Briars Sporting Club
Rothwell Park, Concord, NSW

Description:

Demolition and removal of existing playground. New Amenities block containing team changing facilities and toilets, canteen and multi-purpose space with covered outdoor spectator area. Associated remedial and new landscape works.

Revision	Date	Approved by
G	01/09/16	SF
H	15/09/16	SF

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Appendix

0131B PRELIMINARIES

1 GENERAL

1.1 GENERAL

General conditions

Contract: refer top tender documents.

Interpretation

General: The words principal, and contract administrator have the same meaning, respectively, as owner and architect, unless the context requires otherwise.

Cross reference: The clause **INTERPRETATION**, in the *General requirements* work section, also applies.

1.2 THE SITE

Site restrictions

Entry permits: Make available, to persons entering designated secure areas, valid entry permits. Make sure these persons comply with conditions of entry.

Designated secure areas: To be determined by contractor

List: At least 10 working days before entry is required, submit the full name, address, and date and place of birth of persons required to enter designated secure areas.

- Purpose of submission: Review.

Site limitations: To be determined by contractor

Access: Access on to 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: To be determined by contractor

Protection of persons and property

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

Access ways, 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

Access ways, 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.

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.

1.3 CONSTRUCTION PLANT

Access roads
Owner's existing roads: Use only designated roads.

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

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).

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.

1.4 BUILDING THE WORKS

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: Identify changes since the previous issue, 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 arrange attendance of appropriate subcontractors, the architect, and appropriate consultants.

Frequency: once a week

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.

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.

Progress photographs

General: Take colour progress photographs within 5 working days before each site meeting. At each site meeting submit 2 sets of glossy prints, and the digital files. Identify the project, date, time, location and orientation.

Purpose of submission: Information only.

Minimum frequency: once every 2 weeks

1.5 COMPLETION OF THE WORKS

Final cleaning

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

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

Reinstatement

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

Pest eradication

General: Employ suitably qualified pest exterminators. At practical completion submit a certificate stating that completed works are free of pest types.

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

Anticipated progress claims schedule

General: At commencement of the works, submit a schedule of anticipated progress claims for the contract period. 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 work section or trade heading designated in the specification.

Purpose of submission: Review.

Method of measurement

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

Other civil engineering work: To AS 1181.

1.7 MISCELLANEOUS

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 as documented 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 Application 10.2014.164.1	Yes	Approved 26/06/15
Section 96(1A) DA 10.2014.164.1	Yes	Approved 08/04/16
Construction Certificate		Approval Pending.

Authority conditions schedule

Authority	**Document**	**Condition**
City of Canada Bay Council	DA 10.2014.164.1	All Conditions
City of Canada Bay Council	Section 96(1A) DA 10.2014.164.1	All Conditions (approval pending)
City of Canada Bay Council	Construction Certificate	All Conditions (approval pending)

0171B GENERAL REQUIREMENTS

1 GENERAL

1.1 RESPONSIBILITIES

Performance

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

- Fixed access ways: To AS 1657.
- Structural design actions: To the AS/NZS 1170 series.

Design

Design by contractor: If the contractor provides design, use only appropriately qualified persons and conform to 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.

Noise levels

General: Install systems within the limits of the contract design and documented equipment performance.

1.2 PRECEDENCE

General

Work sections and referenced documents:

- The requirements of other work sections of the specification override conflicting requirements of this work section.
- The requirements of the works sections override conflicting requirements of their referenced documents.
- The requirements of the referenced documents are minimum requirements.

1.3 CROSS REFERENCES

General

Common requirements

Requirement: Conform to the following works Sections:

- *Adhesives, sealants and fasteners*.
- *Fire-stopping*.
- *Metals and pre-finishes*.

Cross referencing styles

Within the text:

- Work section titles are indicated by *Italicised* text.
- Subsection titles are indicated by **BOLD** text.
- Clause titles are indicated by **Bold** text.

1.4 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.

1.5 INTERPRETATION

Abbreviations

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

- AS: Australian Standard.
- BCA: National Construction Code Series Volume One: Building Code of Australia Class 2 to 9 Buildings and Volume Two: Building Code of Australia Class 1 and Class 10 Buildings.
- MSDS: Material safety data sheets.
- NATA: National Association of Testing Authorities.
- NCC: National Construction Code.
- NZS: New Zealand Standard.
- PCA: National Construction Code Series Volume 3: Plumbing Code of Australia.
- PVC: Polyvinyl Chloride.
- PVC-U: Un plasticised Polyvinyl Chloride. Also known as UPVC.
- VOC: Volatile Organic Compound.
- WHS: Work Health and Safety.

Definitions

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

- Attendance: Attendance, provide attendance and similar expressions mean give assistance for examination and testing.
- Contractor: Contractor has the same meaning as builder and is the person or organisation bound to carry out and complete the work under the contract.
- 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.
- Electricity distributor: Any person or organisation that provides electricity from an electricity distribution system to one or more electrical installations. Includes distributor, supply authority, network operator, local network service provider, electricity retailer or electricity entity, as may be appropriate in the relevant jurisdiction.
- Fire hazard properties: To BCA A2.4.
- 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.
- High level interface: Systems transfer information in a digital format using an open system interface.
- Hot-dip galvanized: Zinc coated to AS/NZS 4680 after fabrication with coating thickness and mass to AS/NZS 4680 Table 1.
- IP: IP, IP code, IP rating and similar expression have the same meaning as IP Code in AS 60529.
- Joints:
  . Construction joint: A joint with continuous reinforcement provided to suit construction sequence.
  . Control joint: An unreinforced joint between or within discrete elements of construction which allows for relative movement of the elements.

  - . Contraction joint: An opening control joint with a bond breaking coating separating the joint surfaces to allow independent and controlled contraction of different parts or components, induced by shrinkage, temperature changes or other causes. It may include unbound dowels to assist vertical deflection control.
  - . Expansion joint: A closing control joint with the joint surfaces separated by a compressible filler to allow axial movement due to thermal expansion or contraction with changes in temperature or creep. It may include unbound dowels to assist vertical deflection control.
  - . Isolation joint: A joint between elements of a structure designed to isolate structural movement while permitting horizontal and/or vertical movement between abutting elements.
  - . Weakened plane joint: A contraction joint created by forming a groove, extending at least one quarter the depth of the section, either by using a grooving tool, by sawing, or by inserting a pre moulded strip.
  - . Structural control joint: A control joints (contraction, expansion and isolation) in structural elements when used with applied material and finishes.
  - . Substrate joint: A joint in the substrate which includes construction joints and joints between different materials.
  - . Sealant joint: A joint filled with a flexible synthetic compound which adheres to surfaces within the joint to prevent the passage of dust, moisture and gases.
- Local government authority: A body established for the purposes of local government by or under a law applying in a state or territory.
- Low level interface: Systems transfer information via terminals and voltage free contacts.
- Manufacturer's recommendations: Recommendations, instructions, requirements, specifications (and similar expressions) provided in written or other form by the manufacturer and/or supplier relating to the suitability, use, installation, storage and/or handling of a product.
- 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.
- Network Utility Operator: A person who undertakes the piped distribution of drinking water or natural gas for supply or is the operator of a sewerage system or a stormwater system.
- Obtain: Obtain, seek and similar expressions mean obtain (seek) in writing from the contract administrator.
- Practical completion or Defects free completion: The requirements for these stages of completion are defined in the relevant building contract for the project.
- 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: As defined by the BCA.
- Proprietary: Proprietary means 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.
- Readily accessible: To AS/NZS 3000.
- Record drawings: Record drawings has the same meaning as as-installed drawings, as-built drawings and work-as-executed drawings.
- 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 documents, the local council or statutory authorities.
- If required: A conditional specification term for work which may be shown in the documents or is a legislative requirement.
- Samples: Includes samples, prototypes and sample panels.
- Statutory authority: A public sector entity created by a specific law of the Commonwealth State of Territory.
- 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.
    * Progressive tests: Tests carried out during installation to demonstrate performance in according with this specification.
    * Site tests: Tests carried out on the site.
  . Completion tests: Tests carried out on completed installations or systems and fully resolved 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 contract administrator 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.

1.6 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.

Drawings and manuals for existing services

Subsurface services: Information shown on the drawings relating to underground or submerged services is accurate to the following quality level:

- Quality level to AS 5488

Warranty: No warranty is given as to the completeness or accuracy of drawings and/or manuals of existing services.

1.7 INSPECTION

Notice

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.

Tests: Give notice of the time and place of documented tests.

Light level requirements: to AS/NZS 1680.2.4.

Attendance

General: Provide attendance for documented inspections and tests.

1.8 SUBMISSIONS

General

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

Submission response times: Allow in the construction program for at least the following times:

- Shop drawings: 7 days.
- Samples and prototypes: 7 days.
- Manufacturers' or suppliers' recommendations: 7 days.
- Product data: 7 days.
- Product/design substitution or modification: 14 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.

Identification: 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.

Non-compliance: Identify proposals for non-compliance with project requirements, and characteristics which may be detrimental to successful performance of the completed work.

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

Electronic copies file format: PDF

Transmission medium: Email with attachments up to 5 MB and/or CD-ROM.

Hard copy quantity: Not Required

- Loose documents larger than A3: One transparency on heavyweight plastic film the same size as the standard contract drawings.
- Loose documents up to and including A3: One copy.

Standard contract drawing size: A1

Authority approvals

Authorities' approvals: Submit documents showing approval by the authorities whose requirements apply to the work.

Correspondence: Submit copies of correspondence and notes of meetings with authorities whose requirements apply to the work.

Building penetrations

General: If it is proposed to penetrate or fix to the following, submit details of the methods proposed to maintain the required structural, fire and other properties:

- Structural building elements including external walls, fire walls, fire doors and access panels, other tested and rated assemblies or elements, floor slabs and beams.
- Membrane elements including damp-proof courses, waterproofing membranes and roof coverings. If penetrating membranes, provide a waterproof seal between the membrane and the penetrating component.

Certification

General: Submit certification that the plant and equipment submitted meets all requirements of the contract documents.

Execution details

General: Before starting the installation of building services, submit the following:

- Embedded services: Proposed method for embedding services in concrete walls or floors or chasing into concrete or masonry walls.
- Fixing of services: Typical details of locations, types and methods of fixing services to the building structure.
- Inaccessible services: If services will be enclosed and not accessible after completion, submit proposals for location of service runs and fittings.

Materials

Product certification: If products must conform to product certification schemes, submit evidence of conformance.

Product data: For proprietary equipment, submit the manufacturer's product data as follows:

- Technical specifications and drawings.
- Type-test reports.
- Performance and rating tables.
- Recommendations for installation and maintenance.

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 inclusion. Do not incorporate other samples.

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

Shop drawings

General: Include dimensioned drawings showing details of the fabrication and installation of structural elements, building components, 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.

Record drawings: Submit all documented shop drawings amended to include changes made during the progress of the work and up to the end of the defects liability period.

Services coordination: Coordinate with other building and service elements. Show adjusted positions on the shop drawings.

Space requirements: Check space requirements of equipment and services indicated diagrammatically in the contract documents.

Submission medium: Email with attachments up to 5 MB and/or CD-ROM.

Electronic or Hard copy. Nominate alternatives or include both.

Checking: Make sure that the drawings have been checked before submission.

Building work drawings for building services: Submit detailed dimensioned drawings showing all:

- Access doors and panels.
- Conduits to be cast in slabs.
- Holding down bolts and other anchorage and/or fixings required complete with loads to be imposed on the structure during installation and operation.
- Openings, penetrations and block-outs.
- Sleeves.
- Plinths, kerbs and bases.
- Required external openings.

Tests

General: Submit an inspection and testing plan which is consistent with the construction program. Include particulars of test stages and procedures.

Test reports: Submit written reports on nominated tests.

2 PRODUCTS

2.1 GENERAL

Manufacturers' or suppliers' recommendations

General: Provide and select, if no selection is given, transport, deliver, store, handle, protect, finish, adjust and prepare for use the manufactured items in conformance with the current written recommendations and instructions of the manufacturer or supplier.

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

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

Sealed containers

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

Prohibited materials

Do not provide the following:

- Materials, exceeding the limits of those listed, in the Safe Work Australia Hazardous Substances Information System (HSIS).
- Materials that use chlorofluorocarbon (CFC) or hydro chlorofluorocarbon (HCFC) in the manufacturing process.

Substitutions

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.

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 effective as the identified item, detail or method.

2.2 TESTS

Attendance

General: Provide attendance on tests.

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 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 atmospheric corrosivity category as defined in AS/NZS 2312.

Atmospheric corrosivity category: Category C

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 the external leaf of masonry walls.
- In contact with chemically treated timber, other than copper chrome arsenate (CCA).

3 EXECUTION

3.1 OFF-SITE DISPOSAL

Removal of material
General: Dispose of building waste material off site to the requirements of the relevant authorities.

3.2 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 or acoustic rated. Parallel chases or recesses on opposite faces of a wall: Not 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 to the **Concrete blockwork chasing table**.

Concrete blockwork chasing table

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

3.3 FIXING

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

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

3.4 SERVICES CONNECTIONS

Connections
General: Connect to network distributor services or service points. Excavate to locate and expose connection points. Reinstate the surfaces and facilities that have been disturbed.

Network distributors' requirements
General: If the network distributor elects to perform or supply part of the works, make the necessary arrangements. Install equipment supplied, but not installed, by the authorities.

3.5 SERVICES INSTALLATION

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

Installation: Install equipment and services plumb, fix securely and organise reticulated services neatly. Allow for movement in both structure and services.

Concealment: Unless otherwise documented, conceal all cables, ducts, trays and pipes except where installed in plant spaces, ceiling spaces and riser cupboards. If possible, do not locate on external walls.

Lifting: Provide heavy items of equipment with permanent fixtures for lifting as recommended by the manufacturer.

Suspended ground floors: Keep all parts of services under suspended ground floors at least 150 mm clear of the ground surface. Make sure services do not impede access.

Arrangement: Arrange services so that services running together are parallel with each other and with adjacent building elements.

Dissimilar metals

General: Join dissimilar metals with fittings of electrolytically compatible material.

Temporary capping

Pipe ends: During construction protect open ends of pipe with metal or plastic covers or caps.

Piping

General: Install piping in straight lines at uniform grades without sags. Arrange to prevent air locks. Provide sufficient unions, flanges and isolating valves to allow removal of piping and fittings for maintenance or replacement of plant.

Spacing: Provide at least 25 mm clear between pipes and between pipes and building elements, additional to insulation.

Changes of direction: Provide long radius elbows or bends and sets where practicable, and swept branch connections. Provide elbows or short radius bends where pipes are led up or along walls and then through to fixtures. Do not provide mitred fittings.

Vibration: Arrange and support piping so that it remains free from vibration whilst permitting necessary movements. Minimise the number of joints.

Embedded pipes: Do not embed pipes that operate under pressure in concrete or surfacing material.

Valve groupings: If possible, locate valves in groups.

Pressure testing precautions: Isolate items not rated for the test pressure. Restrain pipes and equipment to prevent movement during pressure testing.

Differential movement

General: If the geotechnical site investigation report predicts differential movements between buildings and the ground in which pipes or conduits are buried, provide control joints in the pipes or conduits, as follows:

- Arrangement: Arrange pipes and conduits to minimise the number of control joints.
- Magnitude: Accommodate the predicted movements.

3.6 BUILDING PENETRATIONS

Penetrations

Fire-resistance rated building elements: Seal penetrations with a system conforming to AS 4072.1.

Non-fire-resistance rated building elements: Seal penetrations around conduits and sleeves. Seal around cables within sleeves. If the building element is acoustically rated, maintain the rating.

Sleeves

General: If piping or conduit penetrates building elements, provide metal or PVC-U sleeves formed from pipe sections as follows:

- Movement: Arrange to permit normal pipe or conduit movement.
- Diameter (for non fire-resistance rated building elements): Sufficient to provide an annular space around the pipe or pipe insulation of at least 12 mm.
- Prime paint ferrous surfaces.
- Terminations:
  - . If cover plates are fitted: Flush with the finished building surface.
  - . In fire-rated and acoustic-rated building elements: 50 mm beyond finished building surface.
  - . In floors draining to floor wastes: 50 mm above finished floor.
  - . Elsewhere: 5 mm beyond finished building surface.
  - . Termite management: To AS 3660.1.
- Thickness:
  - . Metal: 1 mm or greater.

. PVC-U: 3 mm or greater.

Sleeves for cables: For penetrations of cables not enclosed in conduit through ground floor slabs, beams and external walls provide sleeves formed from PVC-U pipe sections.

3.7 CONCRETE PLINTHS

Construction

General: Provide concrete plinths as documented.

General: Provide plinths under all equipment located on concrete floor slabs as follows:

- Concrete: Grade N20.
- Finish: Steel float flush with the surround.
- Reinforcement: Single layer of F62 fabric.
- Surround: Provide galvanized steel surround at least 75 mm high and 1.6 mm thick. Fix to the floor with masonry anchors. Fill with concrete.

3.8 SUPPORT AND STRUCTURE

General

Requirement: Provide incidental supports and structures to suit the services.

3.9 PIPE SUPPORTS

Support systems

General: Provide proprietary support systems of metallic-coated steel construction.

Vertical pipes: Provide anchors and guides to maintain long pipes in position, and supports to balance the mass of the pipe and its contents.

Saddles: Do not provide saddle type supports for pipes greater than DN 25.

Dissimilar metals: If pipe and support materials are dissimilar, provide industrial grade electrically non-conductive material securely bonded to the pipe to separate them. Provide fixings of electrolytically compatible material.

Uninsulated pipes: Clamp piping supports directly to pipes.

Insulated pipes:

- Spacers: Provide spacers at least as thick as the insulation between piping supports and pipes. Extend either side of the support by at least 20 mm.
- Spacer material: Rigid insulation material of sufficient strength to support the piping and suitable for the temperature application.

Support spacing

Cold and heated water pipes: To AS/NZS 3500.1 Table 5.2. Provide additional brackets, clips or hangers to prevent pipe movement caused by water pressure effects.

Sanitary plumbing: To AS/NZS 3500.2 Table 9.1.

Fuel gas: To AS/NZS 5601.1 Table 5.5.

Other pipes: To AS/NZS 3500.1 Table 5.2.

Hangers

Conform to the **Hanger size table**.

Hanger size table

Nominal pipe size (DN)	Minimum hanger diameter (mm) for single hangers
50 maximum	9.5
65 to 90	12.7
100 to 125	15.8
150 to 200	19.0

3.10 PLANT AND EQUIPMENT ACCESS

General

Services and equipment: Locate and arrange all services and equipment so that:

- They comply with the relevant requirements of the appropriate Work Health and Safety regulations.
- Failure of plant and equipment (including leaks) does not create a hazard for the building occupants.
- Failure of plant and equipment (including leaks) cause a minimum or no damage to the building, its finishes and contents including water sensitive equipment or finishes.
- Instruments, gauges and the like are located so they can be easily read.
- Safe tray and an overflow pipe are provided to each tank, hot water heater and storage vessel.
- Piping: Provide access and clearance at fittings which require maintenance or servicing, including control valves and joints intended to permit pipe removal. Arrange piping so that it does not interfere with the removal or servicing of associated equipment or valves or block access or ventilation openings.
- Services and equipment are readily accessible for inspection and maintenance and arranged so that inspection and maintenance can be carried out in a safe and efficient manner. Include the following:
  . Minimise inconvenience and disruption to building occupants or damage to the building structure or finishes.
  . Locate plant (including high level tanks) requiring regular inspection and maintenance so it is either safely and readily accessible from floor level or provide permanent access platforms and ladders.
  . Conform to the relevant requirements of AS 1470, AS 1657, AS/NZS 1892.1, AS 2865 and AS/NZS 3666.1.
- In false ceilings, locate items of equipment that require inspection and maintenance above tiled parts. If not possible, provide access panels where located above set plaster or other inaccessible ceilings. Arrange services and plant locations to reduce the number of access panels. Coordinate with other trades to use common access panels where feasible.
- Modify manufacturer's standard equipment when necessary to provide the plant access in the contract documents.

3.11 VIBRATION SUPPRESSION

Standard Rotating and reciprocating machinery noise and vibration: Vibration severity in Zone A to AS 2625.1 and AS 2625.4.

General

General: Minimise the transmission of vibration from rotating or reciprocating equipment to other building elements.

Speeds

General: If no maximum speed is prescribed do not exceed 1500 r/min for direct driven equipment.

Connections

General: Provide flexible connections to rotating machinery and assemblies containing rotating machinery. Isolate pipes by incorporating sufficient flexibility into the pipework or by use of proprietary flexible pipe connections installed so that no stress is placed on pipes due to end reaction.

Inertia bases

General: If necessary to achieve the required level of vibration isolation, provide inertia bases having appropriate mass and conforming as follows:

- Construction: Steel or steel-framed reinforced concrete. Position foundation bolts for equipment before pouring concrete.
- Supports: Support on vibration isolation mountings using height saving support brackets.

Vibration isolation mountings

General: Except for external equipment that is not connected to the structure of any building, support rotating or reciprocating equipment on mountings as follows:

- For static deflections < 15 mm: Single or double deflection neoprene in-shear mountings incorporating steel top and base plates and a tapped hole for bolting to equipment.
- For static deflections ≥ 15 mm: Spring mountings.

Selection: Provide mountings selected to achieve 95% isolation efficiency at the normal operating speeds of the equipment.

Installation: Set and adjust vibration isolation mounting supports to give clearance for free movement of the supports.

Spring mountings: Provide freestanding laterally stable springs as follows:

- Clearances: ≥ 12 mm between springs and other members such as bolts and housing.
- High frequency isolation: 5 mm neoprene acoustic isolation pads between baseplate and support.
- Levelling: Provide bolts and lock nuts.
- Minimum travel to solid: ≥ 150% of the designated minimum static deflection.
- Ratio of mean coil diameter to compressed length at the designated minimum static deflection: ≥ 0.8:1.
- Snubbing: Snub the springs to prevent bounce at start-up.
- Vertical resilient limit stops: To prevent spring extension when unloaded, to serve as blocking during erection and which remain out of contact during normal operation.

3.12 SEISMIC RESTRAINT OF NON-STRUCTURAL COMPONENTS

General

Requirement: Seismic restraint to AS 1170.4

3.13 FINISHES TO BUILDING SERVICES

General

General: If exposed to view (including in plant rooms), paint new building services and equipment. Surfaces painted or finished off-site: Conform to the *Metals and prefinishes* worksection.

