control sample in half and apply the finish to half the remaining area.

Shop drawings

General: Submit shop drawings to a scale not smaller than 1:50, showing:

- Overall dimensions.
- Materials, thicknesses and finishes of elements including doors, divisions, shelves and benches.
- Type of construction including mitre joints and junctions of members.
- Hardware type and location.
- Temporary bracing, if required.
- Procedures for shop and site assembly and fixing.
- Locations of benchtop joints.
- Stone benchtop layout including joint arrangement and penetrations.
- Locations of sanitary fixtures, stoves, ovens, sinks, and other items to be installed in the units.
- Relationship of fixture to adjacent building elements.
- Proposals for the break-up of large items as required for delivery to the site.
- Proposed method of joining the modules of large items.

Timing: Prior to fabrication.

Environmental rating

Timing: Prior to fabrication.

2 PRODUCTS

2.1 JOINERY MATERIALS AND COMPONENTS

Visible work

Clear finished timber and veneer: Ensure all visible surfaces are free of branding, crayon or chalk marks and of blemishes caused by handling.

Joinery timber

Hardwood: To AS 2796.3.

Seasoned cypress pine: To AS 1810.

Softwood: To AS 4785.3.

Finished sizes: For milled timbers actual dimensions which are at least the required dimensions, except for dimensions qualified by a term such as ‘nominal’ or ‘out of’ 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.

Visible surface with a clear finish: Veneer quality A.

Other visible surfaces: Veneer quality C or D.

Non-structural glued laminated timber

Standard: AS 5067.

Wet processed fibreboard (including hardboard)

Standard: To AS/NZS 1859.4.

Particleboard

Standard: To AS/NZS 1859.1.

Melamine overlaid particleboard: Particleboard overlaid on both sides with low pressure melamine.

Dry-processed fibreboard (including medium density fibreboard)

Standard: To AS/NZS 1859.2.

Melamine overlaid medium density fibreboard: Medium density fibreboard (STD MDF) overlaid on both sides with low pressure melamine.

Decorative overlaid wood panels
Standard: To AS/NZS 1859.3.

Certification
General: Brand panels under the authority of a recognised certification program applicable to the product. Locate the brand on faces or edges which will be concealed in the works.

Certification programs:

- Plywood and blockboard: Engineered Wood Products Association of Australia (EWPAA) Quality Control and Product Certification Scheme.
- Wet processed fibreboard, dry processed fibreboard, particleboard and decorative overlay wood panels: Australian Wood Panels Association AWPA JAS-ANZ Scheme.

High-pressure decorative laminate sheets
Standard: To AS/NZS 2924.1.

Class	Definition	Typical applications
CG (S or F)	Compact general purpose	High performance, self supporting vertical or horizontal surfaces
HD (S or F)	Horizontal heavy duty	High performance horizontal surfaces
HG (S, or P)	Horizontal general purpose	General horizontal surfaces and high performance vertical surfaces
VG (S, or P)	Vertical general purpose	General vertical surfaces and light duty horizontal surfaces
VL (S)	Vertical light duty	Light duty vertical surfaces

Thickness (minimum):

- For horizontal surfaces fixed to a continuous background: 1.2 mm.
- For vertical surfaces fixed to a continuous background: 0.8 mm.
- For post formed laminate fixed to a continuous background: 0.8 mm.
- For vertical surfaces fixed intermittently (e.g. to studs): 3.0 mm.
- For edge strips: 0.4 mm.

Stone facings
General: Provide stone slabs within the visual range of the approved samples. Repair mud veins or lines of separation that are integral to the selected pattern with resin fillers and back lining.

Vinyl and linoleum
Material: Desktop grade sheeting.

Fixing: Spray adhesives to flat surfaces and double-stick contact adhesive method to curved surfaces.

Plastics and rubber

Splashbacks
Glass: 6 mm toughened colourback glass with a factory applied opaque coating to the back.

- Standard: To AS/NZS 2208.

Stainless steel: Grade 304, fine linished finish.

2.2 VENEERS

Timber veneer
Veneer quality: To AS/NZS 2270.

Grades (minimum requirement):

- Select grade, veneer quality A, for visible surfaces to have clear finish or to have no coated finish.
- General purpose grade, veneer quality B, for other visible surfaces.

General: Provide veneers slip matched and flitch batched and falling within the visual range of the approved samples.

Vinyl veneer
Type: Proprietary unbacked vinyl fabric factory-bonded to the designated surface.

2.3 JOINERY ITEMS

General

Provide materials noted on drawings as follows:

- Joinery components and their location, indicative construction details, scribes and trims, materials, dimensions and thicknesses, and finishes shall be as detailed.
- All dimensions noted on drawings shall be confirmed on site after the completion of partitions.
- Finishes selections are noted in the Finishes schedule.
- Hardware and equipment: Major items shall be noted on drawings where they occur and all hardware and equipment items are noted in the FF&E schedule.

2.4 DOMESTIC KITCHEN ASSEMBLIES

Standard

General: To AS/NZS 4386.1.

Plinths

Material: Select from the following:

- Exterior general purpose plywood.
- High moisture resistant particleboard.
- High moisture resistant medium density fibreboard.

Thickness: 16 mm.

Fabrication: Form up with front and back members and full height cross members at not more than 900 mm centres.

Finish: High-pressure decorative laminated sheet.

- Fasteners: Conceal with finish.

Installation: Scribe to floor and secure to wall to provide level platform for carcasses.

Carcasses

Material: Select from the following:

- Melamine overlaid high moisture resistant particleboard.
- Melamine overlaid high moisture resistant medium density fibreboard.

Thickness: 16 mm.

Joints: Select from the following:

- Proprietary mechanical connections.
- Dowels and glue.
- Screws and glue.
- Proprietary joining plates and glue.

Adjustable shelves: Support on proprietary pins in holes bored at equal centres vertically.

- Spacing: 32 mm.

Fasteners: Conceal with finish.

Installation: Secure to walls at not more than 600 mm centres.

Drawer fronts and doors

Material: Select from the following:

- Melamine overlaid high moisture resistant particleboard.
- Melamine overlaid high moisture resistant medium density fibreboard.

Thickness: 16 mm.

Maximum door size: 2400 mm high, 900 mm wide, 1.5 m^2 on face.

Drawer fronts: Rout for drawer bottoms.

Drawer backs and sides

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.

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.
- Nickel plated.

Piano hinges: Chrome plates steel, extending full height of doors.

Slides: Metal runners and plastic rollers with the following features:
- 30 kg loading capacity.
- Closure retention.
- White thermoset powder coating or nickel plated.

2.5 WORKING SURFACES

Laminated benchtops
Finish: High-pressure decorative laminated sheet.

Exposed edges: Extend laminate over shaped nosing, finishing > 50 mm back on underside. Splay outside corners at 45°.

Balance underside: Extend laminate to the undersides of benchtops.

Installation: Scribe to walls. Fix to carcass at least twice per 600 mm length of benchtop.

Joint sealing: Fill joint with sealant matching finish and clamp with proprietary mechanical connectors.

Stone benchtops
Balance underside: Laminate undersides of benchtops.

Splash backs
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 ‘wallnuts’ of adhesive together with double sided adhesive tape for temporary support, and affix directly to the substrate.

3 EXECUTION

3.1 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
Visibility: Do not provide visible fixings except in the following locations:
- Inside cupboards and drawer units.
- Inside open units in which case provide proprietary caps to conceal fixings.

Visible fixings: Where fastenings are unavoidable on visible joinery faces, sink the heads below the surface and fill the sinking flush with a material compatible with the surface finish. In surfaces which are to have clear or tinted finish provide matching wood plugs showing face (not end) grain. In surfaces which are to have melamine finish provide proprietary screws and caps finished to match.

Fix joinery units to backgrounds as follows:
- Floor mounted units: 600 mm centres max.
- Wall mounted units: To each nogging and/or stud stiffener.

Fixings: Screws with washers into timber or steel framing, or masonry anchors.

Adhesives
General: Provide adhesives to transmit the loads imposed and to ensure 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.

Joints: Scribe internal and mitre external joints.

Edge strips: Finish exposed edges of sheets with edge strips which match sheet faces.

Matching: For surfaces which are to have clear or tinted finish, arrange adjacent pieces to match the grain and colour.

Hygiene requirements: To all food handling areas and voids at the backs of units to all areas, seal all carcass junctions with walls and floors, and to cable entries, with silicone beads for vermin proofing. Apply water resistant sealants around all plumbing fixtures and ensure the sealants are fit for purpose.

Labelling
General: Permanently mark each unit of furniture with the manufacturer's name, on an interior surface.

3.2 DELIVERY AND STORAGE

General
General: Deliver joinery units to site in unbroken wrapping or containers and store so that its moisture content is not adversely affected. Do not store in areas of wet plaster. Keep storage to a minimum by delivering items only when required for installation.

Back prime surfaces concealed by backgrounds.

Examine joinery units for completeness and remedy deficiencies.

Acclimatisation
General: Acclimatise the joinery items by stacking it in the in-service conditions with air circulation to all surfaces after the following construction operations are complete:

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

Background
General: Damp clean and vacuum background surfaces that will be permanently concealed.

3.3 COMPLETION

Maintenance manual
General: Submit manufacturer’s published recommendations for service use.

Cleaning
Temporary coatings: On or before completion of the works, or before joining up to other surfaces, remove all traces of temporary coatings used as a means of protection.

General: Remove all dust, marks and rubbish from all surfaces and internal spaces. Clean and polish all self finished surfaces such as anodised and powdercoated metals, sanitaryware, glass, tiles and laminates.

0552b METALWORK

1 GENERAL

1.1 AIMS

Responsibilities
General: Provide metal fixtures that are:
- Undamaged, plumb, level and straight.
- Free of surface defects or distortions.

1.2 CROSS REFERENCES

General
General: Conform to the *General requirements* worksection.

1.3 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of the following:
- Shop fabricated or assembled items ready for delivery to the site.
- Commencement of shop or site welding.
- Site erected assemblies on completion of erection, before covering up by cladding and encasing.
- Steel surfaces prepared for, and immediately before, site applied finishes.

1.4 SUBMISSIONS

Shop drawings
General: Submit shop drawings showing the following information:
- Details of fabrication and components.
- Details of fabrication involving other trades or components.
- Information necessary for site assembly.
- Proposals for the break-up of large items as required for delivery to the site.
- Proposed method of joining the modules of large items.

Shop drawing certification
General: Engage a Professional Engineer and submit certification for the design and installation of: structural steelwork

Tests
Stainless steel: Before fabrication commences, submit satisfactory evidence that relevant procedure test plates have passed the tests specified in AS/NZS 1554.6.

Materials
Manufacturer's data: Submit manufacturer's published product data including standard drawings and details.

Stainless steel: For each batch of stainless steel supplied to the works, submit the certificate of compliance or test certificate specified in the applicable standard.

2 PRODUCTS

2.1 MATERIALS AND COMPONENTS

Metals
Performance: Provide metals suited to their required function, finish and method of fabrication, in sections of strength and stiffness adequate for their purpose.

Copper alloys (brass, bronze)
Composition and designations: To AS 2738.

Rivets
General: Blind rivets where available in the required metal.

Masonry anchors
General: Proprietary types comprising screws or bolts in self-expanding sockets.

Masonry plugs
General: Screws in purpose-made resilient plastic sockets.

2.2 STAINLESS STEEL FINISHES

Sample
General: Provide a finish to match the sample in terms of the mill grade and finish process.

3 EXECUTION

3.1 CONSTRUCTION GENERALLY

Aluminium structures
Standard: To AS/NZS 1664.1 or AS/NZS 1664.2.

Metals
Performance: Provide metals so that they transmit the loads imposed and ensure the rigidity of the assembly without causing deflection or distortion of finished surfaces.

Incompatible metals: Separate using concealed layers of suitable materials in appropriate thicknesses.

Fasteners
Performance: Provide non-galvanic corrosion fasteners.

Materials: Provide fasteners in materials of mechanical strength and corrosion resistance at least equal to that of the lowest resistant metal joined.

To copper and copper alloys: Provide copper or copper-alloy fixing devices only.

To aluminium and aluminium alloys: Provide aluminium alloy or non-magnetic stainless steel fixing devices only.

To stainless steel: Provide appropriate stainless steel materials only.

Fabrication
Workshop: Fabricate and pre-assemble items in the workshop wherever practicable.

Edges and surfaces: Keep clean, neat and free from burrs and indentations. Remove sharp edges without excessive radiusing.

Tube bends: Form bends in tube without visibly deforming the cross section.

Colour finished work: Match colours of sheets, extrusions and heads of fasteners.

Thermal movement: Accommodate thermal movement in joints and fastenings.

Fabrication tolerances
Structural work generally: $\pm$ 2 mm from design dimensions.

Joints
General: Fit joints to an accuracy appropriate to the class of work. Finish visible joints made by welding, brazing or soldering using grinding, buffing or other methods appropriate to the class of work, before further treatment.

Self-finished metals: Free of surface colour variations, after jointing.

Joints: Fit accurately to a fine hairline.

Marking
General: Provide suitable and sufficient marks or other means for identifying each member of site-erected assemblies, and for their correct setting out, location, erection and connection. Mark bolted connections to show the bolting category. Do not mark stainless steel by notching.

Splicing
General: Provide structural members in single lengths.

3.2 WELDING AND BRAZING

General
Quality: Provide finished welds which are free of surface and internal cracks, slag inclusion, and porosity.

Site welds: Avoid site welding wherever possible. If required locate site welds in positions for down hand welding.

Butt weld quality level: Not inferior to the appropriate level recommended in AS 1665 Appendix A.

Brazing

General: Ensure brazed joints have sufficient lap to provide a mechanically sound joint. Do not used butt joints relying on the filler metal fillet only.

3.3 STAINLESS STEEL FABRICATION

Welding stainless steel

Certification of welders: To AS 1796.

Riveting

General: Riveting may be used only to join stainless steel sheet or strip less than 1 mm thick. Drill (not punch) the rivet hole, and drive the rivet cold. On completion, clean and passivate the riveted assembly.

Soldering

General: Do not solder stainless steel.