Exceptions: Do not paint chromium or nickel plating, anodised aluminium, GRP, stainless steel, non-metallic flexible materials and normally lubricated machined surfaces. Surfaces with finishes applied off-site need not be re-painted on-site provided the corrosion resistance of the finish is not less than that of the respective finish documented.

Standard

General: Conform to the recommendations of AS/NZS 2311 Sections 3, 6 and 7 or AS/NZS 2312 Sections 5, 8 and 10, as applicable.

Powder coating

Standard:

- Aluminium for architectural applications: To AS 3715.
- Other metals: To AS 4506.

Painting systems

New unpainted interior surfaces: To AS/NZS 2311 Table 5.1.

New unpainted exterior surfaces: To AS/NZS 2311 Table 5.2.

Paint application

Coats: Apply the first coat immediately after substrate preparation and before contamination of the substrate can occur. Make sure each coat of paint or clear finish is uniform in colour, gloss, thickness and texture and free of runs, sags, blisters or other discontinuities.

Combinations: Do not combine paints from different manufacturers in a paint system.

Protection: Remove fixtures before starting to paint and refix in position undamaged when painting is complete.

Underground metal piping

Corrosion protection: Provide corrosion protection for the following:

- Underground ferrous piping.
- Underground non-ferrous metal piping in corrosive environments.

Protection methods: Select from the following:

- Cathodic protection: Sacrificial anodes or impressed current. Incorporate a facility for periodic testing. Conform to the recommendations of AS 2832.1.
- Continuous wrapping using proprietary petroleum taping material.
- Impermeable flexible plastic coating.
- Sealed polyethylene sleeve.

Low VOC emitting paints

Provide the following low odour/low environmental impact paint types with the following VOC limits:

- Primers and undercoats: < 65 g/litre.
- Low gloss white or light coloured latex paints for broadwall areas: < 16 g/litre.
- Coloured low gloss latex paints: < 16 g/litre.
- Gloss latex paints: < 75 g/litre.

3.14 MARKING AND LABELLING

General

General: Mark services and equipment to provide a ready means of identification and as follows:

- Locations exposed to weather: Provide durable materials.
- Pipes, conduits and ducts: Identify and label to AS 1345 throughout its length, including in concealed spaces.
- Cables: Label to indicate the origin and destination of the cable.

Consistency: Label and mark equipment using a consistent scheme across all services elements of the project.

Electrical accessories

General: Label isolating switches and outlets to identify circuit origin.

Equipment concealed in ceilings

Location: Provide a label on the ceiling indicating the location of each concealed item requiring access for routine inspection, maintenance and/or operation. In tiled ceilings locate the label on the ceiling grid closest to the item access point. In flush ceilings locate adjacent to closest access panel. Items to be labelled include but are not limited to:

- Fan coil units and terminal equipment (e.g. VAV boxes).
- Fire and smoke dampers.
- Isolating valves not directly connected to items otherwise labelled.
- Motorised dampers.
- Wall mounted equipment in occupied areas: Provide labels on wall mounted items in occupied areas including the following:
- Services control switches.
- Temperature and humidity sensors.

Points lists

Automatic control points: Provide plasticised, fade-free points lists for each automatic control panel. Store in a pocket on the door of the panel. Lists to include terminal numbers, point addresses, short and long descriptors.

Pressure vessels

General: Mount manufacturer’s certificates in glazed frames on a wall next to the vessel.

Valves and pumps

General: Label to associate pumps with their starters and valves. Screw fix labels to body or attach label to valve handwheels with a key ring.

Underground services

Survey: Accurately record the routes of underground cables and pipes before backfilling. Include on the record drawings.

Records: Provide digital photographic records of underground cable and pipe routes before backfilling. Include in operation and maintenance manual.

Location marking: Accurately mark the location of underground cables and pipes with route markers consisting of a marker plate set flush in a concrete base, engraved to show the direction of the line and the name of the service.

Markers: Place markers at ground level at each joint, route junction, change of direction, termination and building entry point and in straight runs at intervals of not more than 100 m.

Marker bases: 200 mm diameter x 200 mm deep, minimum concrete.

Direction marking: Show the direction of the cable and pipe run by means of direction arrows on the marker plate. Indicate distance to the next marker.

Plates: Brass, aluminium or stainless steel with black filled engraved lettering, minimum size 75 x 75 x 1 mm thick.

Plate fixing: Waterproof adhesive and 4 brass or stainless steel countersunk screws.

Marker height: Set the marker plate flush with paved surfaces, and 25 mm above other surfaces.

Marker tape: Where electric bricks or covers are not provided over underground wiring, provide a 150 mm wide yellow or orange marker tape bearing the words WARNING – electric cable buried below, laid in the trench 150 mm below ground level.

Labels and notices

Materials: Select from the following:

- Cast metal.
- For indoor applications only, engraved two-colour laminated plastic.
- Proprietary pre-printed self-adhesive flexible plastic labels with machine printed black lettering.
- Stainless steel or brass minimum 1 mm thick with black filled engraved lettering.

Emergency functions: To AS 1319.

Colours: Generally to AS 1345 as appropriate, otherwise black lettering on white background except as follows:

- Danger, warning labels: White lettering on red background.
- Main switch and caution labels: Red lettering on white background.

Edges: If labels exceed 1.5 mm thickness, radius or bevel the edges.

Fixing: Fix labels securely using screws, rivets, proprietary self-adhesive labels or double-sided adhesive tape and as follows:

- If labels are mounted in extruded aluminium sections, use rivets or countersunk screws to fix the extrusions.
- Use aluminium or monel rivets for aluminium labels.

Label locations: Locate labels so that they are easily seen and are either attached to, below or next to the item being marked.

Labelling text and marking: To correspond to terminology and identifying number of the respective item as shown on the record drawings and documents and in operating and maintenance manuals.

Lettering heights:

- Danger, warning and caution notices: Minimum 10 mm for main heading, minimum 5 mm for remainder.
- Equipment labels within cabinets: Minimum 3.5 mm.
- Equipment nameplates: Minimum 40 mm.
- Identifying labels on outside of cabinets: Minimum 5 mm.
- Isolating switches: Minimum 5 mm.
- Switchboards, main assembly designation: Minimum 25 mm.
- Switchboards, outgoing functional units: Minimum 8 mm.
- Switchboards, sub assembly designations: Minimum 15 mm.
- Valves: Minimum 20 mm.
- Self-adhesive flexible plastic labels:
  - . Labels less than 2000 mm above floor: 3 mm on 6 mm wide tape.
  - . Labels minimum 2000 mm above floor: 8 mm on 12 mm wide tape.
  - . Other locations: Minimum 3 mm.

Operable devices: Mark to provide a ready means of identification. Include the following:

- Controls.
- Indicators, gauges, meters.
- Isolating switches.

Vapour barriers: Do not penetrate vapour barriers.

3.15 SOFTWARE

General

General: Provide the software required for the operation and management of building services systems and equipment.

3.16 WARRANTIES

General

General: If a warranty is documented or if a manufacturer's standard warranty extends beyond the end of the defects liability period, name the principal as warrantee. Register with manufacturers as necessary. Retain copies delivered with components and equipment.

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.

3.17 OPERATION AND MAINTENANCE MANUALS

General

General: Submit operation and maintenance manuals for the whole of the work.

Authors and compilers: Personnel experienced in the maintenance and operation of equipment and systems installed, and with editorial ability.

Referenced documents: If referenced documents or technical work sections require that manuals be submitted, include corresponding material in the operation and maintenance manuals.

Subdivision: By installation or system, depending on project size.

Format – electronic copies

Printing: Except for drawings required in the **RECORD DRAWINGS** clause provide material that can be legibly printed on A4 size paper.

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

Quantity and format: Conform to **Submissions – electronic copies**.

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 with title visible, insert in plastic sleeves (one per drawing) and accommodate them in the binders.
- 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.

Date for submission

Date for draft submission: The earlier of the following:

- 2 weeks before the date for practical completion.
- Commencement of training on services equipment.

Date for final submission: Within 2 weeks after practical completion.

3.18 CLEANING

Final cleaning

General: Before the date for practical completion, clean throughout, including all exterior and interior surfaces except those totally and permanently concealed from view.

Labels: Remove all labels not required for maintenance.

3.19 PERIODIC MAINTENANCE OF SERVICES

General

General: During the maintenance period, carry out periodic inspections and maintenance work as recommended by manufacturers of supplied equipment, and promptly rectify faults.

Emergencies: Attend emergency calls promptly.

Annual maintenance: Carry out recommended annual maintenance procedures before the end of the maintenance period.

Maintenance period: The greater of the defects liability period and the period documented in the **Maintenance requirements schedule**.

Maintenance program

General: Submit details of maintenance procedures and program, relating to installed plant and equipment, 6 weeks before the date for practical completion. Indicate dates of service visits. State contact telephone numbers of service operators and describe arrangements for emergency calls.

Maintenance records

General: Record in binders provided with operation and maintenance manuals.

Referenced documents: If referenced documents or technical work sections require that log books or records be submitted, include this material in the maintenance records.

Service visits: Record comments on the functioning of the systems, work carried out, items requiring corrective action, adjustments made and name of service operator. On completion of the visit, obtain the signature of the principal's designated representative on the record of the work undertaken.

Site control

General: Report to the principal’s designated representative on arriving at and before leaving the site.

3.20 POST-CONSTRUCTION MANDATORY INSPECTIONS AND MAINTENANCE

General

General: For the duration of the defects liability period, provide inspections and maintenance of safety measures required by the following:

- AS 1851.
- Other statutory requirements applicable to the work.

Records: Provide mandatory records.

Certification: Certify that mandatory inspections and maintenance have been carried out and that the respective items conform to statutory requirements. Submit certification.

Annual inspection: Provide an annual inspection and maintenance immediately prior to the end of the defects liability period.

0181 ADHESIVES, SEALANTS AND FASTENERS

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide adhesives, sealants and fasteners, as documented and as follows:

- Fitness for purpose: Provide adhesives, sealants and fasteners capable of transmitting imposed loads, sufficient to make sure the rigidity of the assembly, or integrity of the joint.
- Finished surface: Provide adhesives and sealants that will not cause discolouration.
- Compatibility: Do not use sealants or adhesives that are incompatible with the products to which they are applied.
- Sealant replacement: Use sealants that can be safely removed without compromising the application of the replacement sealant for future refurbishment.
- Movement: If an adhered or sealed joint is subject to movement, select a system accredited to accommodate the projected movement under the conditions of service.
- Fasteners: Provide fasteners accredited for the particular use, capable of transmitting imposed loads and maintaining the rigidity of the assembly.

1.2 PRECEDENCE

General

Work sections and referenced documents:

- The requirements of other work sections of the specification override conflicting requirements of this work section.
- The requirements of this work section override conflicting requirements of its referenced documents.
- The requirements of the referenced documents are minimum requirements.

1.3 CROSS REFERENCES

General

Requirement: Conform to the following work section(s):

- *General requirements*.

1.4 INSPECTION

Notice

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

1.5 SUBMISSIONS

Samples

Visible joint sealants: Submit colour samples.

Technical data

Sealants: Submit technical data sheets.

Tests

Compatibility testing: Submit adhesion and compatibility testing data demonstrating that adhesive, sealant or fastener is compatible with materials to be fixed and is suitable for the project conditions.

Warranties

Manufacturer’s warranty: Submit the manufacturer’s published product warranties.

Requirement: Submit the following:

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: Select tape to suit substrate as follows:

- Firm high strength foam tapes: For high energy surfaces including most bare metals such as stainless steel and aluminium.
- Conformable high strength foam: For the following:
  - . Medium energy surfaces including many plastics and paints, and bare metals.
  - . Lower energy surfaces including many plastics, most paints and powder coatings, and bare metals.

Thickness: Select the tape to make sure 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.

Fire rated control joints

General: Provide sealant materials that maintain the nominated fire-resisting rating.

- Fire-stopping: To AS 4072.1.

Lightweight building element joints

Joints subject to rapid changes of movement: Provide sealants that accommodate the movement and are compatible with the contact materials.

Floor control joints

General: Provide trafficable sealants 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 bonded type anchors conforming to **SELECTIONS, ANCHORS**.

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/A240M.

Steel nails: To AS 2334.

- Length: At least 2.5 times the thickness of the member being secured, and at least 4 times the thickness if the member is plywood or building board less than 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

Atmospheric corrosivity category: To the *General requirements* work-section.

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 – Atmospheric corrosivity categories A and B to AS/NZS 2312

Situation	**Self drilling screws to AS 3566.2 Class**	**Threaded fasteners and anchors**		**Powder actuated fasteners**	
Situation	**Self drilling screws to AS 3566.2 Class**	**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 – Atmospheric corrosivity category C to AS/NZS 2312

Situation	**Self drilling screws to AS 3566.2 Class**	**Threaded fasteners and anchors**		**Powder actuated fasteners**	
Situation	**Self drilling screws to AS 3566.2 Class**	**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 – Atmospheric corrosivity categories D and F to AS/NZS 2312

Situation	**Self drilling screws to AS 3566.2 Class**	**Threaded fasteners and anchors**		**Powder actuated fasteners**	
Situation	**Self drilling screws to AS 3566.2 Class**	**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 [1]	Stainless steel 316		Stainless steel 316	
[1] Avoid organic coating in Category F zones.					

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 AS 1420 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 mandrel.

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

End material:

- Aluminium base alloy for metallic-coated or pre-painted 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 make sure the rigidity of the assembly.

3 EXECUTION

3.1 ADHESIVES

Preparation
Substrates: Conform to the following:

- Remove any deposit or finish which may impair adhesion.
- If framed or discontinuous, provide support members in full lengths without splicing.
- If solid or continuous, remove excessive projections.
- If previously painted, remove cracked or flaking paint and lightly sand the surface.

Contact adhesive
Precautions: Do not use contact adhesive 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, plasticised vinyl and hydrophilic surfaces such as glass and ceramics in a high humidity environment.

Applied lamination pressure: Make sure 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 JOINT SEALING

Joint preparation
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 sealant application, 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 sealant application, remove the tape and remove any stains or marks from adjacent surfaces.

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 less than 12 mm.
- 2:1 for joint widths greater than 12 mm.

Sealant application

General: Apply the sealant to dry joint surfaces using a pneumatic applicator gun. Make sure the sealant completely fills the joint to the required depth, provides good contact with the full depth of the sides of the joint and traps no air 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: Less than 5°C or greater than 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.

Excess sealant: Remove from adjoining surfaces using cleaning material nominated by the sealant manufacturer.

Protection

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

Rectification

General: Cut out and remove damaged portion of joint sealant and reinstall so repaired area is indistinguishable from undamaged portion.

3.3 TESTING

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.

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

3.4 FASTENERS

General

Requirement: Install to the manufacturer's recommendations.

Fastening to wood and steel

Timber substrates: To AS 1720.1 Section 4.

Self drilling screws: To AS 3566.1 for timber and steel substrates.

Masonry anchors

Installation: To the manufacturer's recommendations.

0182B FIRE-STOPPING

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide fire-stopping, as documented.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following work-section(s):

- *General requirements*.

1.3 PRECEDENCE

General

Work-sections and referenced documents:

- The requirements of other work-sections of the specification override conflicting requirements of this work-section.
- The requirements of this work-section override conflicting requirements of its referenced documents.
- The requirements of the referenced documents are minimum requirements.

1.4 STANDARDS

General

Service penetration fire-stopping systems: To BCA C3.15.

Control joint fire-stopping systems: To AS 4072.1.

1.5 INSPECTION

Notice

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

- Service penetrations completed and ready for fire-stopping.
- Finished fire-stopping, before being concealed.

1.6 SUBMISSIONS

Certification

General: Submit evidence of conformance with the recommendations of AS 4072.1 Appendix B.

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

- List form: To AS 4072.1 Figure B1.
- Schedule form: To AS 4072.1 Figure B2.

Tests

Type tests: Submit type test certificates for each combination of fire-stopping system, application, type of service, substrate, penetration orientation and drawings of tested details. Include for:

- Service penetration fire-stopping systems: Fire resistance tested to AS 1530.4.
- Fire stop mortars: Resistance to explosive spalling to AS 1774.36.
- Control joint fire-stopping systems: Fire resistance tested to AS 1530.4.

2 PRODUCTS

2.1 MATERIALS

General
Shelf life: Use materials that 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 conforms to the following:

- Expands on exposure to surface heat gain to form a high-volume thermally insulating char that closes gaps and voids.
- Resists the turbulence of a severe fire.
- Can be placed by hand to form an immediate fire seal.
- Insoluble in water after setting.

Product certification
Conformance: Address the following:

- Statutory and performance requirements.
- Adequacy of application/installation.

Appointment: In the joint names of the contractor and the principal.

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 INSTALLATION

General

Extent: Fire-stop and smoke-stop interruptions to fire-resistance 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.

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 cable separation.

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 is greater than 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 the 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 for 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.

Labelling

General: 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

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

0183B METALS AND PREFINISHES

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirements: Provide metal and pre-finishes as documented.

Performance
Requirement: Provide metals in sections of strength and stiffness suited to their required function, finish and method of fabrication.

1.2 PRECEDENCE

General
Work-sections and referenced documents:

- The requirements of other work-sections of the specification override conflicting requirements of this work-section.
- The requirements of this work-section override conflicting requirements of its referenced documents.
- The requirements of the referenced documents are minimum requirements.

1.3 CROSS REFERENCES

General
Requirement: Conform to the following work-section(s):

- *General requirements*.

1.4 SUBMISSIONS

Samples
General: Submit samples of the following:

- Stainless steel: One sample of every documented surface finish.
- Anodising: One sample of every colour and finishing option.

2 PRODUCTS

2.1 METALS

Coated steel
Electrogalvanized (zinc) coating on ferrous hollow and open sections: To AS 4750.

Metallic-coated: Steel coated with zinc or aluminium-zinc alloy as follows:

- Ferrous open sections by an in-line process: To AS/NZS 4791.
- Ferrous hollow sections 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 (plumbing applications): To AS 1769.

Welded pipe (round, square, rectangular): To ASTM A554.

3 EXECUTION

3.1 GENERAL

Metal separation

Incompatible sheet metals: Provide separation by one of the following:

- 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 or paper products.

Brazing

General: Make sure brazed joints have sufficient lap to provide a mechanically sound joint.

Butt joints: Do not use butt jointing for joints subject to load. 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. Make sure self-finished metals are without surface colour variations after jointing.

Preparation

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

Standard: To AS 1627 series.

Priming steel surfaces: If site painting is documented to otherwise uncoated mild steel or similar surfaces, prime as follows:

- After fabrication and before delivery to the works.
- After installation, repair damaged priming and complete the coverage to un-primed surfaces.

Welding

Aluminium: To AS 1665.

Stainless steel: To AS/NZS 1554.6.

Steel: To AS/NZS 1554.1.

3.2 STAINLESS STEEL FINISHES

General

Requirement: Provide a surface finish to match the approved sample.

Pre-assembly

Mechanically polished and brushed finishes: Apply grit faced belts or fibre brushes that achieve uni-directional finishes with buffing, as required to provide 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 or 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.

Post-assembly finish

Electropolish finish for external installations: Provide an electro-chemical process to stainless steel grade 316.

Brushed electropolish finish: Conform to the following:

- Pre-assembly finish: No. 4 brushed finish.
- Post-assembly finish: Provide an electro-chemical processed finish to achieve a No. 7 to No. 8 brushed finish.

Mirror electropolish finish:

- Pre-assembly finish: Mill finish 2B or mirror polished finish.
- Post-assembly finish: Provide an electro-chemical processed finish to achieve a No. 8 mirror 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.

3.3 ELECTROPLATING

Electroplated coatings

Chromium on metals: To AS 1192.

- Service condition number: At least 2.

Nickel on metals: To AS 1192.

- Service condition number: At least 2.

Zinc on iron or steel: To AS 1789.

3.4 ANODISING

General

Standard: To AS 1231.

Thickness grade: To AS 1231 Table H1.

Sample

General: Provide a finish to match the sample in terms of colour and finishing options.

3.5 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: To AS/NZS 3750.22, two coats.
- Prime coat to metal surfaces generally: To AS/NZS 3750.19 or AS/NZS 3750.20.
- Prime coat to zinc-coated steel: To AS 3730.15 or AS/NZS 3750.16.
- Undercoat: To AS/NZS 3750.21.

Pre-painted 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.

Stoving enamel

Application: Spray or dip.

Internal use:

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.

3.6 COMPLETION

Damage

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

Repair

Metallic-coated sheet: If a repair is required to metallic-coated sheet or electrogalvanizing 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 RESPONSIBILITIES

General
Requirement: Provide termite management materials and systems, as documented.

Performance
Objective: To achieve building protection.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following work section(s):

- *General requirements*.
- The *General requirements* work section contains umbrella requirements for all building and services work section.
-

1.3 STANDARD

General
Termite management systems: To AS 3660.1.

1.4 SUBMISSIONS

Certification
Woven stainless steel management systems: Submit certification that stainless steel type 725 has been used to the manufacturer's recommendation.

Tests
Other tests: Submit a Registered testing authority laboratory analysis certificate.

Chemical termite management systems: To AS 3660.1 Appendix E.

1.5 INSPECTION

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

2 PRODUCTS

2.1 NON-CHEMICAL MANAGEMENT SYSTEMS

Concrete slab
Standard: To AS 3660.1 Section 4.

Termite cap and strip shields
Standard: To AS 3660.1 Section 5.

Woven stainless steel mesh
Standard: To AS 3660.1 Section 5.

Type: 725 stainless steel.

Granular materials
Standard: To AS 3660.1 Section 6.

2.2 CHEMICAL TERMITE MANAGEMENT SYSTEMS

General
Standard: To AS 3660.1 Section 7.

Type testing: To AS 3660.1 Appendix E.

Spray application

Reticulation systems

2.3 NON-SOIL MATRIX MANAGEMENT SYSTEMS

Concrete slab
Description: Composite membrane incorporating a termiticide.

Masonry
Description: Bedding mortar incorporating a termiticide.

Application: Masonry bed and perpends as follows:

- Cavity walls built off a concrete slab on ground.
- Raft infill (footing) or formed void slab construction.
- Permanent management system in subfloor brickwork and brick piers.

Assessment criteria
Standard: To AS 3660.3.

3 EXECUTION

3.1 NON-CHEMICAL MANAGEMENT SYSTEMS

Concrete slab
Standard: To AS 3660.1 Section 4.

Termite cap and strip shields
Standard: To AS 3660.1 Section 5.

Woven stainless steel mesh
Standard: To AS 3660.1 Section 5.

Granular materials
Standard: To AS 3660.1 Section 6.

3.2 CHEMICAL TERMITE MANAGEMENT SYSTEMS

General
Standard: To AS 3660.1 Section 7.

Non-soil matrix management systems
Installation: In conformance with the manufacturer's recommendations.

3.3 COMPLETION

Termite management system notice
General: Permanently fix a durable notice in a prominent location to BCA B1.4(i)(ii) or BCA 3.1.3.2(b) and AS 3660.1 Appendix A.

Waste materials
Progressive cleaning: Make sure no waste materials which could attract termites remain on the site.

Warranties
Type: Renewable.

Certificate of installation
General: To AS 3660.1 Appendix A.

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

0185 TIMBER PRODUCTS, FINISHES AND TREATMENT

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide timber products with finishes and treatments as documented.

Performance
Requirements:

- Appropriate for durability and fire-resistance.
- Carrying appropriate certification for the finishing applications.

1.2 PRECEDENCE

General
Work sections and referenced documents:

- The requirements of other work sections of the specification override conflicting requirements of this work section.
- The requirements of this work section overrides conflicting requirements of its referenced documents.
- The requirements of the referenced documents are minimum requirements.

1.3 CROSS REFERENCES

General
Requirement: Conform to the following work section(s):

- *General requirements*.
- *Termite management*.
- *Painting*.

1.4 STANDARDS

General
Preservative treatment: To the AS 1604 series.

1.5 INTERPRETATION

Definitions
General: For the purposes of this work section the definitions given in AS/NZS 4491 and the following apply:

- Designated bushfire prone area (BCA definition): Land which has been designated under power of legislation being subject, or likely to be subject, to bushfires.
- Dry processed fibreboard: A panel manufactured by bonding lignocellulosic fibres (derived from wood or other materials) with a synthetic resin adhesive and curing under heat and/or pressure. The panels are manufactured with a forming moisture content of less than 20%.
- Groups of timbers: Terms employed for that purpose in relevant Australian standards.
- High pressure decorative laminates (HPDL):
  . Panels consisting of core layers impregnated with phenolic and/or aminoplastic resins and a surface layer(s) impregnated with aminoplastic resins (mainly melamine resins).
  . Sheets consisting of a decorative face and layers of fibrous sheet materials (e.g. paper) impregnated with thermosetting resins and bonded together under heat and pressure of at least 5 MPa.
- Particleboard: A panel manufactured under pressure and heat from wood particles and/or lignocellulosic material with the addition of an adhesive.
- Plywood types: To AS/NZS 4491.

- Softboard (Insulation board): Also known as Canite™, insulating board is available with a fine textured finish on one side or finished with 2 coats of matt white casein-kaolin paint. The reverse side is natural finish with a heavier texture.
- Standard trade common names: To AS/NZS 1148.
- Wet processed fibreboard (hardboard): A panel material manufactured from lignocellulosic fibres (derived from wood or other materials) with application of heat and/or pressure, the bond of which is derived from felting of the fibres and the panels are manufactured with forming moisture content greater than 20%.

1.6 SUBMISSIONS

Products

Rainforest species: Submit source certification.

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

Technical data

Treated timber: Submit Safety data sheets for preservative treated timber.

2 PRODUCTS

2.1 GENERAL

Storage and handling

General: Deliver timber products to site in unbroken wrapping or containers and store so that the moisture content is not adversely affected.

2.2 CERTIFICATION

Forest certification

Preservative treatment branding

Requirement: Branding details of preservative treatment as follows:

- Treatment number.
- Preservative code number.
- Hazard class.

Timber certification

Recognised product certification programs:

- Pine framing: Plantation Timber Certification.
- Hardwoods: Australian Timber Industry Certification (ATIC) Quality Scheme.
- Glued-laminated timber: Glued Laminated Timber Association of Australia (GLTAA) Product Certification System.
- Laminated veneer lumber: Engineered Wood Products Association of Australasia (EWPAA) Quality Control and Product Certification Scheme.
- Finger jointed structural timber: Plantation Timber Certification.

Inspection: If neither branding nor certification is adopted, have an independent inspecting authority inspect the timber.

Laminated veneer lumber

Timber panel products

Certification program: 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 block board: Engineered Wood Products Association of Australia (EWPAA) Quality Control and Product Certification Scheme.
- Wet processed fibreboard, dry processed fibreboard, particle board and decorative overlay wood panels: Engineered Wood Products Association of Australia (EWPAA) Quality Control and Product Certification Scheme.

2.3 FIRE-RESISTANCE

General
Standard: To AS 1720.4.

Bushfire prone areas
Standard: To AS 3959 Appendix F.

2.4 DURABILITY

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

Natural durability class: To AS 5604.

Obtain durability: By chemical impregnation, natural durability or both.

Timber quality: Free of core wood (material within 50 mm of the tree's centre) and free of splits, checks, loose knots and cavities. Free of sapwood (lighter coloured wood found on the outer layer of the tree).

Lyctid susceptible timbers: Do not provide untreated timbers containing Lyctid susceptible sapwood.

Preservative treatment
Glued laminated timber products: To AS/NZS 1604.5 Table A1.

Laminated veneer lumber (LVL): To AS/NZS 1604.4 Table A1.

Plywood: To AS/NZS 1604.3 Table A1.

Reconstituted wood-based products: To AS/NZS 1604.2 Table A1.

Sawn and round timber: To AS 1604.1 Table D1.

Untreated sapwood: If used, place to the outside of joints or in locations exposed to higher levels of ventilation.

Moisture content
Test: Methods as follows:

- Timber: To AS/NZS 1080.1.
- Plywood: To AS/NZS 2098.1.
- Reconstructed wood-based products: AS/NZS 4266.3.

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

Subfloor ventilation: To BCA F1.12 or BCA 3.4.1.2 as applicable.

Termite treatment
Requirement: To the *Termite management* work section.

2.5 FINISHING

Surface finish
Hardwood: To AS 2796.1 Table B1.

Softwood: To AS 4785.1 Table B1.

Surface coating
Painting: To the *Painting* work section and as follows:

Application: To the manufacturer's specification.

2.6 RECYCLED TIMBER

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

Classification: Visually graded.

3 EXECUTION

3.1 JOINTS

General

Joints and connections: Use hot-dipped galvanized or stainless steel fasteners, composite bolts, nails or nailed metal connectors.

Timber-to-timber interfaces: Provide a seal coating of preservative formulation and include inside bolt holes and the end grain of the timber.

Avoid: Details that may trap water such as housed, checked or birdsmouth joints.

Fasteners: Follow manufacturer's instructions to prevent chemical treatments reacting with fasteners.

Fastener selection

Hardwood cladding: Bullet head and plain shank nails, if the cladding is painted and nails are punched and stopped.

Softwood cladding: Flat head and plain shank nails, if cladding is painted.

CCA treated softwood cladding: Galvanized, deformed shank (ring or annular) flat head nails.

Unpainted cladding/framing joints: Do not use machine driven T head nails.

3.2 SHRINKAGE RESTRAINT

General

Moisture content: Use finishes and end-grain sealants to minimise moisture content changes.

Fasteners: Align fasteners along member axis and use single fasteners at the joints.

Connections: Use connections that allow for movement.

Avoid shrinkage restraint: Use seasoned timber, especially if timber elements are integrated with steel and/or concrete construction.

Drill holes: 10% oversize in unseasoned timber.

Reduce movement and shrinkage: If timber is unseasoned, use species with similar shrinkage values.

Vertical movement: For unseasoned framing provide adequate clearance at the top of masonry veneer and face fixed members to reduce vertical movement.

3.3 FINISHING

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.

Working with treated timber

Safety: Handle preservative treated timber to NOHSC 2003 and the recommendations of NOHSC 3007.

0191 SUNDRY ITEMS

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide sundry items, as documented and as follows:

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

1.2 CROSS REFERENCES

General

Requirement: Conform to the following work section(s):

- *General requirements*.

1.3 INSPECTION

Notice

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

- Set-out of item locations before fixing.
- Completion of installation.

1.4 SUBMISSIONS

Manuals

Operation and maintenance manuals: Submit a maintenance manual and, if required, an operation manual with the technical specification and manufacturer's recommendations for the item to be installed.

Products

Sealant compatibility statements: Submit statements from all parties to the installation certifying the compatibility of sealants with items.

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.

Shop drawings

General: Submit shop drawings, to a scale that best describes the detail, 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.

Warranties

Submit a manufacturer's and/or installer's warranty, naming the principal, clearly defining warranty period and conditions.

2 PRODUCTS

2.1 MARKING

Identification

General: Deliver materials to the site in the manufacturer's original sealed containers or packaging, legibly marked to show the following:

- Manufacturer's identification.
- Product brand name.
- Product type.
- Quantity.
- Product reference code and batch number.
- Date of manufacture.
- Material composition and characteristics such as volatility, flash point, light fastness, colour and pattern. Provide technical data sheets if not shown on labels.
- Handling and installation instructions.
- Material safety data sheets.

0193 BUILDING ACCESS SAFETY SYSTEMS

. GENERAL

. RESPONSIBILITIES

General
Requirement: Provide the building access safety system, as documented.

Performance
Roofing and cladding: Maintain the waterproofing integrity without damage or distortion. Maintain the structural integrity of the supporting elements.

. DESIGN

General
Requirements
Performance requirements: To AS/NZS 1891.2 Section 4.

Access: Provide a system for three workers at any one time, to access the following:

Full extent of gutters.

Roof mounted plant and equipment.

Roof areas within 2.5 m of fall hazards not otherwise protected by parapets or guard rails.

Documentation

. CROSS REFERENCES

General
Requirement: Conform to the following work section(s):

General requirements.

. STANDARDS

General
Industrial fall-arrest system: To AS/NZS 1891.1, AS/NZS 1891.2, AS/NZS 1891.3 and AS/NZS 1891.4.

Industrial rope access system: To AS/NZS 4488.1 and AS/NZS 4488.2.

. INTERPRETATION

Definitions
General: For the purposes of this work section the definitions given in AS/NZS 1891.1 and AS/NZS 5532 apply.

. SUBMISSIONS

Certification
General: Submit certification of installed system.

Documentation
Instruction manual
General: Submit the manufacturer’s instruction manuals.

Samples
Tests
Type tests: Submit results, as follows:

Site tests: Submit results, as follows:

Training
Warranties
Requirement: Submit the manufacturer’s published product warranties.

. 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.

All equipment attachments with concealed fixings, before they are covered.

Site erected assemblies on completion of erection, before applying finishes.

Steel surfaces prepared for, and immediately before, site applied finishes.

Installation inspector: Registered height safety inspector or engineer.

. PRODUCTS

. MARKING

Identification

General: Deliver fall protection assembly to the site in the manufacturer's original sealed packaging legibly marked to show the following:

Manufacturer's identification.

Installer's contact details.

Intended location.

Load rating and direction.

Current inspection/service date.

Batch number or serial number of the components.

. FALL PROTECTION SYSTEMS

Access safety system

Anchors

Single point anchors: To AS/NZS 5532.

Vertical lifeline and ladder systems

Product: Vertical rail systems including cables, fixed ladders, guides and fall arrestor trolleys.

Personal protective equipment (PPE)

Harness: Supply two full body harnesses with shock absorbing lanyards to AS/NZS 1891.1.

Storage: PPE storage holdall supplied by the manufacture.

Tests

Production tests: Complete the following tests:

Warranties

General: For each type of building access safety system submit the manufacturer's warranty.

. EXECUTION

. INSTALLATION AND TESTING

General

Drilled-in anchors: Load test drilled-in anchors used in shear and not in axial tension (direct pull-out) before use.

Standards

Industrial fall arrest systems: To AS/NZS 1891.2.

Industrial rope access systems: to AS/NZS 4488.1.

Contractor

Installer: Registered Installer, approved by the manufacturer.

Labels and signage

General: To AS/NZS 1891.4 clause 2.2.9.

Proof load test for anchors
Standard: To AS/NZS 4488.2 clause 5.3.

Proof load test for horizontal lifeline and rail systems
Standard: To AS/NZS 1891.3 clause 3.1.

. **MAINTENANCE**

General
Preventative and mandatory system maintenance: By an Accredited Height Safety Inspector/Certifier, in conformance with AS/NZS 1891.4 Section 9 and manufacturer's maintenance/recertification recommendations.

Checklist for all inspections: To AS/NZS 1891.2 Supp 1 Table 8, and AS/NZS 1891.4 Section 9 and Appendices C and D.

The installer/competent person: To AS/NZS 1891.2 clause 1.2.1.

Periodic inspections
Standard: To AS/NZS 1891.2 clause 9.2.

Completion certificate:

Provide inspection, testing and certification by an Accredited Installer and/or Accredited Height Safety Inspector:

Upon completion of the installation at the date for practical completion.

Upon the expiry of the defects liability period or 12 months after completion of the installation whichever is the lesser, and valid for a further 12 months period.

Record the date of the next system inspection and period of validity and display the certificate at the access points of the work area or on the individual system components where provision is made.

Inspection after a fall or other event
Standard: To AS/NZS 1891.2 Supp 1 clause 9.3.

Proof testing of drilled-in anchorages
Standard: To AS/NZS 1891.2 Supp 1 clause 9.4.

On-going maintenance
Certificate: Submit the completion certificates and notify the proprietor of the requirement for continued interval testing.

0201B DEMOLITION

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Carry out demolition, as documented (includes demolition of existing playground + removal of T-12 spotted gumtree and existing scrub + relocation of existing bench seat).

1.2 CROSS REFERENCES

General
Requirement: Conform to the following work section(s):

- *General requirements*.

1.3 STANDARD

General
Demolition: To AS 2601.

1.4 INTERPRETATION

Definitions
General: For the purposes of this work section, the following definitions apply:

- Demolition: The complete or partial dismantling of a building or structure, by pre-planned and controlled methods or procedures.
- Dilapidation record: The photographic or video and written record made before commencement of demolition work of the condition of the portion of the existing building being retained, adjacent buildings, and other relevant structures or facilities.
- Dismantle: The reduction of an item to its components in a manner to allow re-assembly.
- Recover: The disconnection and removal of an item in a manner to allow re-installation.

1.5 INSPECTION

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

- Adjacent structures before commencement of demolition.
- Services before disconnection or diversion.
- Trees as documented to be retained, before commencement of demolition.
- Contents of building before commencement of demolition.
- Structure after stripping and removal of roof coverings and external cladding.
- Underground structures after demolition above them.
- Excavations remaining after removal of underground work.
- Site after removal of demolished materials.
- Services after reconnection or diversion.

1.6 SUBMISSIONS

Authority approvals and Investigation and work plan
These subclauses are not included in this basic version. The full work section is part of the BUILDING Professional package.

Hazardous materials
Audit: Prepare a Hazardous substances management plan to AS 2601 clause 1.6. Include the following:

- Asbestos or material containing asbestos.

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

Records

Dilapidation record: Submit a copy of the dilapidation record for inspection. Submit to each owner of each adjacent property a copy of the part of the record relating to that property and obtain their written agreement to the contents of the record, before commencement of demolition.

Stockpiles

Location: Submit the locations for on-site stockpiles for demolished materials for recycling in the works. Coordinate with the locations of storage for other waste streams and prevent mixing or pollution.

Off site disposal

Disposal location: Submit the locations and evidence of compliance with the relevant authorities for the disposal of material required to be removed from the site.

Recycling

Delivery location: Submit the name and address of the proposed recycling facility.

Certification: Provide evidence of delivery to the nominated recycling facility.

2 PRODUCTS

2.1 DEMOLISHED MATERIALS

Demolished material classes

Ownership and implementation: Comply with the **Demolished material classes table**.

Demolished material classes table

Class	Requirement	Ownership
Recovered items for re-use in the works	Recover without damage items identified in the **Recovered items for re-use in the works schedule**	Principal/proprietor
Recovered items for delivery to the principal	Recover without damage items identified in the **Recovered items for delivery to the principal schedule**	Principal/proprietor
Demolished material for recycling in the works	Stockpile material identified in the **Demolished material for recycling in the works schedule**	Contractor
Demolished material for recycling off site	Demolish and deliver for recycling material identified in the **Demolished material for recycling off-site schedule**	Contractor
Dismantle for relocation as part of the works	Dismantle without damage and store items identified in the **Dismantle for relocation schedule**	Principal/proprietor
Demolished for removal	Remove from the site demolished materials identified in the **Demolish for removal schedule**. Do not burn or bury on site Transit: Prevent spillage of	Contractor

Class	Requirement	Ownership
	demolished materials in transit	

3 EXECUTION

3.1 SUPPORT

Temporary support
General: If temporary support is required, certification for its design and installation is required from a professional engineer engaged by the contractor.

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

Ground support: Support excavations for demolition of underground structures.

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

- Lateral supports: Provide lateral support equal to that given by the structure to be demolished.
- Vertical supports: Provide vertical support equal to that given by the structure to be demolished.

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

3.2 PROTECTION

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

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

Dust protection
General: Provide dust-proof screens, bulkheads and covers to protect existing finishes and the immediate environment from dust and debris.

Security
General: If a wall or roof is opened for alterations and additions, provide security against unauthorised entry to the building.

Temporary screens
General: Fill the whole of designated temporary openings or other spaces using dustproof and weatherproof temporary screens, fixed securely to the existing structure, and installed to shed water to avoid damage to retained existing elements or adjacent structures and contents.

Type: Timber framed screens sheeted with 12 mm plywood and painted. Seal the junctions between the screens and the openings.

Temporary access
General: If required, provide a substantial temporary door-set fitted with a rim deadlock, and remove on completion of demolition.

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

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

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

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

Fixed items
Individual protection: Protect the following items in their existing positions:

Recovered items
General: Recover all components associated with the listed items that are essential for their re-use. Minimise damage during removal.

3.3 DEMOLITION – BUILDING WORKS

Dilapidation record
Purpose: Use the dilapidation record to assess the damage and making good arising out of demolition work.

Availability: Keep the records of the investigations on site and available for inspection until the date of practical completion of the contract.

Encroachment
General: If encroachments from adjacent structures are encountered and are not documented, give notice and obtain instructions.

Concrete slabs
General: Using a diamond saw, neatly cut back or trim to new alignment with a clean true face existing concrete slabs to be partially demolished or penetrated.

Recycling: If concrete crushing is proposed on site, submit details of plant and environmental controls.

Explosives
General: Do not use explosives.

3.4 DEMOLITION – BUILDING SERVICES

General
Requirement: Decommission, isolate, demolish and remove from the site all existing redundant equipment including associated components that become redundant as a result of the demolition.

Breaking down: Disassemble or cut up equipment where necessary to allow removal.

Recovered materials: Recover all components associated with the listed items. Minimise damage during removal and deliver to the locations scheduled.

Refrigeration systems
General: Undertake demolition work on refrigeration systems in conformance with:

- AS/NZS 1677.2 Appendix F.
- The recommendations of SAA HB 40.1 and SAA HB 40.2.

Re-used components
General: Clean re-used components and test for compliance with current Australian Standards before returning to service. Provide results of compliance tests.

3.5 HAZARDOUS MATERIALS

Identified hazardous material
Register: Hazardous materials have been identified as present on site and a Hazardous materials register has been prepared.

Hazardous materials removal
Standard: To AS 2601 clause 1.6.2.

3.6 COMPLETION

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

Making good: Make good any damage arising out of demolition work. Obtain written acceptance from the owner of each adjoining property of completeness and standard of making good.

Temporary support
General: Clear away at completion of demolition.

0221B SITE MANAGEMENT

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide site management, as documented.

Designated areas for protection: as documented (extent of site fencing as documented)

Outline of the works: Contractor to provide a site management plan for the work outlined in the architectural documentation

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

Requirement: Conform to the following work section(s):

- *General requirements*.

1.3 INSPECTION

Notice

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

- Enclosures to trees to be retained.
- Trees to be removed.

1.4 SUBMISSIONS

Submissions program

Training program: Submit a program to familiarise staff regarding the site environmental management plan, environmentally sensitive areas and responsibilities.

Soil erosion and sediment control plan

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

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 of.
- Indicate how the waste will be transported between the site and point of re-use, recycling, stockpiling, treating or disposal and who will be responsible.

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

Ground contamination control plan

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 conformance with the Environmental Protection Authority (EPA) guidelines.

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.

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.

Legislative requirements

Conditions of Development Approval relevant to environment controls: to comply with all council conditions

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. Mark-up 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 council requirements

Noise control measures: as per council 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.

0221 Site management [Content]

Vegetation and fauna
Wild life protected: All native.

Trees to be removed: Inspect to establish if nesting native fauna are present. If present give notice.

Pruning: To AS 4373.

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

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

Dewatering
General: Keep earthworks free of water. Provide and maintain slopes, crowns and drains on excavations and embankments to make sure 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 off-site.

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: city of Canada Bay Council

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 TREE PROTECTION

General
Warning sign: Display a sign in a prominent position at each entrance to the site, warning that trees and plantings are to be protected during the contract. Remove on completion.

Lettering: Road sign type sans serif letters, 100 mm high to AS 4970 Appendix C.

Protection measures program: Before commencement of earthworks.

Standard
General: Comply with the recommendations of those parts of AS 4970 which are referenced in this work section.

Trees to be retained
Extent: All trees NOT marked for removal.

Tree protection
Tree protection zone: To AS 4970 Section 3.

Tree protective measures: To AS 4970 Section 4.

Monitoring and certification: To AS 4970 Section 5.

Work near trees
Harmful materials: Keep the area within the dripline free of sheds and paths, construction material and debris. Do not place bulk materials and harmful materials under or near trees. Do not place spoil from excavations against tree trunks. Prevent wind-blown materials such as cement from harming trees and plants.

Damage: Prevent damage to tree bark. Do not attach stays, guys and the like to trees.

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

Excavation: If excavation is required near trees to be retained, give notice and obtain instructions. Open up excavations under tree canopies for as short a period as possible.

Hand methods: Use hand methods to locate, expose and cleanly remove the roots on the line of excavation. If it is necessary to excavate within the drip line, use hand methods such that root systems are preserved intact and undamaged.

Roots: Do not cut tree roots exceeding 50 mm diameter. Where it is necessary to cut tree roots, use means such that the cutting does not unduly disturb the remaining root system. Immediately after cutting, water the tree and apply a liquid rooting hormone to stimulate the growth of new roots.

Backfilling: Backfill to excavations around tree roots. Place the backfill in layers of 300 mm maximum depth and compacted to a dry density similar to that of the original or surrounding soil. Do not backfill around tree trunks to a height greater than 200 mm above the original ground surface. Immediately after backfilling, thoroughly water the root zone surrounding the tree.