3.4 METAL FIXTURES

General

General: Provide metal fixtures noted on drawings as follows:

- Components and their location, indicative construction details, scribes and trims, materials, dimensions and thicknesses, and finishes shall be as detailed.
- All dimensions noted on drawings shall be confirmed on site.
- Finishes selections are noted in a Finishes schedule on the drawings.
- Hardware and equipment.

3.5 CORNER GUARDS

Guards

General: Where salient corners of the structure are required to be protected from mechanical damage, provide metal corner guards as follows:

- Consisting of rolled angle sections or sections fabricated from metal sheet bent to the radius or angle of the corner.
- Fitting close to adjoining surface finishes.
- Solidly grouted up at the back as necessary to eliminate voids.
- Securely fixed by a method which does not cause distortion in the guard surface, and consists of either concealed built in lugs, or flush countersunk head fixings into masonry anchors.

3.6 COMPLETION

Maintenance manual

General: Submit manufacturer’s published recommendations for service use.

Cleaning

Temporary coatings: On or before completion of the works, or before joining up to other surfaces, remove all traces of temporary coatings used as a means of protection.

0554 STAIRS, LADDERS AND WALKWAYS

1 GENERAL

1.1 AIMS

Responsibilities
Selections: Conform to the **Selections**.

1.2 CROSS REFERENCES

General
General: Conform to the *General requirements* worksection.

1.3 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of the following:
- Shop fabricated or assembled items ready for delivery to the site.
- Commencement of shop or site welding.
- Site erected assemblies on completion of erection, before applying finishes.
- Steel surfaces prepared for, and immediately before, site applied finishes.

1.4 SUBMISSIONS

Subcontractors
General: Submit names and contact details of proposed suppliers and installers.

Shop drawings
General: Submit shop drawings showing the following information where relevant.

Fabricated metal stairs, platforms and walkways: Supplement structural steel shop drawings as follows:
- Details of fabrication and components.
- Details of fabrication involving other trades or components.
- Information necessary for site assembly.
- Proposals for the break-up of large items as required for delivery to the site.
- Proposed method of joining the modules of large items.

Installation of proprietary items
General: Submit the manufacturer's standard drawings and details showing:
- Methods of construction.
- Assembly and fixing, with dimensions and tolerances.

Verification of timber
Certificate: Submit a supplier's certificate (which may be included on an invoice or delivery docket) verifying conformance to grading and noting moisture content. Do not brand timber products.

Inspection: If neither branding nor certification is adopted, submit a report by an independent inspecting authority verifying conformance.

1.5 STANDARDS

General
Access for maintenance: To AS 1657.

Design for access and mobility:
- General requirements – new building work: To AS 1428.1.
- Tactile indicators: To AS 1428.4.

Balustrades for Class 1 and Class 10 buildings: To BCA clause 3.9.2.

1.6 INTERPRETATIONS

Definitions

General: For the purposes of this worksection the definitions given below apply.

- Balustrade: Synonymous with guardrailing.
- Circular stairs: A stair assembly with a helical arrangement of treads.
- Going: In a stair, the horizontal distance from the nosing of one tread to the nosing of the next tread.
- Guardrailing: A structure to prevent a person from falling off any platform, walkway or landing.
- Handrail: A rail to provide handhold on a platform, walkway, stairway or step ladder. It may form part of a guardrailing.
- Individual rung ladder: A ladder without stiles, each rung of which is individually attached to a structure or equipment.
- Ladder: A structure with treads or rungs, with or without stiles and handrails.
  - . Rung ladder: A ladder consisting of stiles and rungs.
  - . Step ladder: A ladder consisting of stiles, treads and handrails.
- Ladder cage: A fixed enclosure which encircles the climbing space of a ladder.
- Landing: A level area used to provide access to a stairway or ladder, or located at an intermediate level in a system of stairways or ladders.
- Nosing: The rounded edge of the tread projecting over the riser.
- Rise: The vertical height from the top of one tread to the top of the next.
- Stairway: A sloping stepped structure having no less than three rises and having a slope within the range of 26.5° and 45° inclusive.
- Stile: A side member that supports the treads or rungs of a ladder. Synonymous with string or stringer.
- Walkway: A passageway that is either level or sloping from the surrounding floor. A walkway can be a continuous structure or steps with landings.

2 PRODUCTS

2.1 STAINLESS STEEL FINISHES

Sample

General: Provide a finish to match the sample in terms of the mill grade and finish process.

Pre assembly

Mechanically polished and brushed finishes: Apply grit faced belts or fibre brushes that achieve uni-directional finishes with buffing as required to the following:

Bead blasted finish: Provide a uniform non-directional low reflective surface by bead blasting. Do not use sand, iron or carbon steel shot. Blast both sides of austenitic grades of stainless steel to equalise induced stress.

Post assembly pre-treatment

Heat discolouration: Remove by pickling.

Welds: Grind excess material, brush, and polish to match the pre assembly finish.

Completion

Cleaning: Clean and rinse to an acid free condition and allow to dry. Do not use carbon steel abrasives or materials containing chloride.

Protection: Secure packaging or strippable plastic sheet.

3 EXECUTION

3.1 CONCRETE STAIRS

Granolithic topping

Water quantity: Use the minimum necessary to achieve full compaction and prevent excessive water being brought to the surface during compaction.

Thickness:

- Landings and treads: 25 mm.
- Risers, strings and skirtings: 13 mm.

Mix: Cement: 1, fine aggregate: 2, coarse aggregate: 1 of 2 mm or 3 mm grading.

Slip-resistance treatment: Form two grooves and fill with a silicon carbide two-part resin.

- Dimensions: 10 mm deep, 15 mm wide, length ≥ width of tread less 100 mm.
- Position:
  . First groove: Centre 35 mm from tread nose.
  . Second groove: Centre 60 mm from step nose.

Carpet finish

Fixing: Adhesive method.

Laying method: Apply the floor covering continuously to the treads and risers.

Rubber finish

Smallest tiles: Half tile.

Nosing tiles: Purpose-made matching tread, nosing and riser tile. Accurately scribe, cut and fit to perimeters. Close butt seams.

Vinyl finish

Preformed: Provide purpose-made vinyl stair finish combining riser, nosing and tread in the one element. Lay each step consecutively with the joint at the bottom of each riser.

Formed in situ: Fit the sheet vinyl to each tread, and to the riser above, in one piece, coved in the angle. Accurately scribe, cut and fit to stair nosings and perimeters.

3.2 CUSTOM-BUILT STEEL STAIRS

Fabrication

Method: Welding.

Joints: Produce smooth unbroken surfaces at joints. Scribe the joints between posts and rails. Make end-to-end joints over an internal sleeve.

Bends: Make changes of direction in rails by evenly curved pipe bends.

Free ends: Seal the free ends of pipes with fabricated or purpose-made end caps.

Fixing to structure

General: Provide fabricated predrilled or purpose-made brackets or post bases, and attach the pipework to the building structure with fixings, including bolts into masonry anchors, and coach screws or bolts into timber, of metal compatible with the pipework.

Galvanizing

General: If possible, complete fabrication before galvanizing; otherwise apply a zinc-rich primer to affected joint surfaces.

3.3 PROPRIETARY STAIR SYSTEMS

General

Materials, design and construction: To AS 1657.

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.

Circular stairs: A proprietary system, mechanically assembled and fixed in place, comprising the following:

- A central steel tube column.
- Prefabricated metal treads sleeved over and cantilevered from the column.
- Top landing.
- Balustrade and handrail to stair and landing.
- Spacers, fixings and accessories necessary to complete the system.

3.4 STAIR NOSINGS

Applied nosings

Aluminium: Purpose-made extruded Slip resistant aluminium nosing.

Vinyl: Purpose-made moulded Slip resistant section.

Ceramic: Purpose-made moulded Slip resistant tiles.

Tactile indicators

Standard: To AS 1428.4.

3.5 FIXED STEEL LADDERS

Assembly

Materials, design and construction: To AS 1657.

General: Fix ladder stiles securely to the building structure at tops and bottoms of flights, and at intermediate points.

3.6 PIPE RAIL BALUSTRADES

Fabrication

Method: Welding.

Joints: Produce smooth unbroken surfaces at joints. Scribe the joints between posts and rails. Make end-to-end joints over an internal sleeve.

Bends: Make changes of direction in rails by evenly curved pipe bends.

Free ends: Seal the free ends of pipes with fabricated or purpose-made end caps.

Fixing to structure

General: Provide fabricated predrilled or purpose-made brackets or post bases, and attach the pipework to the building structure with fixings, including bolts into masonry anchors, and coach screws or bolts into timber, of metal compatible with the pipework.

Galvanizing

General: If possible, complete fabrication before galvanizing; otherwise apply a zinc-rich primer to affected joint surfaces

3.7 COMPLETION

Cleaning

Temporary coatings: On or before completion of the works, or before joining up to other surfaces, remove all traces of temporary coatings used as a means of protection.

0573 EXTINGUISHERS AND BLANKETS

1 GENERAL

1.1 CROSS REFERENCES

General
General: Conform to the *General requirements* worksection.

1.2 AUTHORISED PRODUCTS

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

2 PRODUCTS

2.1 EXTINGUISHERS

Standards
General: Provide portable fire extinguishers and location signs as follows:
- General requirements: AS/NZS 1841.1.
- Water: AS/NZS 1841.2.
- Wet chemical: AS/NZS 1841.3.
- Foam: AS/NZS 1841.4.
- Powder: AS/NZS 1841.5.
- Carbon dioxide: AS/NZS 1841.6.
- Non-rechargeable: To AS/NZS 1841.8.

Selection and location: To AS 2444.

Certification: Required.

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

2.2 BLANKETS

Fire blankets
General: To AS/NZS 3504.

Certification: Required.

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

Selection and location: To AS 2444.

3 EXECUTION

3.1 COMPLETION

Maintenance
Fire extinguishers: To AS 1851.

Fire blankets: To AS 1851.

0581b SIGNS AND DISPLAY

1 GENERAL

1.1 AIMS

Responsibilities
General: Provide signage systems to the **Selections**.

1.2 CROSS REFERENCES

General
General: Conform to the *General requirements* worksection.

1.3 STANDARDS

Signs
Safety signs - design and use: To AS 1319.

Signs and graphics for disabled access: AS 1428 Parts 1 and 2.

1.4 SAMPLES

General
Materials: Submit samples showing each colour and finish of exposed graphics materials and accessories. If there is a range of colours and/or textures for a particular item, submit samples showing the extremes and mean of the range.

2 PRODUCTS

2.1 MATERIALS

Materials standards
Aluminium:

- Plate for engraving: Alloy and temper designation 6063-0.
- For casting: To AS 1874.

Stainless steel: Surface finish designation 4 (general purpose polished).

Plastics:

- PVC-U sheet: Semi-rigid sheet.
- Rigid cellular polystyrene: To AS 1366.3, class VH for cut-out shapes.

3 EXECUTION

3.1 WORKMANSHIP

Production
General: Form graphics items accurately with clean, well defined edges or arises, free from blemishes.

Engraving to two layer plastic laminate: Lettering excavated to expose the lower laminate.

Engraved and filled: Lettering precision excavated and filled colouring material. Clean faces of all filling material.

Casting: Produce shapes free of pits, scale, blow holes or other defects, hand or machine finished if necessary.

Laser cut: Individual vinyl letters with self adhesive backing.

Printed lettering: Lettering and graphic images screen / digitally printed on:

- Film with self adhesive backing.
- Acrylic sheet.
- Aluminium plate.
- Stainless steel plate.

Large format digital printing: Lettering and graphic images screen printed film with self adhesive backing.

Signwriting: Lettering and graphic images hand painted direct to the background by a tradesman with recognised qualifications and demonstrated experience.

Fabricated: Three dimensional, formed as follows:

- Laser cutting from solid material and hand finished as necessary.
- Moulding: Individual plastic hollow three dimensional characters and shapes formed by:
  . Injection moulding.
  . Vacuum forming.
- Built-up individual shapes by fabricating the faces and edges from separate pieces neatly and securely joined.

Installation

General: Install signage level and plumb, securely mounted, with concealed theft-resistant fixings. Fix self adhesive signs free of bubbles and creases.

3.2 STATUTORY SIGNS

Required fire door

Position	- Adjacent to the door, - To the side of the door that faces a person seeking egress, and - If the door is in the held open position, on either the wall adjacent the doorway or both sides of the door.
Message - Auto door with auto hold open device - Self closing door - Door discharging from a fire isolated exit	FIRE DOOR – DO NOT OBSTRUCT FIRE DOOR DO NOT OBSTRUCT DO NOT KEEP OPEN FIRE SAFETY DOOR – DO NOT OBSTRUCT
Letter size	20 mm
Sign type	Printed acrylic sheet adhesive fixed
Compliance	BCA D2.23

Required smoke door

Position	- Adjacent to the door, - To the side of the door that faces a person seeking egress, and - If the door is in the held open position, on either the wall adjacent the doorway or both sides of the door.
Message - Auto door with auto hold open device - Self closing door	SMOKE DOOR – DO NOT OBSTRUCT SMOKE DOOR DO NOT OBSTRUCT DO NOT KEEP OPEN
Letter size	20 mm
Sign type	Printed acrylic sheet adhesive fixed
Compliance	BCA D2.23

Non-required stair, ramp or escalator

Position	Outside the shaft near all doors opening to the shaft
Message	DO NOT USE THIS STAIRWAY IF THERE IS A FIRE (or) Do not use this stairway if there is a fire
Letter size	20 mm (upper case) 16 mm (lower case)
Sign type	Printed acrylic sheet adhesive fixed
Compliance	BCA Spec D1.12

Exit signs, Class 2, 3 and 4 in lieu of illuminated exit signs

Position	- To the side remote from the exit or balcony - To an entrance door of a sole occupancy unit in a Class 2 or 3 building or Class 4 part
Message	EXIT
Letter size	25 mm
Sign type	Printed acrylic sheet adhesive fixed
Compliance	BCA E4.5 and E4.7

Fire exit offence notice (NSW)

Position	Adjacent door providing access to (but not within) a fire exit stair, passage or ramp
Message	OFFENCES RELATING TO FIRE EXITS It is and offence under the Environmental planning and Assessment Act 1979: - To place anything in or near this fire exit that may obstruct persons moving to and from the exit, or - To interfere with or obstruct the operation of any fire doors, or - To remove, damage or otherwise interfere with this notice.
Letter size	> 8 mm (title) > 2.5 mm (rest)
Sign type	Printed acrylic sheet adhesive fixed
Compliance	Environmental Planning and Assessment Regulation 2000 clause 183

Fire exit offence notice (ACT)

Position	Adjacent door providing access to (but not within) a fire exit stair, passage or ramp
Message	OFFENCES RELATING TO FIRE EXITS Under the Fire Brigade Act it is an offence to: - Place anything in this stairway or any associated passageway leading to the exterior of the building which may impede the free passage of persons; - Interfere with or cause obstruction or impediment to the normal operation of fire doors providing access to this stairway; or - Remove, damage or otherwise interfere with this notice.
Letter size	> 20 mm (title) > 3 mm (rest)
Sign type	Engraved and filled in contrasting colours
Compliance	BCA ACT D1.101

Fire hose reels and fire hydrants

Position	Cupboard door or adjacent the FHR

Message	FIRE HOSE REEL (and/or) FIRE HYDRANT
Letter size	External cabinets: 75 mm Internal cabinets: 50 mm
Sign type	White adhesive backed vinyl
Compliance	AS 2441 AS 2419.1 BCA E1.3 and E1.4

Fire hose reel location sign

Position	Above or adjacent the FHR if located in a recess or obscure location
Message	To AS 2441 Figure 10.1
Letter size	16 mm
Sign type	Adhesive backed vinyl
Compliance	AS 2441

Fire brigade booster assembly cabinet

Position	Cabinet doors
Message	FIRE HYDRANT BOOSTER, or FIRE HYDRANT AND SPRINLER BOOSTER, or COMBINED FIRE HYDRANT AND SPRINKLER BOOSTER, as appropriate. If a feed fire hydrant is enclosed in the cabinet, add the symbol FH within a 100 mm circle of thickness and colour to match lettering.
Letter size	≥ 50 mm
Sign type	Adhesive backed vinyl
Compliance	AS 2419.1 clause 7.9

Portable fire extinguishers

Position	Cabinet
Message	FIRE EXTINGUISHER
Letter size	32 mm min
Sign type	Adhesive backed vinyl
Compliance	BCA E1.6 AS 2444 clause 3.6 Fire Brigade

Portable fire extinguishers – location signs

Position	As nominated in AS 2444 clause 3.2 at every installed extinguisher nominated BCA Table E1.6
Message	Prescribed graphic
Letter size	
Sign type	Computer generated adhesive backed vinyl graphic
Compliance	BCA E1.6 AS 2444 clause 3.3 Fire Brigade

Fire blankets

Position	As nominated in AS 2444 clause 6.4 at every blanket location
Message	Prescribed graphic

Letter size	
Sign type	Computer generated adhesive backed vinyl graphic
Compliance	BCA E1.6 AS 2444 clause 5.1, 5.3 and Fig 5.1 Fire Brigade

Termite protection

Position	Meter box or similar
Message	Indicate: - The method of protection - The date of installation - The life expectancy of a chemical barrier as listed on the National Registration Authority label - The installer's recommendation for inspections
Letter size	
Sign type	Laminated page(s)
Compliance	BCA B1.4 (i)(ii) AS 3660.1 Appendix C or D as appropriate

Regulatory carpark signs: Low clearance

Position	Entry to overhead obstruction where clearance is: - 3 m or less – car and light van use only - 4.6 m – all other cases
Message	LOW CLEARANCE 2.2 m
Letter size	As prescribed AS 2890.1 clause 4.3.4 (a)
Sign type	RTA standard
Compliance	AS 2890.1 clause 4.3.4

Regulatory carpark signs: Stop and Give Way

Position	As required for traffic control
Message	Graphic nominated AS 2890.1 clause 4.3.4(b)
Letter size	
Sign type	RTA standard
Compliance	AS 2890.1 clause 4.3.4

Regulatory carpark signs: Speed limit

Position	As required for traffic control
Message	Graphic nominated AS 2890.1 clause 4.3.4(c)
Letter size	
Sign type	RTA standard
Compliance	AS 2890.1 clause 4.3.4

Regulatory carpark signs: Hump warning

Position	As required for traffic control
Message	Graphic nominated AS 2890.1 clause 4.3.4(d)
Letter size	

Sign type	RTA standard
Compliance	AS 2890.1 clause 4.3.4

Regulatory carpark signs: Steep grade warning

Position	As required for traffic control
Message	Graphic nominated AS 2890.1 clause 4.3.4(e)
Letter size	
Sign type	RTA standard
Compliance	AS 2890.1 clause 4.3.4

Disabled access

Position	As nominated BCA D3.3, and AS 1428.1 clause 14.5.1 To each: - Sanitary facility - Accessible entrance - Accessible lift(s) - Path of travel to accessible facilities
Message	International symbols to AS 1428.1 clause 14
Letter size	AS 1428.2 clause 16, Table 1
Sign type	Printed acrylic sheet adhesive fixed
Compliance	BCA Spec A1.3, D3.3(c),D3.6 AS 1428.1

Braille and tactile signs

Position	To each: - Sanitary facility - Accessible entrance - Accessible lift(s) - Path of travel to accessible facilities
Message	International symbols to AS 1428.1 clause 14 for access or deafness
Letter size	BCA Specification D3.6
Sign type	Adhesive fixed polyvinyl membrane with raised message
Compliance	BCA D3.6 AS 1428.1

Deafness

Position	Where hearing augmentation is installed BCA D3.7
Message	International symbols to AS 1428.1 clause 14
Letter size	BCA Specification D 3.6, clause 16, Table 1 AS 1428.2
Sign type	Printed acrylic sheet adhesive fixed
Compliance	BCA D3.7 AS 1428.1

Plant room signs – Lift Machine Room (LMR) – door

Position	External face LMR door
Message	DANGER ENTRY OF UNAUTHORISED PERSONS PROHIBITED
Letter size	25 mm (Danger) 10 mm (message)
Sign type	Printed acrylic sheet adhesive fixed

Compliance	AS 1735.2

Main switchboard, excluding Class 1 dwellings

Position	Main entry or fire indicator panel
Message	Indicate location of main switchboard. Incorporate the term ‘Main Switchboard’.
Letter size	
Sign type	Printed acrylic sheet adhesive fixed
Compliance	AS/NZS 3000 clause 2.9.2.4

Fire orders – Alpine areas

Position	Main entrance to each storey.
Message	FIRE ORDERS followed by an explanation of the following: - Method of operation of the alarm system and location of call points - Location and method of operation of the fire fighting equipment - Location of exits - Evacuation procedure
Letter size	
Sign type	Printed acrylic sheet adhesive fixed
Compliance	BCA G4.9

Swimming pools – South Australia

Position	Label to manual shut off valve
Message	WARNING RE-OPEN THIS VALVE IMMEDIATELY AFTER USING A VACUUM CLEANER THE POOL MUST NOT BE USED WHILE A VACUUM CLEANER IS IN USE
Letter size	2.5 mm
Sign type	Printed acrylic sheet adhesive fixed, contrast to background and resistant to UV, water and pool chemicals
Compliance	BCA SA G 1.1

0611 PLASTERING

4 GENERAL

4.1 AIMS

Responsibilities

General: Provide plaster finishes as follows:

- Resistant to impacts expected in use.
- Free of irregularities.
- Consistent in texture and finish.
- Firmly bonded to substrates for the expected life of the application.
- As a suitable substrate for the nominated final finish.

Selections: Conform to the **Selections**.

4.2 CROSS REFERENCES

General

General: Conform to the General requirements worksection.

4.3 INTERPRETATION

Abbreviations

General: For the purpose to this worksection the abbreviations given below apply.

- CRF: Cement render – finish.
- CRM: Cement render – medium.
- CRS: Cement render – stronger.
- CRW: Cement render – weaker.
- GPF: Gypsum plaster – finish.

Definitions

General: For the purposes of this worksection the definitions given below apply.

- Plastering: The process of coating the framing or solid surfaces of a building with a plastic material which hardens and then may be decorated or remain self-finished.
- Substrate: The surface to which a material or product is applied.
- Base coat: A plaster coat applied prior to the application of the finish coat.
- Bonding treatment: A treatment of a substrate which improves adhesion of a plaster system.
- Finish coat: The final coat of a multi-coat plaster system which may receive decoration or receive finishing treatment, including terms as follows:
  - . Bedding coat.
  - . Hardwall plaster.
  - . Setting coat.
  - . Skim coat.
  - . Whiteset plaster.
- Finishing treatment: The treatment applied to a finish coat which may include processes and results as follows:
  - . Wood float: The plaster is laid on with a trowel and finished with a dry wood float as soon as the wet sheen has disappeared from the surface.
  - . Sponge: The plaster is laid on thinly with a trowel, floated up with a wood float and lightly finished with a sponge.
  - . Smooth (dado) finish: Cement based plaster is laid on with a trowel, skimmed with a float and trowelled down. The surface is trowelled to a smooth, dense finish as the plaster stiffens. No water is applied during trowelling.

  - . Ornamental: Patterned surfaces achieved by working the hardening plaster with a trowel or other tool.
  - . Sprayed: Textured surfaces achieved by projecting plaster onto a substrate using a purpose-designed machine also known as 'tyrolean'.
  - . Stippled: Textured surfaces achieved by working the hardening plaster with a stiff brush.
  - . Thrown: Rough surfaces achieved by throwing plaster onto a substrate or pebbles onto a plastic plaster base.
- Control joints: Includes isolation joints, construction joints and crack control joints.
- Plaster: A mixture of binders, aggregate and water which are applied to substrates in a plastic state and dry and cure to a hard surface which may subsequently be decorated.
  - . Cement: Plaster containing Portland cement as the principal binder.
  - . Gypsum: Plaster containing hydrated or anhydrous calcium sulfate as the principal binder.
- Plastering system: One or more coats of plaster and associated treatments comprising some or all of the following in sequence:
  - . Base coat 1 or 2.
  - . Bonding treatment.
  - . Finish coat.
  - . Finishing treatment.
- Render, rendering: Plaster, plastering, usually single coat and usually cement:lime:sand.

4.4 INSPECTION

Notice

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

- Prototypes ready for inspection.
- Substrates immediately before applying base coats.
- Finish treatments before decoration.

4.5 SUBMISSIONS

Prototypes

Plaster systems: Prepare prototypes of each plaster system complete with beads and other embedded items:

- Size: 1200 x 2400 mm.

5 PRODUCTS

5.1 MATERIALS AND COMPONENTS

Accessories

Beads: To be metal proprietary sections manufactured to be fixed to substrates and/or embedded in the plaster to form and protect plaster edges and junctions.

Lath: To be a proprietary product manufactured from raised expanded metal for use with plaster.

- Mass/unit area: ≥ 1.84 kg/m^2.
- Material thickness: ≥ 0.70 mm.
- Mesh size: 9.5 x 28.6 mm.

Metallic-coatings: For beads or lath in cement plaster: To the **Corrosion resistance and durability table**.

Admixtures

Plasticizers or workability agents: Do not use in cement plasters.

Aggregates

Sand: To be fine, sharp, well-graded sand with a clay content between 1% and 5%, and free from efflorescing salts.

Sand grading for base coat plaster: To the **Sand gradation table.**

Sand gradation table

Sieve size	Percent passing	
	Minimum	**Maximum**
4.75 mm	100	100
2.36 mm	90	100
1.18 mm	60	90
600 µm	35	70
300 µm	10	30
150 µm	0	5
75 µm	0	3

Plaster for autoclaved aerated concrete

General: To be a proprietary product manufactured for use with the wall system.

Bonding products

General: To be proprietary products manufactured for bonding cement-based plaster to solid substrates.

Cement

Standard: To AS 3972.

- Type: GP.

Colouring products

General: To be proprietary products manufactured for colouring cement plaster.

Integral pigment proportion: ≤ 5% by mass of cement.

Cornice cement

General: To be a proprietary product manufactured for use with the cornice.

Cornices

Cast plaster: Proprietary item.

Corrosion resistance and durability

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

Corrosion resistance and durability table – Low corrosivity category

Situation	Metal lath, beads and embedded items	Minimum cement content (mix type) above damp-proof course
Internal	Galvanize after fabrication 300 g/m^2 Metallic-coated sheet Z275/AZ150	CRW
External	Galvanize after fabrication 300 g/m^2	CRW
	Stainless 316 Powder-coated aluminium	CRM

Corrosion resistance and durability table– Medium corrosivity category

Situation	Metal lath, beads and embedded items	Minimum cement content (mix type) above damp-proof course
Internal	Galvanize after fabrication 300 g/m^2 Metallic-coated sheet Z275/AZ150	CRW
External	Stainless 316 Powder-coated aluminium	CRM

Corrosion resistance and durability table– High corrosivity category

Situation	Metal lath, beads and embedded items	Minimum cement content (mix type)

		above damp-proof course
Internal (if plaster is painted)	Galvanize after fabrication 300 g/m^2 Metallic-coated sheet Z275/AZ150	CRW
External	Stainless 316 Powder-coated aluminium	CRS

Curing products

General: To be proprietary products manufactured for use with the plaster system.

Gypsum plaster

General: To be 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/NZS 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: Expanded metal to AS 1397.

Mixes

General: Select a mix ratio to suit the conditions of application in conformity to the **Mixes table**.

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 ≥ 3 < 6 minutes.

Strength of successive coats: Ensure successive coats are no richer in binder than the coat to which they are applied.

Mixes table – Cement render

Mix type		**Substrate**	**Upper and lower limits of proportions by volume**		
			Cement	**Lime**	**Sand**
- Single or multi-coat systems with integral finishing treatments - Base coats in multi-coat systems with cement or gypsum finishes	CRS	Dense and smooth concrete and masonry	1 1	0 0.5	3 4.5
	CRM	Regular clay or concrete masonry	1 1	0.5 1	4.5 6
	CRW	Lightweight concrete masonry and other weak substrates	1 1	1 2	6 9
Second coat - Internal	CRF	Cement render base coats	1 1	1 2	6 9
Second coat - External	CRF	Cement render base coats	1 1	1 2	5 6

Mix 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	- -

Mix table – Gypsum finish coat, by weight

Gypsum plaster (kg)	Lime putty (kg)
17	25
34	50
51	75

Control joint products
General: To be proprietary products manufactured for use with the plastering system and to accommodate the anticipated movement of the substrates and/or the plaster.