Backfill material:

- Mix proportions (topsoil:well rotted composts) by volume: 3:1.
- Neutral pH value.
- Free from weed growth and harmful materials.

Compacted ground: Do not compact the ground or use skid-steel vehicles under the tree dripline. If compaction occurs, give notice and obtain instructions.

Compaction protection: Protect areas adjacent the tree dripline. Submit proposals for an elevated platform to suit the proposed earthworks machinery.

Watering: Water trees as necessary, including where roots are exposed at ambient temperature more than 35°C.

Mulching: Spread 100 mm thick organic mulch to the whole of the area covered by the drip line of all protected trees.

2.7 EXISTING SERVICES

Location

Requirement: 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.

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

Excavation

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

2.8 TREES TO BE REMOVED

Designation

Extent: as per architectural documentation

Marking: Mark trees and shrubs to be removed as follows:

- As per architectural documentation
- Location: 1000 mm above ground level.

2.9 SITE CLEARING

Extent

General: Clear only the following site areas:

- Areas to be occupied by works such as structures, paving, excavation, regrading and landscaping.
- Other areas designated to be cleared.

Contractor's site areas: If not included within the areas documented above, clear generally only to the extent necessary for the performance of the works.

Clearing and grubbing

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

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

Old works: Remove old works, including slabs, foundations, pavings, drains and access chambers covers found on the surface.

2.10 SEDIMENT FILTERS

General

Inspection: Inspect for displacement, undercutting, over-topping and soil build-up, after each rain event. Effect repairs immediately.

Removal: When the upslope areas have been permanently stabilised.

Straw bale filters

Description: Temporary structures made of straw bales (cereal straw) laid end to end across direction of stormwater flow in order to filter sediment.

Slopes: If filter is at toe of a slope, place bales 1500 to 2000 mm away from slope, to provide access for maintenance and to allow coarse sediment to drop out of suspension before reaching sediment filter.

Binding: Wire-bound or with string-tied bindings wrapped around the bale sides.

Installation:

- Trench: 100 mm deep trench the width of a bale and the length of the proposed sediment filter.
- Placement: Lengthwise in the trench with ends tightly abutting and corners lapped.
- Fixing: Drive two 50 x 50 mm wooden stakes or metal star pickets through each bale. Ensure bales are packed closely and staked securely. Eliminate gaps with loose straw wedged between tight.

Backfilling: Compacted excavated soil to ground level on downhill side of barrier, and 100 mm above ground level on the uphill side of the bales.

Silt fence

Description: A temporary barrier of geotextile, supported on wire or mesh fencing in order to filter sediment from stormwater flow.

Slopes: If filter is at toe of a slope, locate fence 1500 to 2000 mm away from slope, to provide access for maintenance and to allow coarse sediment to drop out of suspension before reaching sediment filter.

Contours: Locate fence line and posts along contours curving upstream at the sides to direct flow toward middle of the fence.

Installation:

- Trench: 100 mm wide x 200 mm deep along line of posts and upslope from barrier.
- Posts: 1200 mm long pre drilled steel star picket posts at 3000 mm centres, driven 600 mm and fitted with plastic safety caps.
- Wire mesh: ≥ 14 gauge x ≤ 150 mm mesh spacing. Fasten wire mesh to upslope side of posts with 25 mm long heavy-duty wire staples and tie wire. Extend wire mesh 150 mm into trench.
- Filter: Geotextile selected to suit local soil conditions cut from a continuous roll to minimise joints.
- Fixing: Wire ties to the uphill side of fence posts, and extended 200 mm into the trench. Do not staple onto trees.
- Joints: 150 mm overlap at a support post, with both ends fastened to the post.

Performance: Retain soil found on site but with openings large enough to permit drainage and prevent clogging.

Fence height: 600 mm average.

Backfilling: Backfill trench over toe of geotextile and compact soil.

Straw bale - geotextile filters

Description: Sediment filter comprising straw bales and geotextile.

Slopes: If filter is at toe of a slope, place bales 1500 to 2000 mm away from slope, to provide access for maintenance and to allow coarse sediment to drop out of suspension before reaching sediment filter.

Binding: Wire-bound or with string-tied bindings wrapped around the bale sides.

Bale installation:

- Trench: 100 mm deep trench the width of a bale and the length of the proposed sediment filter.
- Placing: Lengthwise in the trench with ends tightly abutting and corners lapped.
- Fixing: Drive two 50 x 50 mm wooden stakes or metal star pickets through each bale. Ensure bales are packed closely and staked securely. Eliminate gaps with loose straw wedged between tight.

Geotextile installation:

- Geotextile selected to suit local soil conditions cut from a continuous roll to minimise joints.
- Fixing: Staple geotextile to top of straw bale and extend down the uphill face of the bale into the trench. Stretch the geotextile and peg securely into the subgrade.
- Joints: 150 mm overlap at a support post, with both ends fastened to the post.

Performance: Retain soil found on site but with openings large enough to permit drainage and prevent clogging.

Backfilling: Compacted excavated soil to ground level on downhill side of barrier, and 100 mm above ground level on the uphill side of the bales against and over toe of the fabric.

2.11 DISPOSAL OF MATERIALS

Disposal

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

Burial: Bury concrete and other inorganic fragments as follows:

- Location: Beyond built or paved areas.
- Depth: More than 600 mm from finished ground level to the top of the object.
- Compaction: Eliminate voids.

Mulch

Seed free aerial vegetative matter: Put through a chipper. Reduce to pieces not larger than 75 x 50 x 15 mm and stockpile for re-use as mulch.

Material not permitted: Leaf matter and tree loppings from privet, camphor laurel, coral tree, poplar, willow and noxious weeds.

2.12 COMPLETION

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.

Clean up

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 what is required for work during the defects liability period or the plant establishment period. Remove these on completion.

2.13 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.

0222 EARTHWORK

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide earthworks to the dimensions and tolerances, as documented.

Design

Geotechnical and environmental reports provided: Refer to Appendix A

General: The footing or pier depths shown on the drawings are provisional.

Designer: Cardno Consultant Engineers

Authority requirements: As per council conditions

1.2 CROSS REFERENCES

General

Requirement: Conform to the following work section(s):

- *General requirements*.
- *Site management*.

1.3 STANDARDS

General

Earthworks: To AS 3798.

General: Conform to the recommendations of those parts of AS 3798 which are referenced in this work section.

1.4 INTERPRETATION

Abbreviations

General: For the purposes of this work section the following abbreviations apply:

- GITA: Geotechnical inspection and testing authority.
- GTA: Geotechnical testing authority.

Definitions

General: For the purposes of this work section the definitions given in AS 1348, AS 3798 and the following apply:

- Description and classification of soils: To AS 1726.
- Site classification: To BCA 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: Layer(s) of material forming the uppermost structural element of a pavement and on which the surfacing may be placed.
- 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.
- Rock: Monolithic material with volume greater than 0.5 m^3 which cannot be removed until broken up 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 to AS 4419 (loam, silt, clay loam) and is free from:
  . Stones more than 25 mm diameter.
  . Clay lumps more than 75 mm diameter.
  . Weeds and tree roots.
  . 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.
- Zone of influence: A foundation zone bounded by planes extending downward and outward from the bottom edge of a footing, slab or pavement and defining the extent of foundation material having influence on the stability or support of the footings, slab or pavement.

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 before placing fill.
- Filling completed to contract levels.
- Stockpiled topsoil before spreading.

1.6 TOLERANCES

General

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

- Under building slabs and load bearing elements: + 0, - 25 mm.
- Pavement subgrades: + 0, - 40 mm.
- Batters: No steeper than the slope shown on the drawings. Make sure flatter slopes do 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.

1.7 SUBMISSIONS

Design

Calculations: Submit calculations by a professional engineer to show that proposed excavations and temporary supports, including where applicable supports for adjacent structures, will be stable and safe.

Execution details

Report: Submit a time based schedule noting the methods and equipment proposed for the groundworks, including the following:

- Dewatering and groundwater control and disposal of surface water.
- Excavation methods, stages, clearances, batters and temporary supports.
- Stockpiles and borrow pits.
- Placing and compaction methods and stages.

Geotechnical site investigations: Provide a geotechnical report supporting the procedures proposed for excavation.

Disposal location: Submit the locations and evidence of compliance with the relevant authorities for the disposal of material required to be removed from site.

Temporary shoring: Provide a proposal for any temporary shoring or underpinning required including the progressive removal.

Proof rolling: Submit method and equipment for proof rolling.

Certified records of measurement: Submit a certified copy of the agreed records of measurement.

Construction records: Submit the following to AS 3798 clause 3.4 and Appendix B:

- Geotechnical site visit record; and
- Earthworks summary report or daily geotechnical reports.

Materials

Imported fill: Submit certification or test results by a GTA registered laboratory which establish the compliance of imported fill with the contract including the source.

Tests

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

2 PRODUCTS

2.1 FILL MATERIALS

General

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

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

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.

Re-use of excavated material: Only re-use suitable material in conformance with AS 3798 clause 4.4.

Stockpiles: Segregate the earth and rock material and stockpile, for re-use in backfilling operations.

Locations: Do not stockpile excavated material against tree trunks, buildings, fences or obstruct the free flow of water along gutters where stockpiling is permitted along the line of the trench excavation.

Disposal: If stockpiling is not permitted under the contract, dispose of excavated material off-site to AS 3798 clause 6.1.8.

2.2 BORROW OR IMPORTED FILL

Borrow or imported material: Only when no suitable excavated material is available.

- Suitable material: To AS 3798 clause 4.4.

Borrow pits:

- Location: More than 3 m from any fence line, boundary, edge of excavation or embankment.
- Strip and stockpile topsoil.
- Provide erosion protection during winning operations of material and make sure drainage is maintained.
- On completion of winning operations grade abrupt changes of slope, respread topsoil and apply and maintain hydroseeded grassing.

3 EXECUTION

3.1 SITE PREPARATION

Erosion and sedimentation control

Drainage, erosion and sedimentation control: To the *Site management* work section.

3.2 GEOTECHNICAL

As found site conditions

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

- Bad ground.
- Discrepancies.
- Rock.
- Springs, seepages.
- Topsoil > 100 mm deep.

Inspection and testing

Inspection and testing: Conform to the following:

- Level 1 GITA required to AS 3798 clause 8.2.
- Level 2 GTA required to AS 3798 clause 8.3.

3.3 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: By registered surveyor unless otherwise agreed.

Rock

Level and class: If rock is 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.

3.4 REMOVAL OF TOPSOIL

General

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

Maximum depth: 200 mm.

Topsoil stockpiles

General: Stockpile site topsoil intended for re-use and imported topsoil where necessary.

Stockpile heights: Establish stockpiles to maximum height of 1.5 m.

Mark: Identify stockpiles of different soil types.

Vegetation: Do not burn off or remove plant growth which may occur during storage.

Protection: Provide the following:

- Drainage and erosion protection.
- Do not allow traffic on stockpiles.
- If a stockpile is to remain for more than four weeks, sow with temporary grass.
- Protect the topsoil stockpiles from contamination by other excavated material, weeds and building debris.

Remove: Remove topsoil that is unsuitable for re-use from the site to AS 3798 clause 6.1.8.

3.5 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, settlement or heaving.

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

Rock

General: Do not use explosives.

Existing footings

Requirement: If excavation is required within the zone of influence of an existing footing, use methods including (temporary) shoring or underpinning which maintain the support of the footing and make sure that the structure and finishes supported by the footing are not damaged.

Existing services

Location: 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.

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

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

Proof rolling

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

Proof rolling method and equipment: To AS 3798 clause 5.5.

Outcome: If excessive settlement, rebound or heaving is encountered, provide test pits or trenching to determine the extent of bad ground.

Disposal of excess excavated material

General: Remove excess excavated material from site not required or unsuitable for fill.

- Standard: To AS 3798 clause 6.1.8.

3.6 SUBGRADES AFFECTED BY MOISTURE

General

General: If the subgrade is unable to support construction equipment, or it is not possible to compact the overlying pavement only because of a high moisture content, perform one or more of the following:

- Allow the subgrade to dry until it will support equipment and allow compaction.
- Scarify the subgrade to a depth of 150 mm, work as necessary to accelerate drying, and recompact when the moisture content is satisfactory.
- Excavate the wet material and remove to spoil, and backfill excavated areas.

3.7 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.

Deterioration

General: If the bearing surface deteriorates because of water or other cause, excavate further to a sound surface before placing the loadbearing element.

3.8 REINSTATEMENT OF EXCAVATION

General

Fill adjacent structures and trenches: To AS 3798 clause 6.2.6.

Zone of influence: Within the zone of influence of footings, beams, or other structural elements, use concrete of strength equal to the structural element, minimum 15 MPa. Make sure that remedial concrete does not create differential bearing conditions.

Below slabs or pavements: Provide selected fill compacted to the specified density.

Cut subgrades: Where the over excavation is less than 100 mm, do not backfill. Make good by increasing the thickness of the layer above.

Rock depressions and subsoil drains: Backfill rock depressions and over excavation of subsoil drains using coarse subsoil filter.

3.9 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.

3.10 PREPARATION FOR FILLING

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

Foundation preparation: To AS 3798 clause 6.1.7.

Compaction: Compact the ground exposed after stripping or excavation to the minimum relative compaction in AS 3798 Section 5 and the **Compaction table.**

Scarify method: Loosen exposed excavation by scarifying to a minimum or 150 mm, moisture condition and compact to AS 3798 Section 5 and the **Compaction table**.

Impact roller compaction: Use an approved impact roller or impact completion.

Slope preparation: If fill is placed on a surface steeper than 4:1 (horizontal:vertical), bench the surface to form a key for the fill. As each layer of fill is placed, cut the existing ground surface progressively to form a series of horizontal steps more than 1 m in width and more than 100 mm deep. Recompact the excavated material as part of the filling. Shape to provide free drainage.

Under earth mounds
General: Cultivate the ground to a depth of 200 mm before mound formation.

Under slabs, paving and embankments
General: Compact the ground to achieve the densities specified in the **Compaction table**. If necessary loosen the ground to a depth of more than 200 mm and adjust the moisture content before compaction to a density consistent with subsequent filling.

Rock ledges
General: Remove overhanging rock ledges.

3.11 GEOTEXTILE

General
Material: UV stabilised polymeric fabric formed from a plastic yarn composed of at least 85% by weight.

Identification and marking: To AS 3705.

Preparation: Trim the ground to a smooth surface free from cavities and projecting rocks.

Placing: Lay the fabric flat, but not stretched tight, and secure it with anchor pins. Overlap joints 300 mm minimum.

3.12 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, make sure 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.

Placing at structures

General: Place and compact fill in layers simultaneously on both sides of structures, culverts and pipelines to avoid differential loading. Carefully place first layers of fill over the top of structures.

Concrete: Do not place fill against concrete retaining walls until the concrete has been in place for 28 days unless the structure is supported by struts.

3.13 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.

3.14 FILL MOISTURE CONTROL

General

Moisture content: 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 to achieve the required density.

3.15 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 **Minimum relative compaction table**. Shape surfaces to provide drainage and prevent ponding.

Minimum relative 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	95%	70%
Pavements: Subgrade to 300 mm deep	98%	75%

Excavated and stripped ground surface: After excavation and/or stripping, compact these surfaces in conformance with the **Minimum relative compaction table** to a minimum 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.

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.

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

3.16 COMPLETION

Grading

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

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

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.

Site restoration

Requirement: Where variation of existing ground surfaces is not required as part of the works, restore surfaces to the condition existing at the commencement of the contract.

0224B STORMWATER – SITE

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide stormwater drainage, as documented.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following work section(s):
- *General requirements*.
- *Earthwork*.

1.3 STANDARDS

Stormwater drainage
Standard: To AS/NZS 3500.3.

1.4 INTERPRETATION

Definitions
General: For the purposes of this work section the following definition applies:
- Pipe surround: Includes pipe overlay, pipe side support, side zone and haunch zone.

1.5 INSPECTION

Notice
Inspection: Give notice so that inspection may be made at the following stages:
- Excavated surfaces prior to placing bedding material.
- Concealed or underground services prior to being covered.
- Pipe joints before covering.
- Placing of cast in situ concrete.
- Upon completion.

2 PRODUCTS

2.1 MATERIALS

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

Type of pipes and fittings
Fibre reinforced cement (FRC): To AS 4139 and the following:
- ≤ 450 mm diameter: Rubber ring joints to AS 4139.
- > 450 mm diameter: With a purpose machined internal spigot and socket system within the pipe wall.

Glass-reinforced polyester (GRP): To AS 3571.1.

Cast iron access chamber covers and frames: To AS 1830 or AS 1831, as appropriate.

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

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

Precast concrete: To AS/NZS 4058.

Rubber ring joints/elastomeric seals: To AS 1646.

Plastic pipe for subsoil drainage: To AS 2439.1.

Vitrified clay or ceramic: To AS 1741.

Bedding material

Bed and haunch zones: Provide granular material graded to AS 1141 series.

Conformance: Conform to the **Bedding material grading table**.

Bedding material grading table

Sieve size (mm)	Weight passing %	
	Bed and haunch	Side zones
75.0	-	100
19.0	100	-
9.5	-	50-100
2.36	50-100	30-100
0.60	20-90	15-50
0.30	10-60	-
0.15	0-25	-
0.075	0-10	0-25

Filter material

General: Provide filter materials consisting of natural clean washed sands and gravels and screened crushed rock conforming to AS/NZS 3500.3 clause 2.14.1.

2.2 PREFABRICATED PITS

General

Requirement: Provide precast or prefabricated pits in conformance with AS/NZS 3500.3 clauses 2.13.8 and 8.6.

Metal access covers and grates

Standard: To AS 3996.

3 EXECUTION

3.1 PIPING

General

Laying: Lay lengths separately with the barrel bearing evenly on the prepared bedding.

Sockets: Lay with sockets pointing upstream.

Cleaning: Clean pipe interior of dirt, debris, mortar and other foreign matter.

Protection: Provide temporary caps over the ends of incomplete sections to prevent the entry of foreign matter.

3.2 TOLERANCES

General

Requirement: Conform to the **Pipeline tolerances table**. These tolerances are conditional on falls to outlets being maintained and no part of a pipeline having less than the documented gradient.

Pipeline tolerances table

	Permissible angular deviation from the documented alignment	Permissible displacement from the documented positions
Horizontal	1:300	15 mm
Vertical	1:500	5 mm

Pipe underlay (bedding)

General: Bed piping on a continuous underlay of bedding material, minimum 75 mm, maximum 150 mm thick after compaction. Grade the underlay evenly to the gradient of the pipeline.

Chases: If necessary, form chases to prevent projections such as sockets and flanges from bearing on the trench bottom or underlay.

Pipe surrounds

General: Place the material in the pipe surround in layers maximum 200 mm loose thickness, and compact without damaging or displacing the piping.

Trench backfill

General: Backfill the remainder of the trench to the underside of the subgrade with fill material in conformance with the *Earthwork* work section.

Encasement

General: As documented in 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.

3.3 SUBSOIL DRAINS

General

Requirement: Provide subsoil drains to intercept groundwater seepage and prevent water build-up behind walls and under pavements. Connect subsoil drains to surface drains or to the stormwater drainage system as applicable.

Piping: As documented in the **Subsoil pipeline schedule**.

Trench width: ≥ 450 mm.

Trench floor: Grade the trench floor evenly to the gradient of the pipeline. If the trench floor is rock, correct any irregularities with compacted bedding material.

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.

Jointing

General: At junctions of subsoil pipes, provide tees, couplings or adaptors to AS 2439.1.

Pipe underlay (bedding)

General: Bed piping on a continuous underlay of bedding material, minimum 75 mm, maximum 150 mm thick after compaction. Grade the underlay evenly to the gradient of the pipeline.

Chases: If necessary, form chases to prevent projections such as sockets and flanges from bearing on the trench bottom or underlay.

Pipe surrounds

General: Place the material in the pipe surround in layers maximum 200 mm loose thickness, and compact without damaging or displacing the piping.

Depth of overlay:

- To the underside of the bases of overlying structures such as pavements and channels.
- To within 150 mm of the finished surface of unpaved or landscaped areas.

3.4 PITS

Installation

General: Prepare foundation, install pit and connect pipes, to manufacturer's recommendations.

Location: At junctions, changes of gradient and changes of direction of stormwater drains, as documented.

3.5 COMPLETION

Cleaning

General: Clean and flush the whole installation.

0271B PAVEMENT BASE AND SUBBASE

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide base and subbase courses as documented.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following work section(s):
- *General requirements*.
- *Earthwork*.

1.3 INTERPRETATION

Definitions
General: For the purposes of this work section the definitions given in AS 1348 and the following apply:
- Absolute level tolerance: Maximum deviation from design levels.
- Base: Layer(s) of material forming the uppermost structural element of a pavement and on which the surfacing may be placed.
- Flexible pavement: A pavement which obtains its load-spreading properties from intergranular pressure, mechanical interlock and cohesion between the particles of the pavement material.
- Relative level tolerance: Maximum deviation from a 3 m straightedge laid on the surface.
- Subbase: Material laid on the subgrade (or selected material), below the base, either for the purpose of making up additional pavement thickness, to prevent intrusion of the subgrade into the base, or to provide a working platform.

1.4 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of the following:
- Prepared subgrade.
- Proof rolling of subbase before spreading of base.
- Proof rolling of base before sealing.

1.5 SUBMISSIONS

Materials
Source of material: Submit the supplier name, material type (crushed rock, natural gravel, 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 conforms to the documented requirements.

2 PRODUCTS

2.1 BASE AND SUBBASE MATERIAL

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

Crushed rock and recycled material class
Requirement: Provide crushed rock and recycled material as documented, from the following classes:

- Class 1: Pavement base material (with a minimum plasticity index) for unbound pavements requiring a very high standard of surface preparation for a sprayed sealed or thin asphalt surfacing.
- Class 2: Pavement base material (with no minimum plasticity index) for unbound pavements which may not require a very high standard of surface preparation.
- Class 3: Not applicable.
- Class 4: Subbase material for unbound flexible pavements.

3 EXECUTION

3.1 SUBGRADE PREPARATION

General

Requirement: Prepare the subgrade in conformance with the *Earthwork* work section.

3.2 PLACING BASE AND SUBBASE

General

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

Spreading: Spread material in uniform layers without segregation.

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

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

Joints

General: Plan spreading and delivery to minimise the number of joints. Offset joints in successive layers by a minimum of 300 mm.