Water
General: To be clean and free from any deleterious matter.

5.2 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.

Polished plaster
General: In situ applied plaster system incorporating selected stone dust in a proprietary matrix producing a smooth polished surface with visual patterning.

Glass bead coatings
General: Glass beads bound in a proprietary matrix factory applied to MDF panels.

Product or applicator: [complete/delete]

6 EXECUTION

6.1 PREPARATION

Substrates
General: Ensure substrates have:

- Any deposit or finish which may impair adhesion of plaster cleaned off.
- If framed or discontinuous, support members in full lengths without splicing.
- If solid or continuous, excessive projections hacked off and voids and hollows filled 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 to ensure 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.
- Movement control beads: At all movement control joints.
- Stop beads: At all terminations of plaster and junctions with other materials or plaster systems.

Joints in beads: Use 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 substrate as follows:

- Cement plaster: 1 part cement to 2 parts sand.
- Gypsum plaster: 1 part gypsum to 2 parts sand.

Curing: Keep continuously moist for ≥ 5 days and allow to dry before applying plaster coats.

Thickness: From ≥ 3 < 6 mm.

Embedded items

General: If there are water pipes and other embedded items, sheath them to permit thermal movement. Ensure embedded items conform to the **Corrosion resistance and durability table.**

Lath

Location:

- Chases: If chases or recesses are 50 mm wide or greater, fix metal lath extending ≥ 75 mm beyond each side of the chase or recess.
- Metal and other non-porous substrates: Fix metal lath to provide a key.

Installation:

- General: Run the long way of the mesh across supports with strands sloping downwards and inwards from the intended face of the plaster.
- Fixing: Mechanically fix at centres of 150 mm or less.
- Laps: Tie with 1.25 mm galvanized wire ≤ 150 mm. Do not stop edges of sheets at corners but bend around.
- On solid substrates: Space the lath 5 mm or more clear of the substrate.
- Support spacing: ≤ 400 mm.

6.2 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.

Finishing treatments

Plain:

- Bag: To be a finish mainly free from sand by rubbing the finish coat with a Hessian pad when it has set firm.
- Carborundum stone: To be a smooth finish free from sand by, rubbing the finish coat with a fine carborundum stone when it has set hard.
- Foam float: To be an even surface by a wood or plastic floating the finish coat on application and finishing with a foam float to a fine sand textured finish.
- Steel trowel: To be a smooth dense surface by steel trowelling which is not glass-like and is free from shrinkage cracks and crazing.
- Wood or plastic float: To be an even surface by wood or plastic floating the finish coat on application.

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 throating on soffits of external projections neatly finished. Trim around openings. Plaster exposed inside of built-in cupboards.

Joining up

General: If joining up is required, ensure joints will be imperceptible in the finished work after decoration.

Control joints

General: Provide joints in the finish to coincide with control joints in the substrate. Ensure that the joint in the substrate is not bridged during plastering.

- 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 movement joints to divide the plastering area into rectangular panels ≤ 10 m^2.

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.

Plaster thickness

General: Conform to the **Plaster thickness table**.

Plaster thickness table

Substrate	Cement render, total thickness of single or multi-coat work (mm)	Gypsum/lime plaster (mm)
Dense concrete walls	15 max	3 max
Dense concrete ceilings	9 max	3 max
Brickwork and blockwork	12 min	3 max
Lightweight concrete and blocks	12 min	3 max
Metal lath measured from the face of the lath.	18 min	3 max

Temperature

General: If the ambient temperature is ≤ 10ºC or ≥ 30ºC ensure that the temperature of mixes, substrates and reinforcement are, at the time of application, ≥ 5ºC or ≤ 35ºC.

6.3 TOLERANCES

General

Tolerances: Conform to the **Tolerances table**.

Tolerances table

Description	Alignment	Tolerance
Walls and other vertical structures	Vertical	6 mm in 2400 mm
Reveals sides	Vertical	3 mm in 1800 mm
Reveals head up to 1800 mm	Horizontal	3 mm in 1800 mm
Reveals head over 1800 mm	Horizontal	5 mm max
Reveals, piers, beams, wall stop ends and the like up to 300 mm	Square	3 mm max
Reveals, piers, beams, wall stop ends and the like over 300 mm	Square	5 mm max
Radius of corners	Round	Should not vary by more than ± 10% over the length of the arris.

6.4 COMPLETION

Cornices

General: Accurately cut and mitre corners. Match and align ornament. Unless required, or full lengths are not available, do not make butt joints in the length of a cornice.

Installation: Butter edges, mitres and joins for the full length of the cornice with adhesive:

Mechanical fixing: If projection across ceiling ≥ 400 mm, provide additional mechanical fixing:

- Fixing centres: ≤ 600 mm.

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.
-

0612b CEMENTITIOUS TOPPINGS

1 GENERAL

1.1 AIMS

Responsibilities

General: Provide cementitious toppings in conformance with **Selections** and as follows:

- If floating, without edge curl.
- If bonded, without drummy areas.
- Without obvious shrinkage cracks.

1.2 CROSS REFERENCES

General

General: Conform to the *General requirements* worksection.

1.3 TOLERANCES

General

Thickness: Deviation from the stated thickness:

- Thickness < 15 mm: 2 mm.
- Thickness ≥ 15 < 30 mm: 5 mm.
- Thickness ≥ 30 mm: 10 mm.

Flatness deviation: Measured under a 3000 mm straightedge laid in any direction on a plane surface:

- Class A: < 3 mm.
- Class B: ≥ 3 < 5 mm.

2 PRODUCTS

2.1 PRODUCTS

Admixtures

Standard: To AS 1478.1.

Aggregates

Standard: To AS 2758.1.

Coarse aggregate: To be nominal single size ≤ 1/3 topping thickness.

Fine aggregate: To be fine, sharp, well-graded sand with a low clay content and free from efflorescing salts.

Bonding products

General: To be proprietary products manufactured for bonding cement-based toppings to concrete substrates.

Cement

Standard: To AS 3972.

- Type: SL.

Colouring products

General: To be proprietary products manufactured for colouring cement toppings.

Integral pigment proportion: ≤ 10% by mass of cement.

Concrete

Standard: To AS 1379.

Topping not reinforced:

- Class: Normal.

Reinforced topping: Conform to the **Reinforced topping table**.

Reinforced topping table

Exposure location	Strength grade	Cover to reinforcement
Internal + External > 50 km inland and non-industrial and non-tropical	N25	20 mm
External > 50 km inland and tropical + External near coastal > 1 km < 50 km	N32	30 mm
External coastal < 1 km but not in the splash zone	N40	35 mm

Reinforcement

Standard: To AS/NZS 4671.

Mesh sizes for joint spacing as follows:

- SL 42: Up to 3 m internal, 2 m external.
- SL 62: Up to 6 m internal, 4 m external.

Curing products

General: To be proprietary products manufactured for use with cement-based toppings and with the floor finish to be laid on the toppings.

Mixes

General: Provide topping as follows or select mix proportions to the **Mixes table**.

- Air entrainment: ≤ 3%.
- Nominal coarse aggregate size: ≤ 0.3 x topping thickness.
- Slump: 80 mm.
- Standard strength grade: N25.

Water quantity: Use the minimum necessary to achieve full compaction and prevent excessive water being brought to the surface during compaction.

Mixes table

Mix type	Thickness (mm)	Upper and lower limits of proportion by weight		
		Cement	Fine aggregate	Coarse aggregate
Bonded – cement and sand	35	1 1	3 4.5	0 0
Bonded – fine concrete	40	1 1	3 3	1 2
Floating – fine concrete	100	1 1	3 3	1 2
Granolithic	Floors: 25 Skirtings: 13	1	2	1, of 2 mm - 3 mm
Separated – fine concrete	70	1 1	3 3	1 2

Movement control joint products

General: Provide products manufactured for use with cement based toppings and accommodate the anticipated movement of the backgrounds and/or the toppings.

Sealant products

General: Provide proprietary products manufactured for the sealing of movement joints in cement-based toppings.

Slip-resistance products

General: Provide proprietary products manufactured to improve the wet-slip resistance of toppings.

- Silicon carbide granules:
  . Granule size: ≥ 300 < 600 µm.
- Silicon carbide two-part resin:
  . Granule size: ≥ 300 µm.

Surface treatment products
General: Provide proprietary products manufactured for use with cement- based toppings to change the characteristics of the surface of the finished topping.

Water
General: To be clean and free from any deleterious matter.

2.2 MOVEMENT JOINTS

Movement joint materials
Movement joint strip: A proprietary expansion joint consisting of a neoprene filler sandwiched between plates with lugs or ribs for mechanical keying. Set flush with the finished surface.

Proprietary slide plate divider strip: An arrangement of interlocking metal plates grouted into pockets formed in the concrete joint edges.

Sealant: One-part self-levelling non-hardening mould resistant, silicone or polyurethane sealant applied over a backing rod. Finish flush with the terrazzo surface.

Floors: Trafficable, shore hardness > 35.

Backing rod: Compressible closed cell polyethylene foam with a bond-breaking surface.

3 EXECUTION

3.1 PREPARATION

Substrates
General: Ensure substrates have:
- Any deposit which may impair adhesion of monolithic or bonded toppings cleaned off.
- Excessive projections removed and voids and hollows filled with a mix not stronger than the substrate nor weaker than the topping.
- Hardened concrete roughened 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 use a bonding product or treat as follows:
- Keep wet for ≥ 2 hours.
- Remove surplus water and brush on neat cement or a clean slurry of cement and water.
- Place the topping while the slurry is wet.

3.2 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 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.

3.3 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:

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

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.

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 hard, sharp graded abrasive fine aggregate particles.

Coloured applied finish: To a steel trowel finished surface, apply a proprietary liquid or dry shake material in accordance with the manufacturer's written requirements.

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

Burnished finish: Continue steel trowelling until the concrete surface attains a polished or glossy appearance.

Exposed aggregate: After steel trowelling, grind the cured surface of the concrete to expose the coarse aggregate.

Surface finishes

General: Provide surface finishes in conformance with the **Cementitious toppings construction schedule.**

Floor finish dividers

General: Finish cementitious toppings at junctions with differing floor finishes with a corrosion resistant metal dividing strip suitable fixed to the background, with top edge flush to the finished floor. If changes of floor finish occur at doorways make the junction directly below the closed door.

Control joints

Control joints in background: Provide joints in toppings to coincide with control joints in the background.

Topping joints: Provide joints to divide toppings into bays as follows:

- Form in situ using square edge steel forms and trowelling a 3 mm radius to edges.
- Form a groove, extending at least one quarter the depth of the section, either by using a grooving tool, by sawing, or by inserting a premoulded strip.
- Install a control joint product.

Bay sizes:

- Area: ≤ 15 m^2.
- Length to width ratio: ≤ 1:1.5.

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^2 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: Ensure that the temperature of mixes, substrates and reinforcement are, at the time of application, ≥ 5ºC or ≤ 35ºC.

Severe temperature: If the ambient shade temperature is greater than 38°C, do not mix topping.

3.4 MOVEMENT JOINTS

General

General: Provide movement joints to the **Movement joints schedule** and as follows:

- Location:
  - . Over structural (isolation, contraction, expansion) 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.
  - . At abutments with the building structural frame and over supporting walls or beams where flexing of the substrate is anticipated.

Depth of joint: Right through to the substrate.

Sealant width: 6 – 25 mm.

Depth of elastomeric sealant: One half the joint width, or 6 mm, whichever is the greater.

3.5 JOINT ACCESSORIES

Weather bars

General: Provide a corrosion resistant metal weather bar under hinged external doors. Locate under the centres of closed doors.

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 closed door.

3.6 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 ≥ seven days.

Joint sealant

General: If required, seal joints as follows:

- Formed joints ≤ 25 mm deep: With filler and bond-breaker.
- Sawn joints: Full depth of cut.

Protection

General: Protect finished work from damage during building operations.

Slip resistance

Field test of completed surface: To AS/NZS 4663.

0621 WATERPROOFING – WET AREAS

1 GENERAL

1.1 AIMS

Responsibilities

General: Provide wet area waterproofing systems which:

- Are graded to floor wastes to dispose of water without ponding.
- Prevent moisture entering the substrate or adjacent areas.

Selections: Conform to the **Selections**.

1.2 CROSS REFERENCES

General

General: Conform to the *General requirements* worksection.

Records: Document the extent of membrane protection for buildings to BCA 3.8.1.2.

1.3 STANDARDS

Wet areas

Standard: To AS 3740.

1.4 INTERPRETATIONS

Definitions

General: For the purposes of this worksection the definitions given below apply.

- Substrates: The surfaces on which tiles are bedded.
- Bond breaker: A system preventing the membrane bonding to the substrate, bedding or lining.
- Membranes: Impervious barriers to liquid water which may be:
  - . Installed below floor finishes.
  - . Installed behind the wall sheeting or render and termed *External*.
  - . Installed to the face of the wall sheeting or render and termed *Internal.*
  - . Liquid applied in liquid or gel form and air cured to form a seamless film.
  - . Sheet in sheet form with joints lapped and sealed.
- Waterproof (WP): The property of a material that does not allow moisture to penetrate through it.
- Waterproofing systems: Combinations of membranes, flashings, drainage and accessories which form waterproof barriers and which may be:
  - . Loose-laid.
  - . Bonded to substrates.
- Water resistant (WR): The property of a material that restricts moisture movement and will not degrade under conditions of moisture.
- Wet area: An area within a building supplied with a floor waste.

1.5 INSPECTION

Notice

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

- Substrate preparation completed.
- Secondary layers preparation completed.
- Before membranes are covered up or concealed.

1.6 SUBMISSIONS

Shop drawings

Submit shop drawings showing:

- Junctions with vertical surfaces and upstands.

- Junctions at perimeters.
- Drainage details.
- Movement control joints.
- Flashings.
- Penetrations.
- Corners.
- Terminations and connections.

Execution records
Placing records: Photographically record the application of membranes and information as follows:
- Date.
- Portion of work.
- Substrate preparation.
- Protection provided from traffic.