Start of shift: Remix last 2 m of previous days' work for continuity of compaction.

Final trimming

General: Trim and grade the base course to produce a tight even surface with no loose stones or slurry of fines.

3.3 TOLERANCES

Surface level

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

Base abutting gutters: ± 5 mm from the level of the lip of the gutter, minus the design thickness of the wearing course.

Tolerances: Conform to the **Surface level tolerances table**. The tolerances apply to the finished level of each layer, unless overridden by the requirements (including tolerances) for the finished level and thickness of the wearing course.

Surface level tolerances table

Item	**Level tolerance**	
Item	**Absolute**	**Relative**
Subbase surface	+ 10 mm, - 25 mm	10 mm
Base surface	+ 10 mm, - 5 mm	5 mm

3.4 SUBBASE AND BASE COMPACTION

General

Construction operation: 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: If unstable areas develop during rolling or are identified by proof rolling, open up, dry back and recompact, to the requirements of this work section. If dry back is not possible, remove for the full depth of layer, dispose of and replace with fresh material.

Compaction requirements

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

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

Moisture content

General: During spreading and compaction, maintain material moisture content within the range of -2% to +1% from the optimum moisture content (modified compaction).

Spraying: Use water spraying equipment to distribute water uniformly in controlled quantities over uniform lane widths.

Dry back: Allow material to dry back to 60% to 80% of the optimum moisture content before applying the seal or wearing course.

Rectification

General: If a section of pavement material fails to meet the required density or moisture content after compaction, remove the non-conforming material, dispose of off-site or rectify for re-use, replace with fresh material, and recompact.

Level corrections

General: Rectify incorrect levels as follows:

- High areas: Grade off.
- Low areas: Remove layers to a minimum depth of 75 mm, lightly tyne and replace with new material and recompact.

3.5 TESTING

Compaction control tests

Standard: To AS 1289.5.4.1 and AS 1289.5.4.2.

Frequency of compaction control tests

General: Not less than the following (whichever requires the most tests):

- 1 test per layer per 100 lineal metres for 2-lane roads.
- 1 test per layer per 2000 m^2 for carparks.
- 3 tests per layer.
- 3 tests per visit.

0274B CONCRETE PAVEMENT

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide finished surfaces as documented and as follows:

- Free draining and evenly graded between level points.
- Even and smooth riding.
- Finish: brush finish with smooth finish to slab edge.

Performance

Conformance: Comply with the local authority in respect of the levels, grades and the minimum details of thickness, reinforcement and concrete strength for pavements within the kerb-and-gutter property boundaries.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following work section(s):

- *General requirements*.
- *Earthwork*.

1.3 STANDARDS

Concrete

Specification and supply: To AS 1379.

Materials and construction: To AS 3600.

1.4 INTERPRETATION

Definitions

General: For the purposes of this work section the definitions given in AS 1348 and the following apply.

- Absolute level tolerance: Maximum deviation from design levels.
- Ambient temperature: The air temperature at the time of mixing and placing of concrete.
- Average ambient temperature: Average value of the maximum and minimum ambient temperatures over the relevant period at a site.
- Concrete class:
  - . Normal: Concrete which is specified primarily by a standard compressive strength grade and otherwise in conformance 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 conformance 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.
- Relative level tolerance: Maximum deviation from a 3 m straightedge laid on the surface.
- Weather:
  - . Cold: Ambient shade temperature less than 10°C.
  - . Hot: Ambient shade temperature greater than 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 or subgrade.
- Concrete formwork, reinforcement and dowels in position.
- Commencement of concrete placing.
- Completion of concrete placing.
- Evaluation of surface finish.

1.6 TOLERANCES

General

Edges abutting gutters: Within ± 5 mm of the level of the actual gutter edge.

Rigid pavement surface:

- Absolute tolerance: + 10 mm, - 0 mm.
- Relative tolerance: ± 5 mm.

Joint locations in plan (rigid pavement): ± 15 mm.

1.7 SUBMISSIONS

Products

Compliance certificate: As an alternative to testing a product, submit the manufacturer's certificate together with the results of recent tests undertaken by the manufacturer, showing compliance with test criteria.

Aggregates: Nominate the source for all aggregates proposed.

Reinforcement: Submit the manufacturer's certificate of compliance with AS/NZS 4671, or submit test certificates from an independent testing authority.

Liquid curing compounds: Submit certified test results, including the application rate and the efficiency index to AS 3799 Appendix B.

Curing by covering: Submit details of the proposed covering material.

Repair materials: Submit proposals for epoxy resin/grout and elastomeric sealant.

Concrete: Submit the concrete supply delivery dockets.

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.

Trial mix design report: Six weeks before commencing production, submit a report for each mix design containing the information required in AS 1012.2, the individual and combined aggregate particle size distribution, and the records and reports for the tests.

2 PRODUCTS

2.1 REINFORCEMENT

Steel reinforcement

Standard: To AS/NZS 4671.

Identification: Supply reinforcement which is readily identifiable as to grade and origin.

Surface condition: Free of loose mill scale, rust, oil, grease, mud or other material which would reduce the bond between the reinforcement and concrete.

Accessories

Bar chairs: Use plastic tipped wire bar chairs.

Tie wire: Galvanized annealed steel 1.25 mm diameter (minimum).

Dowels

General: Provide each dowel in one piece, straight, cut accurately to length with ends square and free from burrs.

Standard: To AS/NZS 4671.

Grade: 250R steel bars 450 mm long.

Tie bars

Type: Deformed bar, 12 mm diameter, grade 500N, 1 m long.

2.2 AGGREGATE

Characteristics

Standards: AS 2758.1.

Quality: Provide at least 40% by mass of the total aggregates in the concrete mix of quartz sand aggregate having a nominal size of less than 5 mm and containing at least 70% quartz by mass.

Durability: All constituent, fraction of constituent or aggregates to conform to AS 1141.22 and the following:

- Wet strength not less than 80 kN.
- 10% Fines Wet/Dry Variation not to exceed 35%.

Recycled concrete aggregate (RCA): Use coarse aggregates from demolition concrete or RCA.

Blending: If blending coarse RCA with natural aggregates ensure substitution rates are below 30%.

Slipform grading requirements: For concrete mixes proposed for slipforming, conform to the Combined aggregate grading table for the combined total aggregates proportion by mass passing the Australian Standard sieves.

Combined aggregate grading table

Australian Standard sieve	**% passing by mass of sample**
19.00 mm	95–100
9.50 mm	55–75
4.75 mm	36–48
2.36 mm	30–42
1.18 mm	22–34
600 µm	16–27
300 µm	5–12
150 µm	0–3
75 µm	0–2

2.3 CEMENT

General

Standard: To AS 3972.

Transport: Cement in watertight packaging and protect from moisture until used. Do not use caked or lumpy cement.

- Age: Less than 6 months old.
- Storage: Store cement bags under cover and above ground.

2.4 FLY ASH

General

Standard: Fine grade fly ash to AS 3582.1.

Fly ash quantity: Nil to 70 kg/m^3.

Minimum binder content (fly ash plus cement): 300 to 330 kg/m^3.

2.5 WATER

General

Standard: Chloride ion to AS 3583.13 and sulphate ion to AS 1289.4.2.1.

Quality: Water used in the production of concrete to be potable, free from materials harmful to concrete or reinforcement, and be neither salty nor brackish.

Limits: Not containing more than:

- 600 parts per million of chloride ion, as determined to AS 3583.13.
- 400 parts per million of sulphate ion, as determined to AS 1289.4.2.1.

2.6 ADMIXTURES

General

Standard: Chemical admixtures to AS 1478.1.

Quality: Provide admixtures free from calcium chloride, calcium formate, or triethanolamine or any other accelerator. Do not use admixtures or combinations of admixtures without prior written approval.

Dosage: Vary the dosage of chemical admixture to account for air temperature and setting time in conformance with the manufacturer's recommendations.

2.7 CURING COMPOUNDS

General

Curing compounds: To AS 3799 and AS 1160, Type 2, white pigmented or containing aluminium reflective pigments.

Covering with sheet materials: To ASTM C171, white opaque or clear polyethylene film, or white burlap-polyethylene sheet, or equivalent material.

2.8 OTHER MATERIALS

Tactile ground surface indicators

Standard: To AS/NZS 1428.4.1.

3 EXECUTION

3.1 SUBGRADE

Preparation

Conformance: Prepare subgrade in conformance with the *Earthwork* work section.

Extent: Prepare a uniform subgrade for the full pavement formation, extending at least to the back of kerbs.

Reinstatement: Ensure uniformity for backfilling of any utility trenches.

3.2 SUBBASE

Width

Subbase width: Extend the subbase at its full depth to at least the back of kerbs or other edge stops before their installation.

No integral kerbs: Extend granular unbound subbase at least 300 mm beyond each side of the carriageway.

Unbound subbase materials and installation: Conform to the *Pavement base and subbase* work section.

Bound subbase materials and installation: Conform to the *Pavement base and subbase* work section.

Tolerance and friction reduction

Tolerance: Subbase finished surface level, + 0 mm to –10 mm.

Friction reduction: Provide 200 µm thick polyethylene sheeting with 200 mm taped minimum laps and/or a 20 mm thick layer of sand (silt and clay material less than 5%) directly beneath the concrete pavement.

3.3 CONCRETE MIX

Standard

Concrete mix and supply: To AS 3600 Section 17 and AS 1379.

Properties

Workability: Slump values to conform with the following:

- Fixed form paving with manual operated vibration: 50 to 60 mm.
- For slip form with no side forms: 30 to 50 mm.
- Drying shrinkage: Maximum 450 με after 21 days of air drying.

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 32°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

Site mixed supply

Emergencies: If mixing by hand is carried out, provide details.

Plant: Mix concrete in a plant located on the construction site.

Pre-mixed supply

Addition of water: Do not add water.

Transport: Make sure that the mode of transport prevents segregation, loss of material and contamination of the environment, and does not adversely affect placing or compaction.

Concrete delivery docket: For each batch, submit a docket listing the information required by AS 1379 clause 1.7.3, and the following information:

- Any binders or additives.
- Method of placement and climate conditions during pour.
- Name of concrete delivery supervisor.
- The concrete element or part of the works for which the concrete was ordered, and where it was placed.

3.4 INSTALLATION

Junctions with existing pavements

Trimming: Where the pavement is to be joined to an existing pavement remove a strip of the existing pavement at least 300 mm wide for its full depth and trim the edge vertically before placing new pavement material.

Existing sealed pavement: Trim the seal to a neat edge.

Fixed formwork

Description:

- Steel forms.
- Seasoned, dressed timber planks, free of warps, bends or kinks, with the full width of their top edges covered with steel angle sections finishing flush with the form face.

Depth: Equal to the edge thickness of the slab and in one piece.

Tolerances on position:

- Absolute level tolerance: ± 5 mm.
- Relative level tolerance: ± 5 mm.
- Horizontal tolerance: ± 10 mm (maximum departure of face from a plane surface).
- Verticality: 3 mm departure from vertical.

Staking: Stake forms in position using at least 3 steel stakes per form, not more than 1.5 m apart. Lock joints between form sections to prevent movement.

Release agent: Before placing reinforcement, apply a release agent compatible with the contact surfaces, to the interior of the formwork, except where the concrete is to receive an applied finish for which there is no compatible release agent. Clean the reinforcement to remove all traces of release agent.

Re-use: Clean and recoat the forms each time before placing concrete.

Keyways: Form the keyways of keyed construction joints using steel form strips accurately located at the mid-depth of the slab and securely fastened flush against the formwork face.

Reinforcement

Tolerances in fabrication and fixing: To AS 3600.

Locate reinforcement: Place reinforcement in the top half of the pavement.

Minimum cover to reinforcement: 30 mm.

Splicing mesh: Overlap a minimum of 2 cross-wires.

Supports: Provide proprietary concrete, metal or plastic supports to reinforcement in the form of chairs, spacers, stools, hangers and ties, as follows:

- To withstand construction and traffic loads and maintain the concrete cover, as documented.
- 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: 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: 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.
- Mats: For bar reinforcement in the form of a mat, secure each bar at alternate intersections.

Cores, fixings and embedded items

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 cover to reinforcement.

3.5 CONCRETE PLACING AND COMPACTION

Concrete placing

General: Place concrete uniformly over the width of the slab or lane and so that the face is generally vertical and normal to the direction of placing. Hand spread concrete using shovels, not rakes.

Remove: Any water ponding on the ground.

Placing sequence: Commence from one corner (usually the lowest point) and proceed continuously out from that point.

Weather: Do not place concrete in temperatures above 30°C or below 10°C without adequate precautions.

Compaction

Thickness 100 mm or less: Compaction through placing screeding and finishing processes. If required use a hand-held vibrating screed at the surface. Do not use immersion vibrators.

Thickness more than 100 mm and downturns: Use an immersion vibrator.

Placing records

General: Keep on site and make available for inspection a log book recording each placement of concrete, including the following:

- Date of concrete placement.
- Delivery dockets noting the specified grade and source of concrete.
- Slump measurements to AS 1012.3.1.
- The portion of work.
- Volume placed.

Rain

General: During placement and before setting, do not expose concrete to rain.

Protection: Protect surface from damage by covering until hardened.

3.6 CONCRETE PRIMARY FINISH

General

Finishing: Do not commence finishing until all bleed water has evaporated from the surface.

Commence: Immediately after placement and spreading and compaction of the plastic concrete, start finishing operations to achieve the documented finish. Refer finishes schedule for colour, specification and location: Appendix C

Veranda, stairs and ramp to have coved concrete finish.

Unformed surfaces

General: Strike off, screed and level slab surfaces to finished levels, to the tolerance class and finish documented in Refer finishes schedule for colour specification and location: Appendix C

Verandas stairs and ramp too have

Formed surfaces

Damage: Do not damage concrete works through premature removal of formwork.

Curing: 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.

3.7 CONCRETE CURING

General

Curing: Commence curing as soon as possible after finishing and extend for a minimum period of 3 days.

End of curing period: Prevent rapid drying out at the end of the curing period.

Protection: Maintain at a reasonably constant temperature with minimum moisture loss, during the curing period.

Curing methods

Covering sheet method: Immediately after finishing operations cover concrete using damp hessian or cotton mats overlapped at least 150 mm and anchored against displacement by wind or other interference. Keep the mats continuously damp until covered by the covering sheet material. Repair tears immediately.

Moist curing method: Immediately after finishing operations and once concrete has set sufficiently to be not damaged by the curing process keep the concrete surface continuously damp by ponding or spraying constantly with water, fog, or mist, using suitable spraying equipment. Continue wetting for the curing period.

Self levelling toppings: To AS 3799, if also used for curing.

Coloured concrete: Do not cure with plastic sheeting, damp sand or wet hessian. Use only chemical curing compounds compatible with the sealer or simply use a sealer (It must then comply with the requirements of a chemical compound sealer).

Curing compound

Application: Provide a uniform continuous flexible coating to AS 3799 without visible breaks or pinholes. Make sure coating remains unbroken at least for the required curing period after application. Respray defective areas within 30 minutes. Respray within 3 hours after heavy rain.

3.8 JOINTS

General

General: Construct expansion, contraction and construction joints straight and plumb. Make transverse joints normal to longitudinal joints. Extend transverse expansion and contraction joints continuously from edge to edge of the pavement through interconnected slabs.

Joint layout: Install joints as documented.

Contraction joints

Installation: Construct transverse and longitudinal contraction joints by early age power sawing or by placing an insert in the fresh concrete.

Construction joints

Installation: Place header board on the subbase or subgrade at right angles to the pavement centre line.

- Planned location: Terminate each day's placing operation at a transverse construction joint located to coincide with a planned contraction or expansion joint.
- Unplanned joints: If placement is interrupted for 30 minutes or longer, form a tied transverse construction joint within the middle third of the distance between planned joints but no closer than 1.5 m to the nearest planned joint. If necessary remove placed concrete back to the required location.

Expansion joints

Expansion joints: Provide formed full depth joints around structures and features which project through, into or against the pavement, and elsewhere as required.

Doweled expansion joints: Cap dowels at one end with a compressible material.

Preparing joints

Stripping time: At least 12 hours.

Clean: Immediately before installation of the sealer make sure that the joint space is dry, clean and free from loose material. Remove laitance, curing compound and protrusions of hardened concrete from the sides and upper edges of the joint.

Joint sealing

Sealant type: Provide silicone sealant in conformance with manufacturer's recommendations.

Backing rod: Compressible closed cell polyethylene foam with a bond breaking surface.

3.9 SURFACE SEALERS

Slip resistance

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

Curing sealer compound: If using the sealer as a curing compound, apply directly after finishing.

Concrete finishes

Conform to: Finishes in the *Concrete – combined* work section.

Surface repairs

Surface repair method: If surface repairs are required, submit proposals.

3.10 COMPLETION

Protection

General: Keep traffic, including construction plant, off the pavement entirely during curing, and thereafter permit access only to necessary construction plant vehicles that conform to the predetermined load limits appropriate to the use of the concrete.

Reinstating adjacent surfaces

General: Reinstate surfaces next to new pavements and associated elements. Where an existing flexible road pavement has been disturbed, trim it back to a straight and undisturbed edge 250 to 300 mm from and parallel to the new concrete for the full depth of the slab. Backfill with asphalt rammed solid, using suitable rammers.

Traffic on pavement

General: Give notice before opening the pavement to traffic before the work is completed. Provide protection.

0301 PILING

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide piling, as documented.

Performance
Requirements: As documented in the **Design loads schedule**.

Design
General: Design piles which, when properly installed, meet performance requirements.

Designer: Durcos Design Pty Ltd Structural & Civil Engineers

1.2 CROSS REFERENCES

General
Requirement: Conform to the following worksection(s):

- *General requirements*.

1.3 STANDARD

General
Standard: To AS 2159.

1.4 INSPECTION

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

- Setting out.
- Piles and piling material after delivery to site and before installation.
- Installation of piling.
- Pile heads after preparation.
- Pile load tests.
- Concrete piles:
  - . Reinforcement cages after assembly and before installation.
  - . Excavated shafts, including casings and sockets before placing reinforcement.
  - . Reinforcement in excavated shafts, before concreting.
  - . Concreting of piles.

1.5 TOLERANCES

General
Requirement: To AS 2159 Section 7 and as documented in the **Tolerances schedule**.

1.6 SUBMISSIONS

Design
Performance: Submit calculations demonstrating that the proposed piling will meet the performance requirements. Submit the sources of geotechnical information and design parameters used in the calculations.

Safety: Submit calculations demonstrating that the piles can be safely installed to the specified levels by the proposed methods, without damaging the piles or adjacent piles or structures.

Splices: Submit details of proposed splices supported by appropriate professional engineer's documentation.

Design depth: Submit details of pre-drilling and lateral support of preformed pile driving to achieve final design set where the toe level is determined by excavation for adjacent structures.

Execution details

Equipment: Submit details of proposed piling methods, equipment and sequence.

Jetting and pre-boring: If jetting or pre-boring methods are proposed in conjunction with pile driving, submit details of the proposed equipment and methods.

Concrete piles: Submit proposal for using high alumina and early strength cements.

Warranty: Submit details of the proposed warranty for the piling.

Submit: Record of data for piles showing information in AS 2159 clause 7.7.

Preservative treated timber piles: Submit treatment records.

Rectification: Submit details of proposed warranty to correct faults and make good damage which is caused by the pile installation or subsequent movement to that part of the superstructure supported on the piling, or to adjacent property, or to both.

Subcontractors

Subcontractor: Submit name and contact details for the proposed subcontractor specialising in foundation engineering.

Tests

Other tests: Submit results, as follows:

- Load tests report.
- Acid sulfate soil test.
- Site geotechnical investigations: Submit all findings including Cone penetration test (CPT), sampling analysis and water table information.

Warranty

Requirement: Submit the following:

General: Provide warranty for the required period.

2 PRODUCTS

2.1 STEEL PILES

Standards

General: To AS 2159 and AS 4100.

Steel tubes: To AS/NZS 1163, AS 1450, AS 1579.

Structural steel: To AS/NZS 1594, AS/NZS 3678, AS/NZS 3679.1 and AS/NZS 3679.2.

Durability

Uncoated steel: To AS 2159 clause 6.5.3.

Coating protection system: To AS/NZS 2312.

Cathodic protection: To AS 2832.2 or AS 2832.3, as appropriate.

3 EXECUTION

3.1 GEOTECHNICAL

General

Site geotechnical investigation: Refer to appendix A

Acid sulfate soil test: To AS 4428.1 for actual and potential acid sulfate levels.

3.2 INSTALLATION

Adjoining property

Damage: If damage is caused to adjoining property, stop piling operations and give notice.

Setting out

Requirement: Peg the position of each pile and establish a grid of recovery pegs to enable the setting out to be checked. Provide survey record of in situ piles.

Inspection

General: Provide facilities necessary for inspection of piling including safe access, lighting and ventilation.

Monitor: Maintain pile integrity during driving. Stop and re-assess hammer type/size/drop if damage is detected.

Piling system

Installation: To AS 2159 Section 7.

Concrete bored piles:

- Loose material: Do not allow loose material to fall down pile holes before or during concreting.
- Liner: Pack well into position.

Pile capacity

Requirements: As documented in the **Pile capacity schedule**.

Overdriven piles

General: If the pile is driven below the specified level, give notice.

Records of data

Ground level: Record the level of the surrounding ground at the time when the pile is installed.

Records: During installation, keep records to conform to AS 2159 clause 7.7.

3.3 TESTING

Load tests

Strength reduction factor: If the basic geotechnical strength reduction factor is not more than 0.4, no load testing is required unless documented for the confirmation of construction methods or integrity testing.

Failure: If a test pile fails to meet the load test requirements, give notice.

Concrete and grout

During installation: Sample and test concrete/grout to AS 1012.

3.4 PREPARING PILE HEADS

General

Requirement: Prepare pile heads for inclusion into the structure.

Defective material: If the pile at or below cut off level, is damaged by driving, or is otherwise unsound, give notice.

Steel piles

Preparation: Clean the surfaces which will be embedded in concrete. Remove temporary protective treatment where appropriate, but maintain intact for at least 75 mm inside encasing concrete.

0311 CONCRETE FORMWORK

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide formwork, as documented.

Design

Formwork: The design of formwork, other than profiled steel sheeting composite formwork, is the contractor's responsibility. Allow for dimensional changes, deflections and cambers resulting from the following:

- Imposed actions.
- Concrete shrinkage and creep.
- Temperature changes.
- The application of prestressing forces (if any).