Samples
General: Submit 300 x 300 mm samples of each type of membrane.

Products documentation
General: Submit copies of product manufacturers:
- Product technical data sheets.
- Material safety data sheets (MSDS).
- Type tests certificates verifying conformance to AS/NZS 4858.

2 PRODUCTS

2.1 PRODUCTS

Membranes
Standard: To AS/NZS 4858.

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 hob upstands.

3 EXECUTION

3.1 PREPARATION

Substrates
General: Ensure substrates are as follows:
- Clean and free of any deposit or finish which may impair adhesion or location of tiles.
- If walls are plastered remove loose sand.
- If walls or floors are framed or discontinuous, support members are in full lengths without splicing.
- If floors are solid or continuous:
  . Excessive projections are removed.
  . Voids and hollows > 10 mm with abrupt edges are filled with a cement:sand mix not stronger than the substrate nor weaker than the bedding.
  . Depressions < 10 mm are filled with a latex modified cementitious product with feathering eliminated by scabbling the edges.
  . Cracks in substrates wider than 1.5 mm are filled with a filler compatible with the membrane system.

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.

Moisture content
Concrete substrates: Cure for > 21 days.

Moisture content: Verify that the moisture content of the substrate is compatible with the water vapour transmission rate of the membrane system by testing to AS/NZS 2455.1 Appendix B.

Test type:

- Hygrometer test: Seal a hygrometer to the substrate for > 16 hours and measure the relative humidity of the air between the instrument and the slab.
- Electrical resistance test: Connect a resistance meter to the slab and read the moisture content.

Falls
Substrate: If the membrane is directly under the floor finish ensure the fall in the substrate conforms to the fall nominated for the finish.

Joints and fillets
Internal corners: Provide 45° fillets.

External corners: Round or arris edges.

Priming
General: If required, prime the substrates with compatible primers to ensure adhesion of membrane systems.

3.2 APPLICATION

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

Drains
Floor wastes: Turn membrane down onto the floor waste puddle flanges, and adhere.

Hobs
General: Extend membrane over the hob and into the room at least 50 mm. For hobless showers extend 1800 mm into the room.

Sheet joints
Bituminous sheet membranes:

- Side laps > 75 mm.
- End laps > 100 mm.

Synthetic rubber membranes:

- Factory-vulcanized laps > 40 mm.
- Field side laps > 50 mm for side laps.
- Field end-laps > 100 mm for end laps.

PVC membranes:

- Factory welded laps > 30 mm.
- Field–welded laps.
- If used over insulation boards > 100 mm.
- Other instances > 75 mm overlaps in other instances.

Curing of liquid applied systems
General: To the manufacturers instructions.

Curing: Allow membrane to fully cure before tiling.

Membrane terminations
Edge protection: Provide > 150 mm upturns.

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.

Membrane vertical penetrations
Pipes, ducts, and vents: Provide separate sleeves for all pipes, ducts, and vents and have fixed to the substrate.

Membrane horizontal penetrations
Sleeves: Provide a flexible flange for all penetrations, bonded to the penetration and to the membrane.

Overlaying finishes on membranes
Compatibility: If a membrane is to be overlayed with another system such as tiles, pavers or acoustic insulation, 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 movement joints in the topping or bedding mortar to reduce the movement over the membrane.

3.3 FLOOD TEST

General
Application: Perform a flood test prior to the installation of surface finishes.

Set-up:

- Measure for dryness the wall/floor junction of adjacent spaces the slab soffit below using the hygrometer test method.
- Record the result for each area.
- Dam the doorway(s) and seal floor wastes and drainage outlets to allow 50 mm water level.
- Fill space with clean water and leave overnight.

Evaluation:

- Make a visual inspection of the wall/floor junction of adjacent spaces and of the slab soffit below for obvious water or moisture.
- Test the same areas for dryness using the hygrometer test method, and compare the results to the measurements taken prior to flooding.

Compliance:

- Evidence of water from the visual test: Failure.
- No visual evidence of water: Proceed with the hygrometer test.
- Increase in test results before and after flooding: Failure.

Records:

- Submit records of all flood tests.

3.4 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.

0631b CERAMIC TILING

1 GENERAL

1.1 AIMS

Responsibilities
General: Provide tiling systems to walls, floors and other substrates as follows and/or to the
Selections:

- Consistent in colour and finish.
- Firmly bonded to substrates for the expected life of the installation.
- Set out with joints accurately aligned in both directions and wall tiling joints level and plumb.
- To direct all water flowing from supply points to drainage outlets without leakage to the substrate or adjacent areas.

1.2 CROSS REFERENCES

General
General: Conform to the *General requirements* worksection.

1.3 STANDARDS

Tiling
General: Comply with the recommendations of those parts of AS 3958.1 and AS 3958.2 which are referenced in this worksection.

1.4 INSPECTION

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

- Substrate immediately before tiling.
- Trial set-outs before execution.
- Control joints before sealing and grouting.
- Grout and caulking colours before application.

1.5 SUBMISSIONS

Samples
General: Submit labelled samples of tiles, including fittings, accessories, grout and sealants, illustrating the range of variation in colour and finish.

1.6 TESTS

General
Tests: Submit tests as follows:

- Type test slip resistance of tiles to AS/NZS 4586.
- Site test completed surfaces to AS/NZS 4663.
- Impact sound insulation: Not required by acoustic report – Lay damtexc standard as additional measure

1.7 TOLERANCES

Completed tiling
Standard: To AS 3958.1 clause 5.4.6 Tile finish and joints.

2 PRODUCTS

2.1 MARKING

Identification

General: Deliver materials to the site in the manufacturer's original sealed containers legibly marked to show the following:

- Manufacturer's identification.
- Product brand name.
- Product type.
- Dimensions and quantity.
- Product reference code and batch number.
- Date of manufacture.
- Material composition and characteristics such as volatility, flash point, light fastness, colour and pattern.
- Handling and installation instructions.

2.2 TILES AND ACCESSORIES

Tiles

Standard: To AS 4662.

Tactile ground surface indicators: To AS/NZS 1428.4.

Coves, nosings and skirtings: To be matching stop-end and internal and external angle tiles moulded for that purpose.

Exposed edges: To be 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: Provide tile accessories to the **Accessories schedule** which match the composition, colour and finish of the surrounding tiles.

Coves, nosings and skirtings

General: Provide matching stop ends and internal and external angle tiles moulded for that purpose.

2.3 ADHESIVES

General

Standard: To AS 2358 and AS 4992.1.

Type

General: Provide adhesives to the **Wall tiling schedule** and to the **Floor tiling schedule** and compatible with the materials and surfaces to be adhered.

Prohibited uses: Do not provide the following combinations:

- Cement-based adhesives on wood, metal, painted or glazed surfaces, gypsum-based plaster.
- Organic solvent-based adhesives on painted surfaces.
- Organic PVC-based adhesives and organic natural rubber latex adhesives in damp or wet conditions.
- PVA (polyvinyl acetate) based adhesives in wet areas or externally.

2.4 MORTAR

Materials

Cement type to AS 3972: GP.

- White cement: Iron salts content $\leq$ 1%.
- Off-white cement: Iron salts content $\leq$ 2.5%.

Lime: To AS 1672.1.

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

Measurement of volume: Measure binders and sand by volume using buckets or boxes. Do not allow sand to bulk by absorption of water.

Bedding mortar

Proportioning: Select proportions from the range 1:3 – 1:4 cement:sand (by volume) to obtain satisfactory adhesion. Provide minimum water.

Terra cotta tiles: Use proprietary polymer modified mortar.

Mixing: To AS 3958.1.

Water

General: To be clean and free from any deleterious matter.

2.5 GROUT

Type

Cement based proprietary grout: Mix with water. Fine sand may be added as a filler in wider joints.

Terra cotta tiles: Use proprietary polymer modified grout.

Portland cement based grout: Mix with fine sand. Provide minimum water consistent with workability.

- For joints < 3 mm: 1 cement:2 sand (by volume).
- For joints ≥ 3 mm: 1 cement:3 sand (by volume).

Pigments

Pigments for coloured grout: Provide colourfast fillers compatible with the grout material. For cement-based grouts, provide lime-proof natural or synthetic metallic oxides compatible with cement.

2.6 MOVEMENT JOINTS

Movement joint materials

Movement joint strip: A proprietary expansion joint consisting of a neoprene filler sandwiched between plates with lugs or ribs for mechanical keying. Set flush with the finished surface.

Proprietary slide plate divider strip: An arrangement of interlocking metal plates grouted into pockets formed in the concrete joint edges.

Sealant: One-part self-levelling non-hardening mould resistant, silicone or polyurethane sealant applied over a backing rod. Finish flush with the terrazzo surface.

- Floors: Trafficable, shore hardness > 35.

Backing rod: Compressible closed cell polyethylene foam with a bond-breaking surface.

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 28 days minimum.

3.2 PREPARATION

Standard

Preparation: To AS 3958.1 section 4.

Ambient temperature

General: If the ambient temperature is < 5 or > 35°C, do not lay tiles.

Substrates without wet area membranes

General: Ensure substrates are as follows:

- Clean and free of 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:

. Excessive projections are removed.
. Voids and hollows > 10 mm with abrupt edges are filled with a cement:sand mix not stronger than the substrate nor weaker than the bedding.
. Depressions < 10 mm are filled with a latex modified cementitious product with feathering eliminated 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: Ensure 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

Sequence

General: Fix wall tiles before floor tiles.

Cutting and laying

Cutting: Cut tiles neatly to fit around fixtures and fittings, and at margins where necessary. Drill holes without damaging tile faces. Cut recesses for fittings such as soapholders. 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 spacers 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 floor tiles until the bedding has set and attained its working strength.

Cleaning: Keep the work clean as it proceeds and protect finished work from damage.

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.

Sealed joints

General: Fill joints with silicone sealant and finish flush with the tile surface where tiling joins sanitary fixtures and at corners of walls in showers.

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.
  . Chemical resistant epoxy jointed tiling: 5 to 6 mm.
- Large and/or irregular floor 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, ensure cut tiles are a half tile or larger.

Margins

General: Provide whole or purpose-made tiles at margins where practicable, otherwise set out to give equal margins of cut tiles. If margins less than half tile width are unavoidable, locate the cut tiles where they are least conspicuous.

Fixtures

General: If possible position tiles so that holes for fixtures and other penetrations occur at the intersection of horizontal and vertical joints or on the centre lines of tiles. Continue tiling fully behind fixtures which are not built in to the tiling surface. Before tiling ensure that fixtures interrupting the tile surfaces are accurately positioned in their designed or optimum locations relative to the tile layout.

3.5 FALLS AND LEVELS

Grading

General: Grade floor tiling to even and correct falls to floor wastes and elsewhere as required. Make level junctions with walls. Where 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.

3.6 BEDDING

Standard

Cement mortar: To AS 3958.1 clause 5.5.

Adhesive: To AS 3958.1 clause 5.6.

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.

Terra cotta 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.

Thin adhesive beds

General: Provide only if the substrate deviation is less than 3 mm when tested with a 3 m straight edge. Cover the entire tile back with adhesive when the tile is bedded.

Thickness: 1.5 – 3 mm.

Thick adhesive beds

General: Provide on substrates with deviations up to 6 mm when tested with a 3 m straight edge, and with tiles having deep keys or frogs.

Nominal thickness: 6 mm.

Adhesive bedding application

General: Apply adhesive by notched trowel to walls and floors and direct to tiles if required, to provide evenly distributed coverage after laying as follows:

- Domestic internal walls: > 65%.
- Domestic internal floors: > 80%.
- Other wall and floors: > 90%.
- Wet areas and bench tops: 100%.

Pattern of distribution of adhesive: As described in AS 3958.1 clause 5.6.4.3. Verify by examining one tile in ten as work proceeds.

Wall tile spacers: Do not use spacer types that inhibit the distribution of adhesive.

Curing: Allow the adhesive to cure for the period nominated by the manufacturer prior to grouting or allowing foot traffic.

Mortar beds

For floor tiles: Either lightly dust the screeded bed surface with dry cement and trowel level until the cement is damp, or spread a thin slurry of neat cement, or cement-based thin bed adhesive, on to the tile back. Do not provide mortar after initial set has occurred.

- Nominal thickness: 20 to 40 mm.

Thick reinforced beds: Place mortar bed in two layers, and incorporate the mesh reinforcement in the first layer.

3.7 MOVEMENT JOINTS

General

General: Provide movement joints carried through the tile and the bedding to the **Movement joints schedule** and as follows:

- Floor location:
  - . Over structural (isolation, contraction, expansion) joints.
  - . To divide complex room plans into rectangles.
  - . Around the perimeter of the floor.
  - . At junctions between different substrates.
  - . To divide large tiled areas into bays.
  - . At abutments with the building structural frame and over supporting walls or beams where flexing of the substrate is anticipated.
- Wall location:
  - . Over structural joints.
  - . At junctions with different background materials when the filing is continuous.
  - . At vertical corners in shower compartments to AS 3740.
- Depth of joint: Right through to the substrate.
- Sealant width: 6 – 25 mm.
- Depth of elastomeric sealant: One half the joint width, or 6 mm, whichever is the greater.

3.8 GROUTED AND CAULKED 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 surface with a clean cloth.

Edges of tiles: Grout exposed edge joints.

Epoxy grouted joints: Ensure that tile edge surfaces are free of extraneous matter such as cement films or wax, before grouting.

Mosaic tiles

Grouting mosaics: If paper faced mosaics are to be bedded in cement mortar, pre-grout the sheeted mosaics from the back before fixing. After fixing, rub grout into the surface of the joints to fill any voids left from pre-grouting. Clean off surplus grout. When grout has set, wash down. If necessary use a proprietary cement remover.

Caulked joints

General: Provide caulked joints filled with sealant and finished flush with the tile surface as follows:

- Where tiling is cut around sanitary fixtures.
- 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.

3.9 JOINT ACCESSORIES

Floor finish dividers

General: Finish tiled floors at junctions with differing floor finishes with a corrosion resistant metal dividing strip suitably fixed to the substrate, with top edge flush with the finished floor. Where changes of floor finish occur at doorways make the junction directly below the closed door.

Stepping: Less than 5 mm.