1.2 CROSS REFERENCES

General

Requirement: Conform to the following work section(s):

- *General requirements*.
- *Concrete finishes*.

1.3 STANDARDS

General

Formwork design and construction: To AS 3610 and AS 3610.1.

Plywood formwork: To AS 6669.

Profiled steel sheeting, including shear connectors: To AS 2327.1.

Reinforced concrete construction: To AS 3600.

1.4 INTERPRETATION

Definitions

General: For the purposes of this work section the following definitions apply:

- Formwork:
  - . Jump formwork: Incrementally moved formwork.
  - . Lost formwork: Sacrificial formwork left in place.
  - . Slip formwork: Continuously slipped or moving formwork.
  - . Table forms: Prefabricated and reusable formwork systems for slabs and beams.

1.5 INSPECTION

Notice

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

- Completed formwork before placing concrete.
- Used formwork, after cleaning and before re-use.

1.6 TOLERANCES

Formwork

Plumb of elements > 8 m high: 1:1000.

Plumb of elements ≤ 8 m high: To AS 3610.1.

Position: Construct formwork so that finished concrete conforms to AS 3600 clause 17.5.2 and as documented in the **Dimensional deviations schedule**.

1.7 SUBMISSIONS

Calculations

Formwork calculations: Submit calculations by a professional engineer experienced in formwork design to show that allowable concrete stresses will not be exceeded and formwork capability will be maintained for the following:

- Proposed formwork procedures or loadings which differ from those documented.
- Props above a floor that do not coincide with the props below.
- Undocumented formwork shoring or stripping procedures or allowable loadings from stacked materials.

Certification

Formwork design certification: For other than profiled steel sheeting composite formwork, submit certification by a professional engineer experienced in formwork design verifying conformance of the design.

Formwork execution certification: Submit certification by a professional 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.

Execution details

Moveable formwork: Provide the following details on the formwork drawings:

- Table, slip and jump forms: Proposed method and sequence of moving the formwork to provide concrete of the documented quality and surface finish.
- Slip forms: The average rate of movement.

Re-shoring: Submit details of any proposed re-shoring.

Surface repair method: Submit details of any proposed surface method before starting repairs.

Materials

Void formers: Use void formers tested under laboratory conditions. Place formers on damp sand and load with a mass of wet concrete at least equal to the mass of the beams or slabs to be supported. Submit certified test results to verify conformance with the following requirements:

- Deflection during placing and compaction of the concrete does not exceed beam or slab span/1000.
- Additional deflection between initial set and 7 days does not exceed span/400.
- Collapse and loss of load carrying capacity occurs not more than 48 hours after flooding with water, creating a void at least 60% of the original depth of the void former.

Shop drawings

Formwork: Submit shop drawings including details of proposed linings, bolt positions, facings, release agents and, where applicable, re-use of formwork.

2 PRODUCTS

2.1 MATERIALS

General

Form linings, facings and release agents: Compatible with finishes applied to concrete.

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

Void formers: Material capable of maintaining rigidity and shape until the concrete has set, capable of withstanding construction loads and non-collapsible on absorption of moisture.

Profiled steel sheeting composite formwork

Material: Hot-dipped zinc-coated sheet steel to AS 1397.

Minimum steel grade: G550.

Accessories: Adopt material and corrosion protection to match the profiled steel sheeting.

Plywood formwork

Material: Plywood sheeting to AS 6669.

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

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

Tolerances: To AS 3610.1 Section 3.

3 EXECUTION

3.1 PREPARATION

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

3.2 CONSTRUCTION

General

Requirement: Conform to the *Concrete finishes* work section.

Bolt hole filling

Removable bolts: Remove tie bolts without damaging the concrete.

Formwork tie bolts left in the concrete: Position more than 50 mm from the finished surface.

Bolt hole filling: Provide material with durability and colour matching the concrete.

Recessed filling: Fill or plug the hole to 6 mm below the finished surface.

Corners

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

Face of bevel: 25 mm.

Embedments

Fixing: 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 panels for placing concrete.

Release agents

Application: Before placing reinforcement, apply a release agent to form linings and facings.

Slip formwork

Provision for inspection: Provide access below the movable formwork, from which surface treatment and inspection may be carried out.

Profiled steel sheeting composite formwork

Fixing: If sheeting cannot be fixed to structural steel supports with puddle welds, or with welded shear studs in composite construction, provide details of proposed fixings.

Steel linings

Rust: Clean off any rust and apply rust inhibiting agent prior to reuse.

Visually important surfaces

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

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

3.3 COMPLETION

Formwork removal

Extent: Remove formwork, other than profiled steel sheeting composite formwork and lost formwork, including formwork in concealed locations.

Timing: Do not disturb formwork until concrete is hardened enough to withstand formwork movements and removal without damage.

Stripping:

- General: To AS 3600 where it is more stringent than AS 3610.1.
- Vertical formwork: To AS 3610.1 Appendix B Table B1.

- Multi-storey work: Remove formwork without disturbing props supporting succeeding floors.
- Post-tensioned concrete: Remove formwork supporting post-tensioned concrete members to AS 3600 clause 17.6.2.7.

0312 CONCRETE REINFORCEMENT

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide concrete reinforcement, as documented.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following work section(s):
- *General requirements*.
- *Concrete in situ*.

1.3 STANDARDS

General
Reinforced concrete construction: To AS 3600.

1.4 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.

1.5 TOLERANCES

General
Fabrication and fixing: To AS 3600 clause 17.2.
Reinforcement position: To AS 3600 clause 17.5.3.

1.6 SUBMISSIONS

Execution details
Reinforcement: Submit the following:
- Genera: Details of any proposed changes to documented reinforcement.
- Damaged galvanizing: Details of proposed repair to AS/NZS 4680 Section 8.
- Mechanical bar splices: Details and test certificates for each size and type of bar to be spliced.
- Provision for concrete placement: Details of spacing or cover to reinforcement that does not conform to AS 3600.
- Splicing: Details of any proposed changes to documented requirements.
- Welding: Details of any proposed welding of reinforcement.

Materials
Reinforcement strength and ductility: Submit type-test reports to verify conformance to AS 3600 Table 3.2.1 for each reinforcement type.

2 PRODUCTS

2.1 MATERIALS

Fibre reinforcement
Standard: To CIA CPN35.

Steel reinforcement
Standard: To AS/NZS 4671:

Surface condition: Free of loose mill scale, rust, oil, grease, mud or other material which would reduce the bond between the reinforcement and concrete.

Protective coating

Standard: To AS 3600 clause 17.2.1.2.

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: Provide a high build, high solids, chemically resistant coating.

- Thickness: 200 µm minimum.

Galvanizing: To AS/NZS 4680, as follows:

- Sequence: If fabricating after galvanizing, repair damaged galvanizing and coat cut ends.
- Zinc-coating (minimum): 600 g/m^2.

Tie wire

General: 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 in the concrete placed first.

Tolerances:

- Alignment: 1:150.
- Location: ± half the diameter of the dowel.

Grade: 250 N.

Cover

Concrete cover generally: To AS 3600 clause 4.10.

Concrete cover for structures for retaining liquids: To AS 3735.

Concrete cover for residential ground slabs and footings: To AS 2870.

Supports

Proprietary concrete, metal or plastic supports: Provide chairs, spacers, stools, hangers and ties, as follows:

- Able to withstand construction and traffic loads.
- With a protective coating if they are ferrous metal, located within the concrete cover zone, or are used with galvanized or zinc-coated reinforcement.
- Spacing:
  - . Bars: ≤ 60 diameters.
  - . Mesh: ≤ 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

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

Tying

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

Beams: Tie stirrups to bars in each corner of each stirrup. Fix other longitudinal bars to stirrups at 1 m maximum intervals.

Bundled bars: Tie bundled bars in closest possible contact. Provide tie wire at least 2.5 mm diameter and spaced not more than 24 times the diameter of the smallest bar in the bundle.

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

0314 CONCRETE IN SITU

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide concrete in situ, as documented and as follows:

- Conforming to the design details and performance criteria.
- Satisfying the quality and inspection requirements.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following work section(s):

- *General requirements*.
- *Concrete formwork*.
- *Concrete reinforcement*.
- *Concrete finishes*.

1.3 STANDARDS

General

Reinforced concrete construction: To AS 3600.

Specification and supply of concrete: AS 1379.

Concrete structures for retaining liquids: To AS 3735.

1.4 INTERPRETATION

General: For the purposes of this work section the following definitions apply:

- Ambient temperature: The air temperature at the time of mixing and placing of concrete.
- Average ambient temperature: Average value of the daily maximum and minimum ambient temperatures over the relevant period at a site.
- Batch: A quantity of concrete containing a fixed quantity of ingredients and produced in a discrete operation.
- Concrete class:
  - . Normal: Concrete which is specified primarily by a standard compressive strength grade and otherwise conforming to 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 conforming to with AS 1379 clause 1.5.4.
- Early age strength: 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.
- Production assessment: An assessment procedure for concrete specified by strength grade, carried out by the supplier on concrete produced by a specific supplying plant and based on the statistical assessment of standard compressive strength tests on concrete.
- Project assessment: An assessment procedure for concrete specified by strength grade, specified at the customer's option, which provides additional test data for the statistical assessment of concrete supplied to a specific project.
- Sample: A portion of the material used in the works, or to take such a sample.
- Specimen: A portion of a sample which is submitted for testing.
- Weather:
  - . Cold: Ambient shade temperature less than 10°C.

. Hot: Ambient shade temperature greater than 30°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 or subgrade.
- Completed formwork and reinforcement, tendons, cores, fixings and embedded items fixed in place.
- Concealed surfaces or elements before covering.
- Commencement of concrete placing.

1.6 SUBMISSIONS

Design

Loading: Submit details of proposed construction systems, loads and procedures, including propping and re-shoring.

Execution details

Concrete: Submit proposals for mixing, placing, finishing and curing concrete including the following:

- Changes to the concrete mix.
- Curing and protection methods.
- Curing period for low-pressure steam curing.
- Cutting or displacing reinforcement, or cutting or coring hardened concrete.
- Handling, placing, compaction and finishing methods and equipment, including pumping.
- Placing under water.
- Sequence and times for concrete placement, and construction joint locations and relocations.
- Site storage, mixing and transport methods and equipment, if applicable.
- Temperature control methods.
- Sequence of concrete placement: Submit details of any proposed sequential placement of slab segments.
- Sawn joints: Submit details of proposed methods, timing and sequence of sawing joints.

Pre-mixed supply delivery dockets: For each batch, submit a docket listing the information required by AS 1379, and the following:

- For special class performance concrete: Documented 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 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.

Materials

Product conformity: Submit current assessments of conformity, as appropriate, as follows:

- Certificate of conformity by a JAS-ANZ accredited third party.
- Report by a NATA accredited laboratory describing tests and giving results which demonstrate that the product conforms.

Concrete mixes: Submit details, for each grade and type of concrete including any proposed use of special-purpose cement types.

Curing compounds: Submit details of any proposed liquid membrane-forming curing compound, including the following:

- 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.

Admixtures: Submit details of any proposed admixtures, including the following:

- Brand name.
- Place of manufacture.
- Basic chemical composition.

Samples

Coloured concrete: Submit sample blocks of coloured concrete produced using the proposed mix and method before casting final concrete as follows:

- Number: 4.
- Size (nominal): 300 x 300 x 50 mm.

Shop drawings

Cores, fixings and embedded items: Submit the proposed locations, clearances and cover and show any proposed repositioning of reinforcement.

Subcontractors

Pre-mixed supply: 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.

Tests

Other tests: Submit results, as follows:

- Concrete compressive strength test results to AS 1012.9.
- Other concrete properties. Test results as documented in the **Tests schedule**.

2 PRODUCTS

2.1 MATERIALS

External Wall substrate:

Dincel 110mm / 200mm RC wall system as documented to manufacturers recommendations.

Internal Partitions:

Dincel 110mm RC wall system as documented to manufacturers recommendations.

General

Stockpile: If uniform, consistent colour is documented, stockpile sand, cement and aggregates.

Aggregates

Standard: To AS 2758.1.

Cement

Standard: To AS 3972.

Age: Less than 6 months old.

Storage: Store cement bags under cover and above ground.

Water

Standard: To AS 1379 clause 2.4.

Requirement: Clean, free from oil, acid, alkali, organic or vegetable matter and including not more than 500 mg/l of chloride ions.

Polymeric film underlay

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

Chemical admixtures

Standard: To AS 1478.1.

Contents: Free of chlorides, fluorides and nitrates.

Curing compounds

Standard: To AS 3799.

2.2 CONCRETE

Properties

Concrete mix and supply: Conform to the following:

- Normal-class: To AS 1379 clause 1.5.3.
- Special-class: To AS 1379 clause 1.5.4.

Coloured concrete

Standard: To AS 3610.1.

2.3 TESTING

General

Test authority: Concrete supplier or NATA registered laboratory.

Reports and records of test results: To the relevant parts of the AS 1012 series. Keep results on site.

Assessment process of test results

Standard: To AS 1379.

Method of assessment: Project assessment.

Sampling

Method of sampling: AS 1012.1.

Sampling locations: To AS 1012.1 and the following:

- Slump tests: On site, at the point of discharge from the agitator.
- Compressive strength tests: Spread the site sampling evenly throughout the pour.

Frequency of sampling: To AS 1379 Sections 5 and 6 and the following:

- Slump tests: Take at least one sample from each batch.
- Compressive strength tests: To the **Project assessment strength grade sampling table**.

Project assessment strength grade sampling table

Number of batches for each type and grade of concrete per day	Minimum number of samples Columns and load bearing wall elements (per batch)	Minimum number of samples Other elements (per day)
1	1	1
2-5	1	2
6-10	1	3
11-20	1	4
each additional 10	1	1 additional

Making and curing of specimens

General: To AS 1012.8.1 and AS 1012.8.2.

Specimen size:

- Aggregate size ≤ 20 mm: Nominally 200 x 100 mm diameter.
- Aggregate size > 20 mm: Nominally 300 x 150 mm diameter.

Test methods

General: To the relevant parts of the AS 1012 series.

Acceptance criteria:

- General: As documented in the **Concrete properties schedule – performance**.
- Early age compressive strength: As documented in the **Control tests schedule**.

Slump tests: Assess slump for every batch. Perform slump test on each strength sample.

Drying shrinkage at 56 days: To AS 1012.13.

Other concrete properties tests: As documented in the **Tests schedule**.

Embedded pressure pipes

General: Complete leak tests before embedding pipes.

Liquid retaining structures

Testing for liquid tightness: To AS 3735.

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.

Base preparation

General: Conforming to base type, as follows:

- Concrete working base: Remove projections above the plane surface, and loose material.
- Graded prepared subgrade: Blind with sand to create a smooth surface free from hard projections. Lightly wet the sand just before laying the underlay.

Installation

Standard: To AS 2870 clause 5.3.3.

General: Lay underlay over the base as follows:

- 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.
- Continue up vertical faces past the damp-proof course where applicable, and tape fix at the top.
- Patch or seal punctures or tears before placing concrete.
- Cut back as required after concrete has gained strength and formwork has been removed.

3.2 CONCRETE

General

Performance properties: As documented in the **Concrete properties schedule – performance**.

Elapsed delivery time

General: Make sure the elapsed time between the wetting of the mix and the discharge of the mix at the site conforms to the **Elapsed delivery time table**. Do not discharge at ambient temperature below 10°C or above 30°C unless approved heating or cooling measures are taken to deliver concrete within the range 5°C to 35°C.

Elapsed delivery time table

Concrete temperature at time of discharge (°C)	Maximum elapsed time (minutes)
10 – 24	120
24 – 27	90
27 – 30	60
30 – 32	45

Pre-mixed supply

Addition of water: To AS 1379 clause 4.2.3.

Transport method: Prevent segregation, loss of material and contamination of the environment, and do not adversely affect placing or compaction.

Site mixed supply

Emergencies: If mixing by hand, provide details.

Plant: Mix concrete in plant located on the construction site.

3.3 CORES, FIXINGS AND EMBEDDED ITEMS

Adjoining elements

Fixings: Provide fixings for adjoining elements. If required, provide temporary support to the adjoining elements during concreting, to prevent movement.

Protection

General: Grease threads. Protect embedded items against damage.

Compatibility: Provide inserts, fixings and embedded items that are compatible with each other, with the reinforcement and with the documented concrete mix and the documented surface finish.

Corrosion: In external or exposed locations, galvanize anchor bolts and embedded fixings or submit proposed alternate materials.

Structural integrity

Position: Fix cores and embedded items to prevent movement during concrete placing. In locating cores, fixings and embedded items, displace but do not cut reinforcement, and maintain cover to reinforcement.

Isolation: Isolate embedded items to prevent water tracking 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 CONCRETE WORKING BASE

Finish

Membrane support: Wood float finish or equivalent.

Installation

General: Lay over the base or subgrade and screed to the required level.

Surface tolerance

Deviation: Flatness tolerance Class B.

3.5 PLACING AND COMPACTION

Placing

Horizontal transport: Use suitable conveyors, clean chutes, troughs, hoppers or pipes.

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

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

Compaction

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

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

Placing records

Log book: 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

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

Time between adjacent placements

Minimum time delay: As documented in the **Minimum time delay schedule.**

Vertical elements

Placement: Limit the free fall of concrete to maximum of 2000 mm.

Placing in cold weather

Cement: Do not use high alumina cement.

Placing concrete: Maintain temperature of the freshly mixed concrete at 5°C or more.

Formwork and reinforcement: Before and during placing maintain temperature at 5°C or more.

Severe weather: If severe weather conditions are predicted, use high early strength cement.

Temperature control: Heat the concrete materials, other than cement, to the minimum temperature necessary so that the temperature of the placed concrete is within the documented limits.

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 formwork, materials, and equipment coming in contact with the concrete.

Maximum temperature of water: 60°C when placed in the mixer.

Freezing: Prevent concrete from freezing.

Placing in hot weather

Handling: Prevent premature stiffening of the fresh mix and reduce water absorption and evaporation losses. Mix, transport, place and compact the concrete conforming to the **Elapsed delivery time table**.

Placing concrete: Maintain the temperature of the freshly mixed concrete conforming to the **Hot weather placing table**.

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

Formwork and reinforcement: Before and during placing, maintain temperature at 35°C or less.

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

- Cool the concrete using liquid nitrogen injection before placing.
- Cover horizontal transport containers.
- Spray the coarse aggregate using cold water before 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 or more in all dimensions except for concrete of strength 40 MPa or more, in sections exceeding 600 mm in thickness	27°C

Placing under water

General: Do not place under water unless conditions prevent dewatering.

Minimum cement content for the mix: Increase by 25%.

3.6 CURING

General

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

- Curing: Cure continuously from completion of finishing 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, conforms to 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.

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, conform to AS 3799.

Visually important surfaces: Apply curing compounds to produce uniform colour on adjacent surfaces.

Cold weather curing

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

Hot weather curing

Curing compounds: If curing compounds are proposed, provide details.

Protection: Select a protection method from the following:

- If the concrete temperature is more than 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 more than 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

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

3.7 JOINTS

Construction joints

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

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.

Expansion joints

Joint filling: Fill with jointing materials as documented. 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: Provide jointing materials compatible with each other, 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.

Foamed materials (in compressible fillers): Closed-cell or impregnated, not water absorbing.

Slip joints

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

3.8 COMPLETION

Protection

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

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

0315 CONCRETE FINISHES

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide finishes to formed and unformed concrete surfaces, as documented and as follows:

- Compatible with documented finishes. Refer finishes schedule for colour specification and location: Appendix C

1.2 CROSS REFERENCES

General

Requirement: Conform to the following work section(s):

- *General requirements*.

1.3 STANDARDS

General

Formed surfaces: To AS 3610.1.

1.4 INTERPRETATION

Definitions

General: For the purposes of this work section 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 off-form finishes.
- Evaluation of surface finish.

1.6 TOLERANCES

Formed surfaces

Quality of the surface finish: To AS 3610.1 Table 3.3.2.

Unformed surfaces

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

Flatness tolerance class table

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

1.7 SUBMISSIONS

Prototypes

Test panels: Provide test panels to AS 3610.1 and as documented in the **Test panels schedule**.

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 evaluation of completed work.

Surface treatment: Do not proceed with the related work until the acceptable range of surface treatments has been determined.

Tests

Slip resistance: Submit test results, as follows:

- Site slip resistance test of completed installation to AS 4663.

2 PRODUCTS

2.1 MATERIALS

Surface hardeners, sealants and protectors

Supply: If documented, provide proprietary products to the manufacturer's recommendations.

Slip resistance treatment

Slip resistance classification: To AS 4586.

3 EXECUTION

3.1 SURFACE MODIFIERS

General

Application: Apply to clean surfaces to the manufacturer's recommendations.

3.2 FORMED SURFACES

General

Surface finish: Provide formed concrete finishes as documented in the Finishes Schedule for colour specification and location: Appendix C

Damage: Do not damage concrete works through premature removal of formwork.

Curing

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

Evaluation of formed surfaces

General: If evaluation of formed surface tolerance or colour is required, complete the evaluation before surface treatment.

Surface repairs

Method: If surface repairs are required, submit proposals.

Finishing methods

Details: If soffits of concrete elements or faces of concrete columns are to have a finish other than an off-form finish, provide finishes as documented.

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 formwork while the concrete is green. Wet the surface and scrub with stiff fibre or wire brushes, flushing continuously with clean water, until the aggregate is uniformly exposed. Do not use acid etching. Rinse the surface with water.

Floated finishes:

- Sand floated finish: Remove the vertical face formwork 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 vertical face formwork 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 formwork 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.

3.3 UNFORMED SURFACES

General

Surface finish: Refer finishes schedule for colour specification and location: Appendix C

Finished levels: Strike off, screed and level slab surfaces to finished levels and to the flatness tolerance class documented.

Surface repairs

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 re-float 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 hand steel trowels to produce a smooth surface relatively free from defects.
- When the surface has hardened sufficiently, re-trowel 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 finish, uniform in texture and appearance, and free of trowel marks and defects.

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

Broom finish: After machine floating and steel trowelling use a broom or hessian belt drawn across the surface to produce a coarse even-textured transverse-scored surface.

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

Sponge finish: After machine floating and steel trowelling, use a damp sponge to wipe the surface to produce an even textured sand finish.

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

Finishing methods – supplementary finish

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

Coloured applied finish: After machine floating, apply a proprietary liquid or dry shake material to the manufacturer’s recommendations and trowel to achieve the required appearance.

Stamped and coloured faux paved or cobblestone finish: Provide a proprietary finishing system.

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

0331B BRICK AND BLOCK CONSTRUCTION

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide brick construction, as documented.

Materials
Manufacturer: Boral Australia
Range: Smooth Face Clay Brick
Colour: Red and Brown – as per DA approval.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following work section(s):
- *General requirements*.

1.3 STANDARDS

General
Materials and construction: To AS 3700.

1.4 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of the following:
- Set out.
- 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.

1.5 TOLERANCES

General
Requirement: To AS 3700 Table 12.1.

2 PRODUCTS

2.1 DURABILITY

General
Exposure locations: To AS 3700 clause 5.4.

2.2 MATERIALS

Brick and block units
Manufacturers: Austral Bricks or similar approved

Range: Common Bricks (rendered finish) Refer finishes schedule for colour specification and location: Appendix C

Colour: not specified

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

Salt attack resistance grade: To AS 3700 Table 5.1.

Minimum age of clay bricks: 7 days.

Mortar materials

Mortar class: To AS 3700 Table 5.1.

Cement: To AS 3972.

White cement: With ≤ 1% iron salts content.

Lime: To AS 1672.1.

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

Water: Clean and free from any deleterious matter.

Admixtures: To AS 3700 clause 11.4.2.4.

Pigment: To BS EN 12878, and as follows:

- Integral pigment mix proportion: ≤ 10% by weight of cement.

Mix proportions: As documented in the **Masonry cement mortar mix proportions table** and **Cement (GP/GB) mortar mix proportions table**.

Masonry cement mortar mix proportions table (cement:lime:sand), by volume

Mortar class to AS 3700	Clay	Concrete	Calcium silicate	Water thickener
M3	1:0:4	1:0:4	n/a	Yes
M4	1:0:3	n/a	n/a	Yes

Cement (GP/GB) mortar mix proportions table (cement: lime:sand), by volume

Mortar class to AS 3700	Clay	Concrete	Calcium silicate	Water thickener
M2	1:2:9	n/a	n/a	No
M3	1:1:6	1:1:6	n/a	Optional
M3	1:0:5	1:0:5	1:0:5	Yes
M4	1:0.5:4.5	1:0.5:4.5	n/a	Optional
M4	1:0:4	1:0:4	1:0:4	Yes
M4	1:0-0.25:3	1:0-0.25:3	n/a	Optional

Grout

Standard: To AS 3700 clause 11.7.

Minimum characteristic compressive strength: 12 MPa.

2.3 BUILT-IN COMPONENTS

General

Durability class of built-in components: To AS 3700 Table 5.1.

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.

Reinforcement

Standard: To AS/NZS 4671.

Corrosion protection: To AS 3700 clause 5.9.

Minimum cover: To AS 3700 Table 5.1.

Wall ties

Standard: To AS/NZS 2699.1.

Corrosion protection: To AS/NZS 2699.1.

Strength classification:

- Cavities > 60 mm and < 200 mm wide: Heavy duty.

Connectors and accessories

Standard: To AS/NZS 2699.2.

Corrosion protection: To AS/NZS 2699.2.

Flashings and damp-proof courses

Standard: To AS/NZS 2904.

Slip joints

Standard: To AS 3700 clause 4.13.

3 EXECUTION

3.1 GENERAL

Mortar mixing

General: Measure volumes accurately to the documented 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 masonry units, 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: To 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: Provide a control joint where joining to existing structures. Do not tooth new masonry into existing work unless approved by a professional engineer.

Mortar joints

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

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

Finish: Conform to the following:

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

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

Monolithic structural action
Header units: Except in stretcher bond facework, provide brick and block header units, to AS 3700 clause 4.11.2.

Spacing: 600 mm maximum.

Location: Provide header units in the following locations:

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

Rods
Set out: Construct masonry to the following rods:

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

Protection
General: Cover the top surface of brickwork and blockwork to prevent the entry of rainwater and contaminants.

Single leaf and solid walls: Moisture protection to AS 3700 clause 4.7.4.

Temporary support
General: If the final stability of the masonry is dependent on construction of (structural) elements after the brickwork and blockwork is completed, provide proposals for temporary support or bracing.

3.2 CAVITY WORK

Cavity clearance
General: Keep cavities clear at all times.

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

Cavity width
General: Provide minimum cavity widths in conformance with the following:

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

Openings
Care: Do not close the cavity at the jambs of external openings.

Wall ties connectors and accessories
Protection: Install to prevent water passing across the cavity.

3.3 DAMP-PROOF COURSES

Location
General: Provide damp-proof courses as follows:

- Timber floors: In the first course below the level of the underside of ground floor timbers in internal walls and inner leaves of cavity walls.
- Cavity walls built off slabs on ground: In the bottom course of the outer leaf, continuous horizontally across the cavity and up the inner face bedded in mortar, turned 30 mm into the inner leaf 1 course above.
- Masonry veneer construction: In the bottom course of the outer leaf, continuous horizontally across the cavity. Fasten to the inner frame 75 mm above floor level.

- Walls adjoining infill floor slabs on membranes: In the course above the underside of the slab in internal walls and inner leaves of cavity walls. Project 40 mm and dress down over the membrane turned up against the wall.

Height: Not less than:

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

Installation

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

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

Lap sealing: Seal with a bituminous adhesive and sealing compound.

3.4 FLASHINGS

Location

General: Provide flashings as follows:

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

Installation

General: Sandwich flashings between mortar except where on lintels or shelf angles. Bed flashings, sills and copings in one operation to maximise adhesion.

Laps: If required, lap full width at angles and intersections and at least 150 mm at joints. Step as necessary, but not exceeding 2 courses per step for brickwork and 1 course per step for blockwork.

Lap sealing: Seal with a bituminous adhesive and sealing compound.

Pointing: Point up joints around flashings, filling voids.

Weepholes

Location: Provide weepholes to external leaves of cavity walls in the course immediately above flashings, and cavity fill, and at the bottoms of unfilled cavities.

Form: Open perpends.

Maximum spacing: 1200 mm.

3.5 WALL TIES

Location

General: Space wall ties in conformance with AS 3700 clause 4.10 or AS 4773.2, as appropriate, and at the following locations:

- Not more than 600 mm in each direction.
- Adjacent to vertical lateral supports.

- Adjacent to control joints.
- Around openings.

Installation

Fixing of masonry veneer ties:

- To timber frames: Screw fix to outer face of timber frames with fixings to AS 3566.1.
- To concrete: Masonry anchors.
- To steel frames: Screw fix to outer face of steel studs with fixings to AS 3566.1.

3.6 CONTROL JOINTS

General

Location and spacing: Provide contraction joints, expansion joints or articulation joints to AS 3700 clause 4.8.

Control joint filling

Filler material: Provide compatible sealant and bond breaking backing materials which are non-staining to brickwork and blockwork. Do not use bituminous materials with absorbent masonry units.

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

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

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

Fire rated control joints

General: If a control joint occurs in an element of construction required to have a fire resistance rating, construct the control joint with fire stopping materials which maintain the fire resistance rating of the element.

Fire stopping: To AS 4072.1.

3.7 BRICKWORK AND BLOCKWORK 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.

3.8 BRICKWORK 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. 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.

3.9 REINFORCED AND GROUTED BLOCKWORK

Cleaning core holes

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

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

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

Grouting

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

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

Compaction: Compact by vibration or by rodding.

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

3.10 LINTELS

Location

General: Provide 1 lintel to each wall leaf as documented in 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: To structural drawings.

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

- Minimum propping period: 7 days.

3.11 CONNECTORS AND ACCESSORIES

Slip joints

General: Provide slip joints to top of all unreinforced masonry walls supporting concrete slabs and other concrete elements.

Protection: Keep the slip joints in place and protect from displacement.

Flexible masonry ties

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

Locations and details: To structural drawings.

0341 STRUCTURAL STEEL

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide structural steelwork, as documented and provide for the fixing of adjoining building elements that are to be connected to or supported on the structural steel.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following worksection(s):
- *General requirements*.
- *Steel – hot-dip galvanized coatings*.
- *Steel – protective paint coatings*.
- *Structural fire protection systems*.

1.3 STANDARDS

General
Materials, construction, fabrication and erection: To AS 4100.
Cold-formed steel: To AS/NZS 4600.

1.4 INTERPRETATION

Abbreviations
AESS: Architecturally Exposed Structural Steel.
ILAC: International Laboratory Accreditation Cooperation.

1.5 INSPECTION

Notice – off site
Inspection: Give notice so that inspection may be made of the following:
- Materials including welding consumables before fabrication.
- Submission of the proposed welding procedure to prevent distortion and non-ductile welds in tension zones.
- Testing of welding procedures and welder qualification tests.
- Commencement of shop fabrication.
- Commencement of welding.
- Before placement of root runs of complete penetration butt welds.
- Completion of fabrication before surface preparation.
- Surface preparation before shop painting.
- Completion of protective coating before delivery to site.

Notice – on site
Inspection: Give notice so that inspection may be made of the following:
- Steelwork on site before erection.
- 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 before any encasement.
- Completed grouting, encasement, fire protection or site painting.

1.6 SUBMISSIONS

Anchors

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.

Bolts

Compliance: Submit a manufacturer's compliance/test certificate from an ILAC accredited testing organisation confirming conformance with AS/NZS 1252.

Independent certification: Provide a local NATA-accredited laboratory independent compliance certificate based on appropriate testing and verification.

Execution

Anchor bolts: If anchor bolts do not meet specified location tolerances, submit proposals that will allow steel erection to proceed.

Splicing: If splicing of structural members is intended, submit proposals.

Welding procedures: Submit details of proposed welding procedures, using the WPS form in Appendix C of AS/NZS 1554.1.

Identification marks: If members and/or connections are to be exposed to view submit details of proposed marking.

Distortions: Submit proposals for preventing or minimising distortion of galvanized components, welded components or welded and galvanized components; and proposals for restoration to design shape.

Record drawings

General: Supply as-built structural and shop drawings.

Samples

AESS: Submit samples of AESS as documented in the **AESS schedule**.

Special finishes: Submit samples of finished steel as documented in the **Special finishes schedule**.

Minimum sample sizes: 0.1 m^2.

Shop drawings

General: Submit shop drawings showing the following information:

- Relevant details of each assembly, component and connection.
- Information relative to fabrication, surface treatment, transport and erection.

Specific requirements: Include the following information:

- Marking plans.
- Identification.
- Steel type and grade.
- Dimensions of items.
- Required camber, where applicable.
- Fabrication methods including, where applicable, hot or cold forming and post weld heat treatment.
- Location, type and size of welds and/or bolts and bolt holes.
- Weld categories and bolting categories.
- Orientation of members.
- Surface preparation methods and coating system if shop applied.
- Best practice details in relation to application of protective coatings.
- Breather holes for hollow sections (with seal plates) being hot-dip galvanized.
- Procedures necessary for shop and site assembly, and erection.
- 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, and the procedure for final removal.
- Required fixings for adjoining building elements.

Substitution: If alternative sections or connections are proposed, provide details.

Purlins and girts: If it is proposed to support anything other than cladding on or from purlins and girts, provide details.

Splices: If variations to documented splice locations or additional splices are proposed, submit details.

Subcontractors

General: Submit names and contact details of proposed fabricator and installer.

Tests

Steel properties: Submit evidence that the steel used in the work conforms to the cited material standards.

Bars and sections: Submit results of all non-destructive tests.

Plates: Submit results of all ultrasonic tests.

Welds: Submit results of all non-destructive examinations.

2 PRODUCTS

2.1 STEEL TYPE AND GRADE

Material

Steel members and sections: Conform to the **Steel grade (minimum) table** and as documented in the **Steel grade (minimum) schedule**.

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/NZS 1163: Circular sections less than 165 mm nominal outside diameter	C250
Hollow sections to AS/NZS 1163: Sections other than the above	C350
Cold formed purlins and girts to AS 1397	G450 Z350 or Z450

Steel certification

Acceptable evidence: Certified mill test reports, or test certificates issued by the mill in conformance with AS/NZS 1163 clause 13.2.2 for cold formed hollow sections, AS/NZS 3679.1 clause 11.2.2 for hot rolled bars or sections or AS/NZS 3679.2 clause 10.2.3 for welded I sections.

Alternative: Have the steel tested by an independent NATA or ILAC accredited testing authority for compliance with the chemical composition and mechanical test requirements of the cited material standard.

Testing

Requirement: As documented in the **Non-destructive testing of bars and sections schedule**.

Ultrasonic testing of plates

Quality level to AS 1710

2.2 BOLTS

Bolts, nuts and washers

Finish: Hot-dip galvanized, corrosion-free, and in serviceable condition.

3 EXECUTION

3.1 FABRICATION AND ERECTION

General

Care: Shop detail and fabricate members so that they can be properly erected.

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 correcting distorted members, conform to the submitted procedures and avoid damage.

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 in conformance with the marking plans.

High strength bolting: If the work includes more than one bolting category, mark high-strength structural bolted connections with a 75 mm wide flash of colour, clear of holes.

Cold formed members: Clearly mark material thickness.

Monorail beams: Identify and mark rated capacity in conformance with AS 1418.18 clause 5.12.6.

Tolerances

Measurement: Check tolerances by measurement after fabrication and application of corrosion protection.

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: Submit proposals for weld type and electrodes.

Non-destructive weld examination

Standard: To AS/NZS 1554.1.

Methods: Conform to the **Non-destructive weld examination (NDE) table**.

Radiographic and ultrasonic examination: By an independent testing authority.

Repairs: Repair welds revealed as faulty by non-destructive examination and repeat the examination.

Non-destructive weld examination (NDE) table

Type of weld and category	Examination method	Extent (% of total length of weld type)
Shop fillet welds	Visual means	100
Site fillet welds	Visual means	100
Butt welds, GP	Visual means	100
Butt welds, SP	Visual means	100
Fillet and butt welds, SP	Radiographic or ultrasonic examination	10

3.3 BOLTING

General

Standards: To AS 1110.1, AS 1111.1 and AS/NZS 1252.

Bolting category
General: As documented in the **Bolting category schedule**.

Connections
Connection type: For connections not documented, submit proposals.

Bolting category 8.8/TF contact surfaces: Clean, as rolled and free from applied finishes.

Anchor bolts
General: Provide each anchor 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.

Galvanizing: Galvanize all components.

Hexagonal bolts: To AS 1111.1.

Hexagonal nuts: To AS 1112.3.

Plain washers: To AS 1237.1.

Set out: Set out bolt groups using templates and subject to survey check.

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.

Permanent bolting
Completion: Bolt only when correct alignment and preset or camber has been achieved.

3.4 ARCHITECTURALLY EXPOSED STRUCTURAL STEEL

General
Requirement: Provide AESS as documented in the **AESS schedule**.

Standard: Conform to the requirements of *ASI/SCNZ AESS E - AESS Sample specification*.

Fabrication
Requirement: Conform to the requirements of *ASI AESS F - AESS Code of practice*.

Welds: Make intermittent welds appear continuous, either with additional welding, caulking or filler.

Corners and edges: Grind fair those corners and edges, which are sharp, marred, or roughened.

Rough surfaces: Deburr and ground smooth.

3.5 SURFACE PREPARATION AND TREATMENT

General
General: Conform to the *Steel – protective paint coatings* and/or *Steel – hot-dip galvanized coatings* work sections as appropriate.

AESS surface preparation: Class 2 blast and to the requirements of *ASI AESS F - AESS Code of practice.*

3.6 SPECIAL FINISHES

General
General: Apply special finishes as documented in the **Special finishes schedule**.

3.7 METAL SPRAYING

General
General: Apply sprayed metal finishes as documented in the **Metal spray schedule**.

3.8 FIRE PROTECTION COATINGS

General
General: Apply fire protection to structural steelwork in conformance with the *Structural fire protection systems* work section.

3.9 ERECTION

General
Standard: To AS 3828.

Execution: Make sure that every part of the structure has sufficient design capacity and is stable under construction loads produced by the construction procedure or as a result of construction loads, which are applied.

Calculations: If required to justify the adequacy of the structure to sustain any loads and/or procedures, which may be imposed, provide calculations.

Temporary work

General: Provide all necessary temporary bracing or propping.

Temporary connections: If required cleats are not shown on shop drawings, submit details.

Temporary members: If temporary members are required, fix so as not to weaken or deface permanent steelwork.

Hand cutting

General: If hand cutting of bolt holes appears to be necessary, submit a report and proposed alternative options.

Cold-formed purlins

Trimming members: Provide to support edges of roof sheeting along hips, valleys and roof penetrations.

Movements

General: Allow for thermal movements during erection.

Site welds

Completion: Weld only when correct alignment and preset or camber have been achieved.

Overhead welding: If overhead welding is required, submit proposals.

Anchor bolts

General: For each group of anchor 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 or masonry, set steelwork on packing or wedges.

- Permanent packing or wedges: Form with solid steel or grout of similar strength to the permanent grout.
- Temporary packing or wedges: Remove before completion of grouting.

Timing: Grout at supports before the construction of any supported floors, walls, roofing, wall cladding or precast.

Temperature: Do not grout if the temperature of the base plate or the footing surface exceeds 35°C.

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.

Drifting

Limitation: Use drifting only to bring members into position, without enlarging holes or distorting components.

3.10 REPAIRS

General

General: Repair finishes to restore the full integrity of each phase and each coating.

3.11 COMPLETION

Tolerances

Conformance: After erection is complete confirm conformance with AS 4100 clause 15.3.

Temporary connections

General: Remove temporary cleats on completion and restore the surface.

0342 LIGHT STEEL FRAMING

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide light steel floor, wall, roof and truss framing, as documented and as follows:

- Suitable for having flooring, linings, cladding and roofing fixed to it.
- In conformance with the documented performance criteria.
- Independently designed and documented.
- Independently certified by a professional engineer for the design and the erected framing.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following work section(s):

- *General requirements*.

1.3 STANDARDS

General

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

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

1.4 INTERPRETATION

Definitions

General: For the purposes of this work section the definitions given in NASH-1 Standard apply.

1.5 INSPECTION

Notice

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

- Steel framing erected on site before lining or cladding.

1.6 TOLERANCES

General

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

1.7 SUBMISSIONS

Design

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

Reactions: Submit the location and magnitude of reactions that are 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 drawings, to a scale that best describes the detail, 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 documented configurations and loadings.

Roof trusses: Submit drawings to show:

- Plan: Truss layout.
- Elevations: Arrangement of members, allowing for the accommodation of in-roof services, and the size and section type of each member.
- Method of assembly and connection details.

- Holding down and bracing: Details demonstrating capability to resist lateral and uplift forces.

Wall frames: If pre-fabricated wall framing is used, submit drawings to show:

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

2 PRODUCTS

2.1 GENERAL

Storage and handling

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

2.2 COMPONENTS

Cold-formed steel framing

General: Cold-form sections from steel, metallic-coated to AS 1397.

Corrosion protection: To BCA 3.4.2.2.

Framing members

Cold-formed steel framing: For proprietary systems, comply with NASH-1.

3 EXECUTION

3.1 GENERAL

Fabrication

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

Service holes: Form holes by drilling or punching.

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

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

Fastening

Type: Select from the following:

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

Welding

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

Prefabricated frames

General: Protect frames from damage or distortion during erection.

Metal separation

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

Unseasoned or CCA treated timber

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

Earthing

Permanent earthing: Required.

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

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

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

3.2 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.

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

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

3.3 ROOF TRIM

Fascia, valley gutter and barge boards
Requirement: Supply and fix fascia, valley gutter and barge boards in conformance with the manufacturer's requirements. Refer Attach

3.4 COMPLETION

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

0344B STEEL – HOT-DIP GALVANIZED COATINGS

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide hot-dip galvanized coatings, as documented and as follows:

- Controls atmospheric corrosion to structural steelwork or steel products in the time to first maintenance.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following work section(s):

- *General requirements*.

1.3 STANDARDS

General

Coating: To AS/NZS 4680.

Coating on fasteners: To AS 1214.

Durability: To AS 2309 and AS/NZS 2312.

Metal finishing

Steel preparation methods: To AS 1627 series.

Coating mass/thickness minimum: To AS/NZS 4680.

Threaded fasteners coating mass/thickness minimum: To AS 1214 Table 2.

1.4 SUBMISSIONS

Execution details

Holes and lifting lugs: If holes and lifting lugs are required to facilitate handling, filling, venting and draining during galvanizing, submit details on size and location.

Detailing features: If design and fabrication features of the items to be galvanized leads 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 items to be galvanized are likely to lead to dimensional change or distortion, identify these and submit proposals for its minimisation.

Embrittlement: Take due care to avoid embrittlement of susceptible steels.

Mechanical properties: Avoid mechanical damage. Make sure 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.

- Inhibitor: Required.

Post treatment

General: Passivate.

Drilling after completion of hot-dip galvanizing

Repair: Prime drill hole surfaces to AS/NZS 4680 clause 8 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
Standard: To AS/NZS 4680 clause 7.

Coating quality: 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 coated contact surfaces to achieve the required design slip factor, without removing excessive coating thickness.

- Contact surface preparation: To GAA After-fabrication hot dip galvanizing Chapter 4.

Slip factor test: To AS 4100 Appendix J.

Surplus zinc on fastener threads: Remove.

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 paint finishes
Coarse preparation: Remove spikes, and make sure edges are free from lumps and runs.

Light sweep blasting before painting: Required.

- Maximum zinc removal: 10 µm.
- Abrasive grade (range): 150 – 180 µm.
- Abrasive type - clean ilmenite or garnet.
- Blasting angle to surface: 45° maximum.
- 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 to AS/NZS 4680 clause 8.

Site coating reinstatement
Rejection: If any item has damaged areas exceeding the limits specified for repair in AS/NZS 4680 clause 8.1, reject the object.

Extent: Areas damaged by transport, site welding, site flame cutting, site handling, or erection.

Method: To AS/NZS 4680 clause 8.

0345B STEEL – PROTECTIVE PAINT COATINGS

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide protective paint coatings for the protection of mild steel products and structural steel against interior and exterior atmospheric corrosion, as documented.

Dulux Protective Coatings system

Refer finishes schedule for colour specification and location: Appendix C

Performance

Requirement: Control corrosion to structural steelwork and mild steel products until the first scheduled maintenance.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following work section(s):

- *General requirements*.

1.3 STANDARDS

General

Surface preparation and coating: To the recommendations of AS/NZS 2312.

1.4 INTERPRETATION

Abbreviations

General: For the purposes of this work section the following abbreviations apply:

- DFT: Dry Film Thickness.
- ITP: Inspection and Test Plan.
- MIO: Micaceous Iron Oxide.
- SDS: Safety Data Sheet.
- µm: micron (10^{-6}m).