Adjustments

If the floor finish divider was installed by the wet area waterproof membrane applicator check that the height is sufficient for the topping and tile thickness. Adjust as required with a matching flat bar adhesive fixed to the divider angle.

Weather bars

General: Provide a corrosion resistant metal weather bar under hinged external doors. Locate under the centres of closed doors.

3.10 COMPLETION

Spare tiles

General: Supply spare matching tiles and accessories of each type for future replacement purposes. Store the spare materials on site.

Quantity: At least 1% of the quantity installed.

Cleaning

General: Clean tiled surfaces using an appropriate tile cleaning agent, and polish.

Operation and maintenance manuals

General: Submit a manual describing care and maintenance of the tiling, including procedures for maintaining the slip-resistance grading stating the expected life of the slip-resistance grade.

0652b CARPETS

1 GENERAL

1.1 AIMS

Responsibilities
Lay carpet to backgrounds as follows and/or to the **Selections**:
- To remain secured for the warranty life of the carpet.
- To remain consistently smooth for the warranty life of the carpet.
- To form the pattern required.

1.2 CROSS REFERENCES

General
General: Conform to the *General requirements* worksection.

1.3 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of the following:
- Each batch of material upon delivery to the works.
- Subfloor prepared to receive the carpet installation.
- Fixings, edge strips, and underlay installed ready to lay carpet.
- Completed carpet after cleaning and before covering for protection.

1.4 SUBMISSIONS

Samples
General: Submit labelled production run samples illustrating the range of colour, pattern, texture and pile yarn available in the required carpet types.

Sample size:
- Carpet: 1 m long x roll width or 1 m wide, whichever is less.
- Tiles: 4 x tile size.

Edge strip: Submit a 300 mm length of each type.

Underlay: Submit one labelled sample.
- Size: At least 600 x 600 mm.

Penetrations: Submit one production carpet sample with a penetration access cut as specified in *Laying carpet*.

Accessories: Submit one sample of each of the following:
- Carpet gripper.
- Heat-bonding tape.
- Bonding adhesive.

Stitching: Submit one sample, at least 1 m long, of a stitched seam.

Labelling
Carpet classifications: Deliver carpet labelled to the classification in **Selections.**

2 PRODUCTS

2.1 GENERAL

Critical radiant flux
Standard: to AS ISO 9239.1.

Carpet systems and carpet tiles: Conform to the values of critical radiant flux nominated in **Selections**.

Smoke development rate
Standard: To AS ISO 9239.1.

Floor finishes in non-sprinklered buildings: 750 percent-minutes.

2.2 CARPET

Tolerances
Standard: To AS 1385.

Batching
General: Carpet laid in a single area and of a single specified type, quality, colour and design, must come from one manufacturing batch and dye lot.

Insect resistance
Insecticide: Provide carpets and underlays composed entirely of materials either inherently resistant to insect attack, or treated against insect attack, including by moth and carpet beetle, by application of insecticide to the yarn during the dyeing or scouring process.

Electrical resistance
General: Provide carpet which is within the range of surface resistance specified in AS 2834 clause 2.1.2, when tested to AS 4155.6.

VOC limits
Total VOC limit:

. Generally: 0.5 mg/m^2.
. Compliance: To the Environmental Classification Scheme operated by the Carpet Institute of Australia.

2.3 CARPET TILES

Carpet tiles
Type: 'Non-stick', non-curling tiles capable of being taken up without damage and then relaid in different positions.

Marking: On the back, showing recommended direction of laying.

Carpet tile tolerances:

- Edge dimensions: $\pm$ 2 mm.
- Squareness: Maximum difference of 2 mm between lengths of diagonals.

Sustainable carpet tile backing
Re-useable backing: Proprietary vinyl backing to carpet tiles capable of separation and re use in replacement tiles.

2.4 UNDERLAYS

Standard
General: To AS/NZS 2455.1.

Fibre cement underlay
Thickness: 5 mm minimum.

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.

Soft underlay
Standard: To AS 4288.

2.5 ADHESIVES AND TAPES

Standard
General: To AS/NZS 2455.1.

Adhesives
General: Compatible with the floor covering material, and suitable for bonding it to the subfloor.

Friction compound: Suitable for holding tiles in position without permanent sticking.

Hot-melt adhesive tapes
General: Commercial grade glass fibre and cotton thermoplastic adhesive coated tape 60 mm wide on a 90 mm wide metal foil base and backed with silicon-coated release paper.

2.6 STRIPS

Preformed gripper strips
General: Commercial grade plywood carpet gripper strip with 3 rows of rust-resistant angled pins of length appropriate to the carpet type.

Size (minimum): 33 mm wide x 7 mm thick.

Location: At edges, except where edge strips are used. Provide double gripper strips to edges where recommended.

Edge strips
Type: Heavy duty edge strip appropriate to the floor covering type (tackless or adhesive fixed), capable where necessary of accommodating different levels of adjacent floor finishes.

Form: Metal moulding or extrusion, with vinyl inserts.

Location: At exposed edges of the carpet, and at junctions with differing floor finishes or finishes of a different thickness. Where edge strips occur at doorways, locate the junctions directly below the closed door.

3 EXECUTION

3.1 SUBSTRATE

Substrates
General: Ensure substrates conform to the **Substrate tolerance table** and are as follows:

- To AS/NZS 2455.1 or AS/NZS 2455.2, as appropriate.
- Clean and free of any deposit or finish which may impair adhesion or location and functioning of movement joints.

Substrate tolerance table

Property	Length of straight edge laid in any direction	Max. deviation under the straight edge
Flatness	3 m	6 mm
Smoothness	150 mm	1 mm

Concrete substrate correction: Remove projections and fill voids and hollows with a levelling compound compatible with the adhesive.

Timber substrate correction: Remove projections. If conformance to the **Substrate tolerance table** can not be achieved fix an underlay in brick pattern with joints avoiding substrate joints.

Moisture content: Do not commence installation unless:

- Concrete: The moisture content of the concrete has been tested to AS/NZS 2455.1 Appendix B and values obtained as follows:
  - . ≤ 5.5% when tested by the electrical resistance method.
  - . ≤ 70% when tested by the surface hygrometer test.
- Plywood: The moisture content of battens/joists or plywood background has been tested to AS 1080.1 and values obtained as follows:
  - . Airconditioned buildings: 8 to 10%.
  - . Intermittently heated buildings: 10 to 12.5%.
  - . Unheated buildings: 12 to 15%.

Fixtures: Remove door stops and other fixtures, and refix in position undamaged on completion of the installation.

3.2 LAYING CARPET

Standard
General: To AS/NZS 2455.1.

Setting out
General: Lay the carpet in continuous lengths without cross joins in the body of the area. Where unavoidable cross joins occur at doorways, locate the joins directly below the closed doors.

Joints in underlay: Ensure joints in underlay do not coincide with carpet joints. Do not carry underlay over carpet grippers or edge strips.

Partition layout: Confirm that permanent partitions have been installed before starting carpet laying.

Fixing underfelt

To timber floors: Secure underfelt with staples at 100 mm centres at edges and joints, in parallel lines 600 mm apart.

To concrete floors: Glue continuously at edges and joints with a 100 mm wide strip to each piece, and at 600 mm centres both ways with 150 mm diameter patches.

Seaming methods

Woven carpet: Machine or hand sew. Do not provide glued taped seams.

Tufted carpet: Seam with hot-melt adhesive tape.

Carpet installation

Gripper system: To AS/NZS 2455.1 clause 3.5.

Direct stick system: To AS/NZS 2455.1 clause 3.6.

Double bond system: To AS/NZS 2455.1 clause 3.7.

Pre applied underlay adhesive system: To AS/NZS 2455.1 clause 3.8.

Hook and loop system: To AS/NZS 2455.1 clause 3.9.

Cutting laid carpet

Method: Where penetrations through laid carpet are necessary for electrical, telephone or other outlets, cut the carpet either by cross cutting or by cutting rectangular or circular openings.

Cutting holes in concrete floors: Protect the carpet and remove concrete particles and dust on completion. Replace the cut carpet over the opening without any signs of fraying or other damage, and fix with a peel-up adhesive, or resew.

3.3 LAYING CARPET TILES

General

Standard: To AS/NZS 2455.2.

Set out: Do not provide cut tiles which are less than half tile width. Provide full tiles in doorways. Keep joint lines straight.

Laying: Do not allow the pile to catch in the joint when laying. Do not tack or sew the tiles to the floor or to each other.

Fixing

Perimeter and grid system: To AS/NZS 2455.2 clause 7.1.

Fully adhered pressure sensitive system: To AS/NZS 2455.2 clause 7.2.

Double bond system: To AS/NZS 2455.2 clause 7.3.

Fixing cut tiles: Adhesive fix to 100% of tile.

3.4 STAIRS

Installation

General: To AS/NZS 2455.1 clause 3.10.

3.5 COMPLETION

Cleaning

Progressively clean the work. Remove waste, excess materials and adhesive.

Final cleaning: When the installation is complete, clean the carpet as necessary to remove extraneous matter, marks and soiling and to lift the pile where appropriate.

Protection: provide fabric drop sheets. Do not use plastic sheeting. If wheeled traffic is to follow carpet installation protect with hardboard sheets butted and fixed with adhesive tape.

0655 TIMBER FLOORING

1 GENERAL

1.1 AIMS

Responsibilities
General: Provide timber flooring systems to backgrounds as follows and/or to the **Selections**:
- Appropriately secured.
- Appropriately smooth and flat for the intended use.
- Form the pattern as required.
- Structurally adequate.
- Suitable for the applied finish.
- At its equilibrium moisture content.

1.2 CROSS REFERENCES

General
General: Conform to the *General requirements* worksection.

1.3 INTERPRETATION

Definitions
General: For the purposes of this worksection the definitions given below apply:
- Substrate: The structure that supports the flooring (e.g. concrete slabs, bearers and joists, or structural sheet floor framing).
- Moisture content: The percentage by mass of water present in the timber.
- Equilibrium moisture content (EMC): For given conditions of humidity and temperature, the moisture content which timber approaches at which it neither gains nor loses moisture while the conditions of its environment are maintained.
- Feature: Any figure, grain, natural variation or similar which affects timber appearance.
- Flooring:
  . Fitted: Flooring fitted between the walls of each room i.e. not platform floors.
  . Intermittently-supported: Flooring which is supported by, and spans across, beams, joists or battens.
  . Continuously-supported: Flooring which is supported by, and directly fixed to, a continuous supporting surface.
  . Platform: Flooring laid over the whole of the joisted floor structure prior to the erection of external and internal wall frames.
  . Strip flooring: Flooring made from machined timber with tongues and grooves along the length of the strips.
  . Engineered floor panels: Manufactured flooring with wearing and decorative surfaces of timber or plastic laminated to supporting layers of plywood usually with tongues and grooves along the lengths of the boards.
- Parquet: Timber mosaic panels or blocks bonded to a background either directly or over an underlay.
  . Mosaic parquetry panels: Pre assembled timber finger modules held together to form tiles or panels.
  . Block parquet: Square groups of pre finished timber blocks laid individually.
- Underlay: Sheet material fixed to supporting structure and forming part of the substrate on which flooring may be continuously supported.
- Acoustic underlay: A resilient underlay providing acoustic isolation.

1.4 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of the following:
- Substrate before laying flooring.
- Control joints: Before fitting skirting.
- Trial set-out: Before execution.
- Completed installation before the application of coated finishes.

1.5 TESTS

Product moisture content
General: Confirm that the moisture content of timber flooring products, as delivered, matches the moisture content of the substrate as measured on site. If there is a mismatch allow for acclimatisation.

Test method for timber products: To AS/NZS 1080.1.

Test method for concrete substrate: To AS/NZS 2455.1 Appendix B.

1.6 SUBMISSIONS

Product samples
General: Submit samples of each timber flooring type illustrating the range of variation in colour and figure

Verification
Certificate: Submit a supplier's certificate (which may be included on an invoice or delivery docket) verifying conformance to grading and noting moisture content. Do not brand timber products.

Inspection: If neither branding nor certification is adopted, submit a report by an independent inspecting authority verifying conformance.

1.7 TOLERANCES

Tolerances
Maximum deviation of the finished floor surface: 3 mm under a 3 m straight edge laid in any direction.

2 PRODUCTS

2.1 GENERAL

Forest certification
Certified wood products: all excluding recyled content

Adhesive
General: Provide adhesives to the **Selection schedules** and as follows:
- Compatible with the materials and surfaces to be adhered.
- Alkali resisting.
- Solvent and water content: ≤ 40%.
- Shear strength when cured (average): ≥ 1.47 MPa.
- Elasticity: Sufficient to withstand continuous expansion and contraction of boards.
- Will not break down under service.

Ventilation: Provide adequate ventilation appropriate for moisture curing.

Acoustic underlay
General: Closed cell foam sheeting perforated to receive adhesive beads.

Critical radiant flux
Standard: to AS ISO 9239.1.

Flooring system: Conform to the values of critical radiant flux nominated in **Selections**.

Smoke development rate
Standard: To AS ISO 9239.1.

Floor finishes in non-sprinklered buildings: 750 percent-minutes.

2.2 STRIP FLOORING

Recycled timber

Type or species:Jarrah

Source: existing building (stored at 83 Angove Street)

Appearance: To be re-sawn and finished to eliminate weathering stains and expose fresh timber.

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
Compressed fibre cement sheets	AS/NZS 2908.2	Type A, Category 5
Particleboard flooring	AS/NZS 1860.1	Class 1 flooring
Plywood flooring	AS/NZS 2269.0	Type: Bond type A

Identification

General: Identify timber using branding or certification.

- Branding: Brand timber under the authority of a recognised product certification or accreditation program applicable to the product. Locate the brand mark on faces or edges which will be concealed in the works.
- Provide certification from the recognised product certification or accreditation programs as appropriate:
  - . Flooring: TRADAC Accredited Timber Flooring Manufacturers Program.
  - . Hardwoods: Australian Timber Industry Certification Quality Scheme.
  - . Milled radiata pine products: Plantation Timber Certification.
  - . Engineered Wood Products Association of Australia Quality Control and Product Certification Scheme.
  - . Sawn radiata pine boards: Plantation Timber Certification.
- Brand preservative treated decking timber to AS 1604.1.

2.3 PARQUET FLOORING AND SUBSTRATES

Timber

Marking: Identify timber by branding on faces or edges which will be concealed in the works as follows:

- Flooring: TQL Accredited Timber Flooring Manufacturers Program. (formally TRADAC).
- Hardwoods:
  - . Australian Timber Industry Certification Quality Scheme.
  - . Plantation Timber Association of Australia Certification.

Plywood underlay

Standard: To AS/NZS 2269.

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

Particleboard underlay

Particleboard: To AS 1860.2, Class 1.

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

Grading

Grading: Conform to the **Grading table**.

Product	Standard	Grade

Product	Standard	Grade
Hardwood	AS 2796.1	Parquet clear
Plywood	AS/NZS 2269.2	Bond Type A

3 EXECUTION

3.1 PREPARATION

Storage
General: Deliver timber flooring to site in unbroken wrapping or containers and store so that its moisture content is not adversely affected. Do not store on the background until the moisture content of the background is suitable for the installation of the floor. Do not store in areas of wet plaster.

Acclimatisation
General: After the following construction operations are complete, acclimatise the flooring by stacking it in the in-service conditions for a minimum period of two weeks with air circulation to all surfaces as follows:

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

Substrates
General: Ensure substrates are as follows:

- Clean and free of any deposit or finish which may impair adhesion or location and functioning of movement joints.
- If solid or continuous:
  . Excessive projections are removed.
  . Voids and hollows > 10 mm with abrupt edges are filled with a cement:sand mix not stronger than the substrate nor weaker than the bedding.
  . Depressions < 10 mm are filled with a latex modified cementitious product with feathering eliminated by scabbling the edges.

Flatness: < 3 mm. deviation of the surface under a 3 m straight edge laid in any direction with no abrupt variations greater than 1mm over 250 mm.

Moisture content
General: Do not commence installation of flooring unless:

- Concrete substrate: The moisture content of the concrete has been tested to AS/NZS 2455.1 Appendix B and values obtained as follows:
  . ≤ 5.5% when tested by the electrical resistance test.
  . ≤ 70% when tested by the hygrometer test.
- Plywood underlays or timber flooring products: The moisture content has been tested to AS/NZS 1080.1 and values obtained as follows:
  . Airconditioned buildings: 8 to 10%.
  . Intermittently heated buildings: 10 to 12.5%.
  . Unheated buildings: 12 to 15%.

If these values are not achieved allow for acclimatisation.

3.2 SUPPORT FIXING – STRIP FLOORING

Battens for strip flooring on concrete slabs
General: Ensure support members are in full lengths without splicing.

Framing fixed direct: Fix seasoned battens to the concrete slab in conformance with the **Strip flooring battens table** so that their top surfaces are aligned.

- Battens: 70 x 35 mm seasoned timber.

- Spacing of fasteners: < 600 mm.

Framing fixed on resilient pads: Fix seasoned battens on resilient pads to the concrete slab in conformance with the **Strip flooring battens table** so that their top surfaces are aligned.

- Pad spacing: 400 mm centres.

Vapour barrier under battens: 200 μm high-impact resistant polyethylene. Lap 300 mm, seal the laps with pressure-sensitive tape and return up the vertical surfaces and trim at the level of the flooring.

Strip flooring on steel joists

General: Screw fix seasoned battens to the steel joists in conformance with the **Strip flooring battens table** so that their top surfaces are aligned.

Strip flooring battens table

Strip flooring timber (average species density)	Standard	Flooring thickness	Batten spacing for flooring type	
			Butt jointed	End matched
Cypress	AS 1810	20	450	450
Hardwood density 560 kg/m^3 or more	AS 2796.1	19	600	450
		25	600	450
		30	600	600
Hardwood density less than 560 kg/m^3	AS 2796.1	19	450	390
		25	600	450
		30	600	600
Softwood density 560 kg/m^3 or more	AS 4785.1	19	450	450
		35	600	450
Softwood density less than 560 kg/m^3	AS 4785.1	19	450	390
		35	600	450

3.3 SUPPORT FIXING – SHEET UNDERLAY

Battens for sheet underlay on concrete slabs

Framing fixed direct: Fix seasoned battens to the concrete slab in conformance with the **Sheet underlay battens table** so that their top surfaces are aligned.

- Battens: 70 x 35 mm seasoned timber.
- Spacing of fasteners: < 600 mm.

Framing fixed on resilient pads: Fix seasoned battens on resilient pads to the concrete slab in conformance with the **Sheet underlay battens table** so that their top surfaces are aligned.

- Pad spacing: 400 mm centres.

Vapour barrier under battens: 200 μm high-impact resistant polyethylene. Lap 300 mm, seal the laps with pressure-sensitive tape and return up the vertical surfaces and trim at the level of the flooring.

Sheet underlay battens table

Plywood stress grade	Plywood thickness	Batten spacing
F11	13 mm	450 mm
F14	12.5 mm	450 mm
F11	18.5 mm	600 mm
F14	17 mm	600 mm

3.4 UNDERLAY FIXING

Underlay batten fixed on concrete slabs

General: Fix plywood underlay to the battens so that their top surfaces are aligned.

Orientation: Fix at 45° to the direction of parquet flooring pattern.

Installation: Lay the length of the sheets at right angles to the supports. Stagger the end joints and locate them centrally over supports. If panels are not tongue and grooved provide noggings or trimmer joists to support the edges.

Fixing to battens:

- Nailed only: 150 mm along ends, 300 mm on intermediate battens.
- Glued/nailed: Continuous 10 mm glue bead and nails at 300 mm.
- Glued only: To the adhesive manufacturer's recommendations with downward pressure during curing.

Underlay movement control joints: Provide joints of widths as follows:

- Against vertical building elements: 12 mm.
- Between tongue and groove sheets: Hand pressure assembly.

Underlay adhesive fixed on concrete slabs

Plywood: Apply a sealant to the underside compatible with the adhesive.

Vapour barrier: A liquid applied membrane compatible with the adhesive system.

Glue and nail fixing:

. Nail centres: 300 mm from edges and at 600 x 600 mm.

. Glue beads: 10 mm diameter and at 500 x 500 mm.

Glued only fixing: Apply adhesive with a notched trowel to the manufacturer's recommendations. Provide downward pressure during curing.

Acoustic underlay

General: Apply the bonded acoustic underlay nominated in the **Applied timber flooring schedule** to the manufacturer's instructions.

Floors on steel joists

General: Screw fix plywood underlay to the steel joists so that their top surfaces are aligned.

3.5 FLOOR FIXING

Room environment

General: During fixing and stabilising, operate the heating system of radiant heated or airconditioned rooms at 1.5°C above normal maximum temperature.

Adhesive

General: Use a urethane elastomer adhesive in addition to nails as follows:

- Continuously supported flooring: 4 mm beads at 300 mm spacing at right angles to run of flooring.
- Intermittently supported flooring: 6 mm bead along each joist or batten.

Nailing

General: Ensure the boards are in contact with the joists at the time of nailing, particularly where boards are machine nailed. Skew nail in a uniform pattern**.** If nails are to be less than 10 mm from ends of sheets or boards, pre-drill nail holes 0 – 1 mm undersize.

Secret nailing: Do not use boards of more than 85 mm cover width, and use one nail or staple skewed at 45°. Do not cramp more than one board at a time.

Sinking: Punch nails 3 mm below finished surfaces and fill the sinking flush with a material tinted to match the flooring which is compatible with the floor finish.

Top nailing: For boards more than 65 mm cover width, use two nails skewed 10 degrees in opposite directions. Do not cramp more than 800 mm width of boards at one time.

Strip flooring

Installation: Lay in straight and parallel lines with each board firmly butted to the next and firmly bedded on the subfloor. Cramp sufficient only to bring the boards together and no more than 800 mm of flooring at any one time.

Adhesive: Apply adhesive in addition to nailing over softwood joists or underlay.

Set-out: Locate joints in boards so that they are evenly and symmetrically distributed and as follows:

- Butt joints: Centrally on supports.
- End-matched joints: Not in adjacent boards.
- Minimum number of spans across supports: 2.

Movement control joints

Perimeters: Provide 12 mm wide joints against vertical building elements.

Between underlay sheets: 6 mm.

Floors under 6 x 6 m: Partially cramp strip flooring to allow a 1 mm gap every 600 mm or 1.5 mm every metre.

Floors over 6 x 6 m: Additionally, divide floors into maximum dimensions of 6 m with joints 4 mm wide filled with a flexible sealant compatible with the applied finish.

Parquet, panel and adhesive fixed strip flooring

Vapour barrier under adhesive fixed flooring: A liquid applied membrane compatible with the adhesive system.

Trial set-out: Prepare a trial parquet tile or panel set-out to each area to:

- Maximise the size of equal margins of cut parquet tiles or panels.
- Locate movement joints.

Laying method: To the manufacturer's flooring installation guide.

Performance: Spread adhesive and lay boards to achieve the following:

- Contact between panel and adhesive: 75%. Verify by lifting and examining 1 panel in 20.
- Clamp starting and finishing rows to prevent sideways movement.
- Avoid clusters of end joints.
- Ensure adhesive does not bleed through at joints.
- Remove excess adhesive progressively before initial cure.
- Hold down in contact with the adhesive over night to achieve a complete cure .
- If pins or nails are used as well as adhesive for parquet blocks, punch below the surface without bruising. Fill holes to match the blocks.

3.6 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.

Spare flooring products

General: Supply an extra 5% of flooring products, to be stored on site as spares.

0656 FLOOR SANDING AND FINISHING

1 GENERAL

1.1 AIMS

Responsibilities

Basic sanded surface: Provide as follows:

- To an even plane.
- Free of irregularities.
- Suitable for finish sanding.
- As a suitable substrate for a carpet finish.
- As a suitable key for an adhesive fixed resilient finish.

Finish sanded surface: Provide as follows:

- As a suitable key for an applied coating system.
- That will result in a clear finished surface free of scratch marks when observed standing.

Coating system: Provide as follows and/or to the **Selections**:

- Of a consistent film thickness throughout the surface.
- Of a consistent level of gloss.
- Without edge bonding.

1.2 CROSS REFERENCES

General

General: Conform to the *General requirements* worksection.

1.3 INTERPRETATION

Definitions

General: For the purposes of this worksection the definitions given below apply.

- Basic sanding: Sanding procedures resulting in an even plane surface free of irregularities.
- Finish sanding: Sanding procedures resulting in a surface suitable for the application of the coating system.
- Coating system: Applied materials to enhance wear and protect the flooring material.
- Flooring:
  - . Hard flooring: Timber with a wearing surface not easily cut with an abrasive.
  - . Mild flooring: Timber with a wearing surface easily cut with an abrasive.
- Filling: Treatment to enhance the surface appearance by:
  - . Flood filling: To fill the pores of open-grained timber or minor cracks in parquetry.
  - . Stopping: To fill punched nail head cavities.
- Staining: Treatment to alter the colour of the timber surface.
- Sealing: Treatment to:
  - . Prevent excessive penetration of coating system.
  - . Prevent edge bonding by the coating system.
- Edge bonding: The tendency of some coating systems to glue the edges of strip flooring and parquetry panels which prevents an even distribution of movement gaps.

1.4 STANDARD

Floor sanding and finishing

General: To AS 4786.2.

1.5 INSPECTION

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

- Before surface preparation of timber.
- Completion of finish sanding.
- After staining.
- After application of each clear finishing coat.

1.6 SUBMISSIONS

Samples
General: Submit samples of the coating system illustrating the finished effect on the selected floor surface

Product conformity
General: Submit current assessments of conformity as follows:

- Declaration of conformity by an AS ISO 9001 quality management system certified supplier to the requirements of Appendix I 'Uniform Paint Standard' to the Standard for the Uniform Scheduling of Drugs and Poisons ( ).

Application of coating systems
General: Submit proposals.

2 PRODUCTS

2.1 ABRASIVES

Grades
General: Select abrasives in accordance with the **Abrasives table**.

Abrasives table

Floor hardness	Basic sanding	Finish sanding		Sanding between finish coats of coating system
		Initial cuts	Final sand	
Hard	F24 to F30	F40 to F60	F80 to F120	F150 or finer
Mild	F36 to F40	F60 to F80	F100 to F120	F150 or finer
Soft	F60 to F80	F80 to F100 if necessary	F120	F150 or finer

Scratching: If scratching persists during the final sanding re-sand with a finer grade of abrasive.

2.2 FINISH

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

Coating system
Type: Provide the coating system nominated in **Selections**.

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

Sanding procedure
General: Provide sanding procedure as follows:

Floor type	Proposed use of floor surface	
	As flooring substrate	As a finished surface
New floor	Basic sanding	Basic sanding and finish sanding
Existing floor – poor condition	Basic sanding	Basic sanding and finish sanding
Existing floor – good condition		Finish sand only

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.

Ensure substrates are clean and free of any deposit which may impair the following:
- Application of the coating system.
- Adhesion of resilient finishes.

Preparation
General: Punch nails 3 mm below the surface. Remove 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.

Basic sanding – parquet
Uneven or hard flooring: First cut at 45° to the direction of the grain of the wood, second cut at 90° to the first cut, third cut at 45° to the first cut, and fourth cut at 90° to the third cut.

Boundary areas: Bring to the same surface condition as the main sanded area, using disc sanding.

Inaccessible areas: Hard 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.

Fill minor cracks and stop punched nails with a putty knife.

Fill deeper holes in layers > 6 mm allowing each fill to dry. Ensure cavities are filled slightly above the surface without air pockets.

Flood fill porous timber with the cloth application of water based filler diluted to a creamy consistency.

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: For a water based coating system use a final grade of paper of minimum F220 screen back.

Finish sanding – parquet

General: After basic sanding, cut twice parallel to the fourth basic sanding cut, then cut twice again in that direction using increasingly fine abrasives.

Boundary areas: Bring to the same surface condition as the main sanded area.

Inaccessible areas: Hand scrape to produce the same surface condition as the main sanded area.

For a water based coating system use 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

'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 accordance with the manufacturer's printed instructions. 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

Requirement: After sanding, finish with 3 coats of clear sealer to AS 3730.27.

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 instructions.

3.4 COMPLETION

Cleaning

General: Vacuum clean the area and protect with fabric drop sheets. Do not use plastic sheeting.

-

0671b PAINTING

1 GENERAL

1.1 AIMS

Responsibilities
General: Provide coating systems to substrates as follows:
- Consistent in colour, gloss level, texture and dry film thickness.
- Free of runs, sags, blisters, or other discontinuities.
- Paint systems fully opaque.
- Clear finishes at the level of transparency consistent with the product.
- Fully adhered.
- Resistant to environmental degradation within the manufacturer's stated life span.

Selections: Conform to the **Selections**.

1.2 CROSS REFERENCES

General
General: Conform to the *General requirements* worksection.

Associated worksections
Associated worksections: Conform to the following: [complete/delete]

1.3 STANDARDS

Painting
General: Comply with the recommendations of those parts of AS/NZS 2311 which are referenced in this worksection.

1.4 SUBMISSIONS

Clear finish coated samples
General: Submit pieces of timber or timber veneer matching the timber to be used in the works, prepared, puttied, stained, sealed and coated in accordance with the specified system, of sufficient size so that, each piece can be cut into 4 segments, marked for identification, and distributed as directed.

Opaque coated samples
General: Submit, on representative substrates, samples of each coating system showing surface preparation, colour, gloss level, texture, and physical properties;

Paint
General: Submit the selected manufacturer's details at least 3 weeks before the paint is required, as follows:
- Paint brand name and paint line quality statement.
- Material safety data sheets (MSDS) showing the health and safety precautions to be taken during application.
- The published recommendations for maintenance.

2 PRODUCTS

2.1 PAINTS

Paint brand

Quality: If the product is offered in a number of levels of quality, provide premium quality lines.

Combinations
General: Do not combine paints and stopping/filling compounds 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.

Delivery
General: Deliver paints to the site in the manufacturer's labelled and unopened containers.

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.

Toxic ingredients
General: Comply with the requirements of Appendix I Uniform Paint Standard to the Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP).

3 EXECUTION

3.1 PREPARATION

Standards
General: To AS/NZS 2311 Section 3.

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 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
Fixtures: Remove door furniture, switch plates, light fittings and other fixtures before starting to paint, and refix in position undamaged on completion of painting.

Adjacent surfaces: Protect adjacent finished surfaces liable to damage from painting operations.

'Wet paint' warning
General: Place notices conspicuously and do not remove them until paint is dry.

Repair
General: Clean off marks, paint spots and stains progressively and restore damaged surfaces to their original condition. Touch up new damaged decorative paintwork or misses only with the paint batch used in the original application.

Substrate preparation
General: Prepare substrates to receive the painting systems.

Cleaning: Clean down the substrate surface. Do not cause undue damage to the substrate or damage to, or contamination of, 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, by methods which may involve 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 (last abrasive no coarser than 220 grit) to show no scratches across the grain.

3.2 PAINTING

Standard
General: To AS/NZS 2311 Section 6.

Light levels
General: ≥400 lux.

Drying
General: Use a moisture meter to demonstrate that the moisture content of the substrate is at or below the recommended maximum level for the type of paint and the substrate material.

Paint application
General: 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.

Painting conditions
General: Do not paint in dusty conditions, or otherwise unsuitable weather as follows unless the paint is suitable and recommended for such conditions:

- Relative humidity: ≥ 85%.
- Surface temperature ≤ 10°C or ≥ 35°C.

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 which does the following:

- Satisfactorily atomises the paint being applied.
- Does not require the 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: Provide masking, ventilating and screening facilities generally to the standards set out for spray painting booths, AS/NZS 4114.1 and AS/NZS 4114.2.

Sanding
Clear finishes: Sand the sealer using the finest possible abrasive (no coarser than 320 grit) and avoid cutting through the colour. Take special care with round surfaces and edges.

Repair of galvanizing
General: For galvanized surfaces which have been subsequently welded, prime the affected area.

Primer: Organic zinc rich coating for the protection of steel to AS/NZS 3750.9 Type 2.

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: If not embedded, paint new services and equipment including in plant rooms, except chromium, anodised aluminium, GRP, UPVC, stainless steel, non-metallic flexible materials and normally lubricated machined surfaces. Repaint proprietary items only if damaged.

Windows
Operation: Ensure that opening windows function correctly after painting.

Door leafs
Drying: Leave doors fixed open to allow drying. Do not allow door hardware, accessories or the like to damage the door finish during the drying process.

4 SELECTIONS

4.1 PAINTING SYSTEMS

New unpainted interior surfaces
Standard: To AS/NZS 2311 Table 5.1.

New unpainted exterior surfaces
Standard: To AS/NZS 2311 Table 5.2.

Specialised painting systems
Standard: To AS/NZS 2311 clause 5.2 for the following final coats:

- High build textured or membrane finishes (B38 to AS/NZS 2311).
- 2 pack gloss pigmented polyurethane (B44 to AS/NZS 2311).
- 2 pack epoxy (B29 to AS/NZS 2311).
- 2 pack water based epoxy (B29A to AS/NZS 2311).

Previously painted surfaces
Apply the following:

- Sealer: [complete/delete]
- Undercoat: [complete/delete]

4.2 PAINTING SCHEDULES

General
Number of coats: Unless specified as one or two coat systems, each paint system consists of at least 3 coats.

Final coat selection: To the **Interior painting schedule** and the **Exterior painting schedule.**

Low VOC emitting paints
Provide the VOC limits noted in the **Interior painting schedule** and the **Exterior painting schedule.**

Paint colours
Number of separate colours: Supply paint to the **Paint colour schedule.**

0672 TEXTURED AND MEMBRANE COATINGS

1 GENERAL

1.1 AIMS

Responsibilities

General: Provide coating systems to substrates as follows:

- Consistent in colour, gloss level, texture and dry film thickness.
- Free of runs, sags, blisters, or other discontinuities.
- Textured coating systems fully opaque.
- Clear finishes at the level of transparency consistent with the product.
- Fully bonded.
- Resistant to environmental degradation within the manufacturer's stated life span.
- Will accommodate movement in the substrate between control joints.

Selections: Conform to the **Selections**.

1.2 CROSS REFERENCES

General

General: Conform to the *General requirements* worksection.

1.3 STANDARDS

Textured and membrane coatings

General: Comply with the recommendations of those parts of AS/NZS 2311 which are referenced in this worksection.

1.4 INTERPRETATION

Definitions

General: For the purposes of this worksection the definitions given below apply.

- Substrate: The surface to which the coating material is applied or is to be applied.
- Latex extensible wall coating (or 'membrane' coating): A non-aggregate flexible watertight finish.
- High-build low profile latex coating: A water based coating designed to be used over textured coatings to elevate the exposure performance of the paint system.
- Non-aggregate textured latex coating: A latex coating selected for aesthetic purposes to provide decorative profiles according to the application technique used.
- Aggregate –filled textured latex coating: An aggregate filled medium to high profile textured coating selected for aesthetic purposes to provide maximum relief from underlying surface irregularities according to the application technique used.
- Paint or coating system: A product in liquid form, which when applied to a surface, forms a dry film having protective, decorative or other specific technical properties.
- Sealer: A product used to seal substrates to prevent:
  - . Materials from bleeding through to the surface.
  - . Reaction of the substrate with incompatible top coats.
  - . Undue absorption of the following coat into the substrate.
- Primer, prime coat: The first coat of a coating system that helps bind subsequent coats to the substrate and which may inhibit its deterioration.
- Undercoat: An intermediate coat formulated to prepare a primed surface or other prepared surface for the finishing coat.
- Finish coat: The final coat of a coating system.
- Gloss: The optical property of a surface, characterised by its ability to reflect light specularly.
- Sheen: Gloss which is observed on an apparently matt surface at glancing angles of incidence.

- Levels of gloss finish: When the specular direction is 60 degrees, a surface with the following specular gloss reading are defined as follows:
  . Full gloss finish between 50 and 85 gloss units.
  . Semi gloss between 20 and 50 gloss units.
  . Low gloss between 5 and 20 gloss units (also known as low sheen).
  . Flat finish < 5 gloss units (also known as matt).
- Opacity: The ability of a paint to obliterate the colour difference of a substrate.
- Adhesion: The sum total of forces of attachment between a dry film and its substrate.
- Gloss unit: Numerical value for the amount of specular reflection relative to that of a standard surface under the same geometric conditions.

1.5 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of the following:
- Application stages:
  . Completion of substrate preparation.
  . After application of prime or seal coats.
  . After application of undercoat.
  . After application of each subsequent coat.

1.6 SUBMISSIONS

Textured or membrane coated samples
General: Submit, on representative substrates, samples of each coating system showing surface preparation, colour, gloss level, texture, and physical properties

Coating system
General: Submit the selected manufacturer's details at least 3 weeks before the paint is required, as follows:
- Coating brand name.
- Technical data sheets.
- Material safety data sheets (MSDS) showing the health and safety precautions to be taken during application.
- The published recommendations for maintenance.

Specialist applicators
General: Submit name and contact details of proposed specialist applicators.

Tests
Fire retardant systems: Submit type test results to confirm minimum indices, when tested to AS/NZS 1530.3, on a substrate representative of the intended use, for paint systems specified as Low flame spread or Fire retardant:
- Spread of flame index: 3.
- Sum of Ignitability index and Heat evolved index: 7.
- Smoke developed index: 3.

Substrate acceptance
Applicator: Submit the applicator's certification of the acceptability of the paint finish substrate.

Timing: Before commencing installation.

Warranty
Material Warranty: Submit the manufacturer's material warranty as follows:
- Extent: Paintwork generally.
- Terms: Paint systems are suitable for their intended use.
- Warranty period: As defined by the manufacturer.

Material performance warranty: Submit an alternative performance warranty to include materials and application as follows:

- Terms: Submit the performance criteria as defined by the manufacturer.
- Measure: As defined by the manufacturer.
- Warranty period: As defined by the manufacturer.

Timing: Before the application of the paint system.

2 PRODUCTS

2.1 COATINGS

Combinations

General: Do not combine coatings from different manufacturers in a coating system.

Delivery

General: Deliver coatings to the site in the manufacturer's labelled and unopened containers.

Tinting

General: Provide only products which are colour tinted by the manufacturer .

Toxic ingredients

General: Comply with the requirements of Appendix I Uniform Paint Standard to the Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP).

Standards

Coating types:

- Wall coatings - latex extensible: To AS/NZS 4548.1.
- Latex finish coatings – high-build, low profile: To AS/NZS 4548.2.
- Latex – textured coatings – non aggregate: To AS/NZS 4548.3.
- Latex – textured coatings – aggregate filled: To AS/NZS 4548.4.

3 EXECUTION

3.1 PREPARATION

Standards

General: To AS/NZS 2311 Sections 3.

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 installation of fittings, floor sanding and laying flooring materials.

Protection

Fixtures: Remove door furniture, switch plates, light fittings and other fixtures before starting to paint, and refix in position undamaged on completion of the painting.

Adjacent surfaces: Protect adjacent finished surfaces liable to damage from painting operations.

'Wet paint' warning

General: Place notices conspicuously and do not remove them until the paint is dry.

Restoration

General: Clean off marks, paint spots and stains progressively and restore damaged surfaces to their original condition.

Touch up: Apply seamless repairs to damaged decorative coatings or misses with the coating batch used in the original application.

Substrate preparation

General: Prepare substrates to receive the coating systems.

Cleaning: Clean down the substrate surface. Do not cause undue damage to the substrate or damage to, or contamination of, the surroundings.

Filling: Fill cracks and holes with fillers, sealants or grouting cements as recommended by the coating system manufacturer and as appropriate for the substrate.

Moisture content: Do not commence application unless:

- Concrete: The moisture content of the concrete has been tested to AS/NZS 2455.1 Appendix B and the values in clause 2.4.2 (c) have been obtained.

3.2 APPLICATION

Proprietary coating systems
Generally: Apply the complete coating system to the manufacturer's technical data sheets.

Standard
Methods of application: To AS/NZS 2311 clause 6.7.

Light levels
General: ≥ 400 lux.

Drying
General: Use a moisture meter to demonstrate that the moisture content of the substrate is at or below the recommended maximum level for the type of coating and the substrate material.

Paint application
General: 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.

Spraying
Coatings with known health hazards: Not permitted on site.

0673 POWDER COATINGS

1 GENERAL

1.1 AIMS

Responsibilities

General: Provide powder coating systems to substrates as follows:

- Consistent in colour, gloss level, texture and dry film thickness.
- Fully bonded.
- Resistant to environmental degradation within the manufacturer's stated life span for the product type.

Selections: Conform to the **Selections**.

1.2 CROSS REFERENCES

General

General: Conform to the *General requirements* worksection.

1.3 STANDARDS

Substrates

Application to aluminium and aluminium alloy substrates for architectural applications: To AS 3715.

Application to substrates other than aluminium for architectural applications: To AS 4506.

1.4 INTERPRETATION

Definitions

General: For the purposes of this worksection the definitions given below apply.

- HSS: Heat sensitive substrate; e.g. medium density fibreboard (MDF)
- Substrate: The surface to which the coating material is applied or is to be applied.
- Thermoset powder coat: A mixture of finely ground particles of pigment and resin sprayed on to the surface to be coated. The charged powder particles adhere to the electrically grounded surfaces until heated and fused into a smooth coating in a curing oven.
  - . Thermoset polyester powder coating utilises an enhanced polyester resin.
  - . Thermoset fluoropolymer coating, for factory applied spray coatings on aluminium products, includes PVF_2 and PTFE coatings (poly tetra fluoro ethylene).

1.5 SUBMISSIONS

Powder coated samples

General: Submit, on representative substrates, samples of each coating system showing surface preparation, colour, gloss level, texture, and physical properties

Manufacturer's documents

General: Submit the selected manufacturer's details at least 3 weeks before the material is required for fabrication, as follows:

- Recommended coating system for the nominated service condition.
- Brand name.
- Storage and handling recommendations.
- Maintenance recommendations.

Specialist applicators

General: Submit name and contact details of proposed specialist applicators as registered by the coating manufacturer.

Accreditation: To the Australasian Institute of Surface Finishing.

Warranties

General: Submit the coating manufacturer's warranties noted in **Selections**.

2 EXECUTION

2.1 CLEANING

Architectural aluminium applications
Completed assembly: Clean to AS 3715 Appendix C.