Definitions

General: For the purposes of this work section the definitions given in AS/NZS 2310 and the following 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.

1.5 INSPECTION

Notice

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

- Items after fabrication, before commencing surface cleaning and preparation.
- Surfaces after preparation, before application of first coating.
- Coating stages:
  - . After application of primer or seal coats.
  - . After application of each subsequent coat.

- Repair of coating damage: Exposure of corrosion pitting or significant metal loss by blasting process.

1.6 SUBMISSIONS

Execution details

Detail of structural steelwork: Where design and fabrication features of items to be coated may lead to difficulties, submit details before starting surface preparation.

Removal of deleterious materials: Submit advice on suitability of marking paints, and removal of materials which may be deleterious to coating processes such as grease, oil and paint.

Repair of damaged coating: If the protective coating is damaged, submit a coating repair proposal, based on the coating manufacturer's recommendations for reinstating the corrosion protection function of the system.

Reinstatement: If final coat varies from the submitted sample, submit proposals for reinstatement of the visible final coating system.

Maintenance painting

Existing systems: Identify, itemise and submit details of areas of corrosion, damage and other degradation.

Recoating systems: Submit details of coating systems for maintenance painting of previously coated items and structural elements, including surface preparation.

Samples

Painting and coating colour: Submit a 400 x 400 mm sample of the finished product for each coating system.

Retention: Retain samples for comparison during application.

Substrate acceptance

Applicator: Submit the applicator's certification of the acceptability of the coating substrate before commencing installation.

Warranties

General: Submit details of the proposed warranty terms, form and period. If separate warranties are offered by the manufacturer and the applicator, make sure they are interlocking.

2 PRODUCTS

2.1 GENERAL

Storage and handling

Requirement: Handle, store, mix and apply all protective coatings in conformance with the manufacturer's recommendations.

Ambient temperature range for storage: 15°C to 25°C.

Sunlight: Protect coating materials from direct sunlight before mixing or adding the converter (catalyst).

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 from the one manufacturer's supply.

Safety data sheets (SDS)

Requirement: Keep on site copies of all relevant SDS.

2.2 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.
- Quantity.

- Product reference code and batch number.
- Date of manufacture.
- Material composition and characteristics such as volatility, flash point, light fastness, colour and pattern. Provide technical data sheets if not shown on labels.
- Handling and installation instructions.
- Safety data sheets.

3 EXECUTION

3.1 GENERAL

Product warnings
Requirement: Conform to the SDS.

Surroundings
Protection: Prevent the release of abrasives, overspray or paint waste debris into the air, ground or to any watercourse. Prevent damage to other assets, services or equipment.

Reinstatement: Repair and/or clean affected surrounding areas.

Working area
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 until the coating is no longer affected.

3.2 SURFACE PREPARATION

General
Standards: Conform to the following:

- Removal of oil, grease and related contaminants: To AS 1627.1.
- Power tool cleaning: To AS 1627.2.
- Abrasive blast cleaning: To AS 1627.4.

Defects: Remove all surface defects, including cracks, laminations, deep pitting, weld spatter slag, burrs, fins, sharp edges and other defects before preparing the surface for coating.

Untreated steel
General: Conform to the following requirements:

- Wash and degrease all surfaces to be coated with a free-rinsing, alkaline detergent, in conformance with the manufacturer's recommendations and all safety warnings.
- Wash with clean water to remove all soluble salts.
- De-burr and round all edges with a power tool to a minimum radius of 2 mm.
- Abrasive blast clean all steel surfaces to be coated using a non-metallic medium to generate a surface profile of 35 to 65 µm.
- Abrasive blast cleaning class: Sa 2.5 – Very thorough blast cleaning.
- Remove spent abrasive from the surface by blowing with clean, dry air and/or by vacuum cleaning.
- Start 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 applying the full primer coat documented in **SELECTIONS, PROTECTIVE PAINT COATING SYSTEMS**.
- Before application, make sure that the surface is free of contaminants including oil, grease, dirt, dust, salt and any other deleterious materials that will interfere with coating performance.

Galvanized, aluminium and zinc primed surfaces
Requirement: Remove grease, oil and other solvent-soluble contaminants by wiping with mineral turpentine or white spirit. Finally, wipe with a clean solvent. Allow to dry and immediately proceed with the next operation.

Galvanized and aluminium surfaces: Abrade surfaces to a medium coarse type finish to provide an adhesion key.

Zinc primed surfaces: If present, remove zinc salts from zinc primers.

Treatment of welds

Requirement: Clean welds to remove roughness, using power tools to AS 1627.2. Remove filings by vacuuming or compressed air.

Temporary welds: Grind flush any temporary welds.

Porous, skip or stitch welds: Not permitted.

Site welding: If possible, avoid site welding. If on site welding is required, prepare the weld as per shop welds and as follows:

- Prime welds with the documented primer before contamination can occur. Make sure the primer overlaps the sound adjacent coating by 25 to 50 mm.
- Apply intermediate and topcoats over the primed welds to match the surrounding coating system, overlapping the sound adjacent coating by 25 to 50 mm.

Shop priming

Requirement: Dust off and apply a coat of primer in conformance with the manufacturer's recommendations.

Site coating

General: High pressure wash down all surfaces with clean water. Lightly sand down primer/intermediate coats, which have been shop applied, before site application of next coat.

3.3 COATING APPLICATION

General

Requirement: 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:

- Relative humidity above 85%.
- Substrate temperature less than 3°C above the dewpoint.
- Ambient air temperature below 5°C or above 40°C.
- Substrate temperature below 10°C or above 45°C.
- Surface to be coated is wet or damp.
- 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 deteriorating or unfavourable for application or curing.
  - High wind conditions.
- Surface preparation standard has not been achieved.
- Time between surface blast cleaning and the commencement of coating has exceeded 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.

Pre-coating: Before the spray application of each coating, stripe coat by brush method all edges, welds, seams, rivets, bolts, boltholes (including slots) and difficult to spray areas. Prime the underlying surfaces of replacement bolting, washers and nuts before installation.

Procedure: Conform to the coating order shown in **SELECTIONS, PROTECTIVE PAINT COATING SYSTEMS**.

Timing: Conform to the coating manufacturer's minimum and maximum recoat intervals and curing times.

Subsequent coats: Before applying any subsequent coating layer, make sure the surface condition of the preceding coat conforms to **SELECTIONS, PROTECTIVE PAINT COATING SYSTEMS** and is clean and free from defects.

3.4 PROTECTION

Contamination

Surfaces: Prevent contamination of coated surface, which are not yet dry, from blasting dust, abrasive or surface preparation debris and any other foreign matter.

Post application care

General: Protect the coating against physical, chemical, or atmospheric damage until all components are fully cured.

Care: Stack and handle all coated items using fabric slings or padded chains. Use soft packaging, carpet strips or other deformable materials between all coated items.

Water ponding: Stack coated items to prevent water ponding.

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, rinse with clean water and abrade so that edges of sound paint are feathered. Coat the area with the appropriate intermediate and finishing coat materials.

Areas damaged exposing 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 documented 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 discernible 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 as being 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.

4 SELECTIONS

4.1 PROTECTIVE PAINT COATING SYSTEMS

Polyurethane – AS/NZS 2312 Category A and B table

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 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	75 µm Epoxy zinc	50 µm High Solids	Nil

Location	Primer	Second Coat	Third Coat
conforming to AS/NZS 2312 PUR2	phosphate conforming to AS/NZS 3750.13	Polyurethane conforming to AS/NZS 3750.6	

Polyurethane – AS/NZS 2312 Category C, D and E table

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 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 table

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
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 table

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	75 µm Zinc rich epoxy	200 µm High-Build	Nil

Location	Primer	Second Coat	Third Coat
conforming to AS/NZS 2312 EHB4	conforming to AS/NZS 3750.9 Type 2	Epoxy MIO conforming to AS/NZS 3750.14	
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/NZS 3750.14

Epoxy Acrylic – AS/NZS 2312 Category A and B table

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 table

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 conforming to AS/NZS 2312 ACC6	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	50 µm Epoxy Acrylic conforming to AS/NZS 3750.5

Low VOC steel protection and decoration – AS/NZS 2312 Category A and B table

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/L	Nil	Nil
Internal decorative	50 µm waterborne inorganic zinc conforming to AS/NZS 3750.15 Type 3 VOC < 15 g/L	40 µm waterborne acrylic conforming to AS/NZS 3750.16 VOC < 75 g/L	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/L	Nil	Nil

Location	Primer	Second Coat	Third Coat
External decorative exceeding AS/NZS 2312 IZS2	75 µm waterborne inorganic zinc conforming to AS/NZS 3750.15 Type 3 VOC < 15 g/L	40 µm waterborne Acrylic conforming to AS/NZS 3750.16 VOC < 75 g/L	Nil

Low VOC steel protection and decoration – AS/NZS 2312 Category C, D and E table

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/L	Nil	Nil
Internal decorative	50 µm waterborne inorganic zinc conforming to AS/NZS 3750.15 Type 3 VOC < 15 g/L	40 µm waterborne Acrylic conforming to AS/NZS 3750.16 VOC < 75 g/L	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/L	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/L	50 µm waterborne epoxy conforming to AS/NZS 3750.13 VOC < 20 g/L	40 µm waterborne Acrylic conforming to AS/NZS 3750.16 VOC < 75 g/L

Industrial silicone enamel – AS/NZS 2312 Category A and B table

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

0346 STRUCTURAL FIRE PROTECTION SYSTEMS

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide structural fire protection systems, as documented.
Manufacturer: Dulux Steel Protective Coating,
Website: www.duluxprotectivecoatings.com.au/contact-us.
Refer finishes schedule for colour specification and location: Appendix C

1.2 CROSS REFERENCES

General
Requirement: Conform to the following work section(s):
- *General requirements*.

1.3 STANDARDS

Structural fire protection systems
Materials and components: To BCA Spec A2.3.

Coatings for fire protection of building elements
Standard: AS 3784.1.

1.4 INTERPRETATION

Abbreviation
General: For the purpose of this work section the following abbreviation applies:
- FRL: Fire-resistance level, in conformance with BCA A1.1.

1.5 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of the following:
- Substrate preparation.
- System support installation.
- Steel protective primer application.
- Completed application of protective system coating thickness.

1.6 SUBMISSIONS

Certification
Fire protection systems: Submit evidence of conformance with the fire resistance levels as documented in the **Fire resistance level schedule**.

Execution details
Substrate cleaning: Give notice of surface conditions which cannot be corrected by normal hand tool cleaning methods.

Samples
General: Submit samples of each specified system thickness, density, colour, texture and support type.

Subcontractors
General: Submit names and contact details of proposed suppliers and installers.

Tests
Site tests for sprayed systems: Submit results of thickness and density measurements.

Warranties
Requirement: Submit the warranty for the installed protection system.

2 PRODUCTS

2.1 GENERAL

2.2 STORAGE AND HANDLING

General: Handle, store, mix and apply all coatings in conformance with the manufacturer's recommendations.

Ambient temperature range for storage: room temperature (15°C to 25°C).

Use-by-date: Use products with limited shelf life before their use-by-date unless written authorisation is obtained from the coating manufacturer.

2.3 MARKING

Identification

General: Deliver materials to the site in the manufacturer's original sealed containers or packaging, legibly marked to show the following:

- Manufacturer's identification.
- Product brand name.
- Product type.
- Quantity.
- Product reference code and batch number.
- Date of manufacture.
- Material composition and characteristics such as volatility, flash point, light fastness, colour and pattern. Provide technical data sheets if not shown on labels.
- Handling and installation instructions.
- Material safety data sheets.

2.4 SPRAYED FIRE-RESISTING MATERIALS

Base

General: Either perlite or vermiculite with gypsum as the hydraulic binding agent to form plaster.

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.

2.5 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.

2.6 METAL COMPONENTS

General

Atmospheric corrosion category: To the *General requirements* work section.

Corrosion protection: To *Adhesives, sealants and fasteners* work section.

Expanded metal lath

Conformance: To BCA Spec A2.3 Annexure to Table 1 clause 1.6.

Aperture: 6 to 20 mm.

Self-furring expanded metal lath ribs: V-shaped at 100 to 150 mm intervals.

Steel wire mesh

Finish: Galvanized.

Welded rectangular mesh:

- Keying: 10 to 25 mm aperture.

- Wire diameter: 0.7 to 1.6 mm.

Twisted hexagonal mesh:

- Conformance: To AS 2423.
- Mesh size: Nominally 25 to 32 mm.

Fixings

Screws: Deep threaded self-tapping screws, preferably with ribbed heads.

Staples: Steel wire staples.

Adhesive cement: Fixing cement as recommended by the board manufacturer as being part of the tested complete protection system.

3 EXECUTION

3.1 SPRAYED FIRE-RESISTING PRODUCTS

Applicators

General: Approved by the coating manufacturer to install the coating.

Surface preparation

Sprayed to contour: Before coating application, remove materials which may impair adhesion to the substrate, including mill scale, dirt, grime, oil, grease, mould release agents, dust, loose rust, non-compatible primers and paint.

Compatibility: If paint on the steel sections is not compatible with the coating, apply an alkali-resistant sealer compatible with the paint.

Stable gaps and joints wider than 15 mm: Bridge with an appropriate supporting material before applying the coating.

Unstable gaps and joints: Provide a control joint in the spray, with metal lath support on either side of the joint.

Protection of areas not to be coated

General: Prevent damage from spillage, overspray, contamination and fallout.

Sequence

General: Apply coatings after installation of supports, fixings and other attachments and before installation of items which may obstruct the application.

Fixing reinforcement and support

Encapsulated substrates: If support not required, wrap and overlap reinforcement at joints and wire tie together.

Spraying

General: Provide full cohesion in the coating.

External coatings

Setting: Prevent rapid drying, and exposure to wind-driven rain, running water, freezing conditions, structural movement, vibration or impact conditions during setting.

Detailing: Provide water shedding and a weather seal at the coating-substrate interface with UV stable mastic sealant or weather shields.

Thickness measurements testing

Thickness gauge: If possible, use a direct-reading pin-type thickness gauge with a base plate of 25 mm diameter. Alternatively, use prefixed gauges that do not impair fire performance.

Frequency of measurement: To AS 3784.1 clause 11.9.3

Acceptance criteria for deficient areas: To AS 3784.1 clause 11.9.4 as follows:

- Thickness not less than 85% specified thickness: Deficient area not to exceed 1 m^2, and no other deficient area within 3 m of this deficient area.
- Thickness not less than 75% specified thickness: Deficient area not to exceed 0.2 m^2, and no other deficient area within 1 m of this deficient area.

Density measurements testing

Acceptance criterion: The manufacturer's stated average dry density ± 15%.

Frequency of measurement: 1 per 10 m^2 of sprayed surface.

3.2 BOARD FIRE PROTECTION

Fixing

System: Fix the following proprietary systems in conformance with the recommendations of the manufacturer or supplier to achieve the documented 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 recommendations of the manufacturer or supplier.

3.3 COMPLETION SUBMISSIONS

Certification

Compliance: Submit a Certificate as evidence of compliance with BCA requirements for suitability of the completed fire protection system for the documented FRL.

0411 WATERPROOFING – GROUND SLAB

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide roof and deck waterproofing systems to substrates, as documented.

Performance
Requirements: Conform to the following:

- Waterproof for a five minutes duration rainfall intensity, for 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
Requirement: Conform to the following worksection(s):

- *0171 General requirements*.

1.3 STANDARDS

Membrane materials
Standard: To AS 4654.1

Membrane design and installation
Standard: To AS 4654.2.

Stormwater drainage
Standard: To AS/NZS 3500.3.

1.4 INTERPRETATION

Definitions
General: For the purposes of this worksection the definitions given in AS 4654.1 and AS 4654.2 and the following apply:

- Acrylic - liquid applied: Water based formulations which air dry to form plastic membranes.
- 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: A system preventing a membrane bonding to the substrate, bedding or lining.
- Double detail joint: A joint formed by turning up and bonding the horizontal membrane to a vertical substrate and adding an overflashing of membrane material bonded to the vertical substrate and folded over and bonded to the horizontal membrane. In certain situations the double detail can be achieved by bonding an angle profile of membrane material to the junction prior to laying the membrane.
- Elastomer: A polymer having elastic properties similar to rubber.
- PVC membrane: Flexible plastic sheet membrane (vinyl).
- Polyurethane - liquid applied: Water or solvent based formulations which moisture cure to form an elastic rubber membrane.

- Seamless membranes: Membranes applied in liquid or gel form and air cured to form a seamless film.
- Slip sheet: A sheet used to isolate the membrane system from the supporting substrate or from the topping or mortar bedding. The most common material is polyethylene.
- Substrate: The surface to which a material or product is applied.

1.5 SUBMISSIONS

Records

Placing records: Photographically record the application of membranes and label with the following information:

- Date.
- Portion of work.
- Substrate preparation.
- Weather during application and curing.
- Protection provided from traffic and weather.

Products

Manufacturer's documentation: Submit copies of the following data:

- Product technical data sheets.
- Safety data sheets (SDS).
- Preventative maintenance procedures.
- Instructions and procedures for the repair of the membrane.

Prototypes

General: Apply waterproofing to 10 m^2 of deck to demonstrate surface preparation, crack and joint treatment, corner treatment, and execution quality. Install final surface finish to demonstrate aesthetic affects and quality of materials and execution.

Samples

Requirement: Submit 300 x 300 mm samples of each type of membrane including the finish of the visible surface.

Shop drawings

Requirement: Submit shop drawings showing the following:

- Junctions with vertical surfaces.
- Drainage details.
- Control joints.
- Flashings.
- Penetrations.
- Corners.
- Terminations and connections.
- Membrane layers.
- Insulation and protection.

1.6 INSPECTION

Notice

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

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

2 PRODUCTS

2.1 MEMBRANES

Membrane systems
Requirement: Provide a proprietary membrane systems certified as suitable for the intended external waterproofing.

2.2 ACCESSORIES

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

Control joint covers
Corners, crossovers, tees and bends: Factory mitred, welded and provided with 500 mm legs.

End closures: Factory folded and sealed to match joint cover profile.

3 EXECUTION

3.1 PREPARATION

General
Substrates: Prepare substrates as follows:

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

Moisture content
Concrete substrates: Cure for more than 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 1884 Appendix A.

Falls
Verify that falls in substrates are greater than 1.5%.

External corners: Round or arris edges.

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

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

3.2 APPLICATION

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

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

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

Overflows: Apply a bond breaker to the perimeter of the overflow outlet at its junction with the surface to which the membrane will be fixed. Turn the membranes into the overflow to prevent moisture from tracking behind the membrane.

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

End laps generally: Stagger end lap joints.

Bituminous sheet membranes:

- Side laps: 75 mm.
- End laps: 200 mm.
- Method: Heat welded.

Synthetic rubber membranes:

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

PVC membranes:

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

Curing of liquid applied systems

General: To the manufacturers' instructions.

Control of movement

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

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

Control joint covers: Install after fixing hobs and membranes.

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

Membrane terminations

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

- Height: To AS 4654.2 Appendix A.
- 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. Use vertical terminations.

Membrane vertical penetrations

Pipes, balustrades, ducts, and vents: Provide separate sleeves for all pipes, ducts, and vents and have them fixed to the substrate. Use Alsan flashing reinforced with fleece for all steel bar and pipe penetrations.

Membrane horizontal penetrations

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

Membrane at balcony doors and windows

Requirement: Install membrane before 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.

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

Membrane around skylights and hatches

Requirement: Install membranes to upstands before the installation of the skylight or hatch.

Membrane at parapets
Requirement: Terminate membrane upstands under parapet flashing or capping giving 75 mm overlap. Do not top fix parapet cappings. Seal heads of fasteners against capping.

Membrane at gutters
Requirement: Terminate membrane over a corrosion resistant metal angle fixed to the gutter support substrate with the vertical leg of the angle turned down into the gutter at least 35 mm.

Membrane to planter boxes
Membrane: Extend root-resistant membrane at least 100 mm vertically above the soil fill level and secure.

Drainage: Grade the base of the planter to adequately sized drainage outlets and terminate the membrane in the outlets.

Drainage riser: Install a riser with drainage slots that extend from the membrane level to the top of the drainage cell. Extend the riser above the soil fill level and finish with a screw cap to provide access for drain clearing.

Protection board: Provide protection board to the full extent of the membrane including areas between soil level and the underside of flashings and cappings.

Drainage cell: Provide geo-filter fabric wrapped drainage cell to the base of the planter and turn geo-filter fabric up drainage riser at least 100 mm above drainage slots.

Cappings and flashings: Provide capping to the tops of planter walls to protect the membrane. Extend the capping to overlap the top of the protection board on the inside face of the planter wall. Where planter walls abut other walls, provide a flashing over the top of the membrane.

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

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

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

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

3.3 FLOOD TEST

General
Application: Perform a flood test before the installation of surface finishes.

Set-up:

- Measure for dryness the wall/floor junction of adjacent spaces and of the slab soffit below using electrical resistance testing to AS 1884 Appendix A.
- 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 a moisture meter, and compare the results to the measurements taken before flooding.

Conformance:

- 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 COMPLETION

Protection

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

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

Warranties

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

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

4 SELECTIONS

4.1 EXTERNAL WATERPROOFING SCHEDULES

Single layer sheet system schedule

Location	Under ground slab
	To CCBC Specification.

Location	Vertical face ground slab
	To CCBC Specification.

Location	Vertical face retaining walls
	To CCBC Specification.

0421 ROOFING – COMBINED

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide a roofing system and associated work, as documented and which satisfies the product performance requirements.

1.2 PERFORMANCE

Ambient climatic conditions

Design rainfall intensity (mm/h) to AS/NZS 3500.3

Methods for fire tests on building materials, components and structures - Simultaneous determination of ignitability, flame propagation, heat release and smoke release: to AS 1530.3

Full scale room fire testing: to AS ISO 9705

Method of testing sheet roof and wall cladding for cyclonic & non-cyclonic regions: to AS 4040.2/3

Structural design and the effects of external loads on structures and their element: To AS 1170

Design and installation of sheet roof and wall cladding – Metal: To AS 1562.1

Roof access

Type: to comply with Australian standards and relevant Occupational and Health & Safety Acts

Manufacturer: Roofsafe Industrial Safety (Roofsafe T-Systems Pty Ltd)

3 Bushells Place, Wetherill Park NSW 2164, Tel: (02) 8781 2100, Fax: (02) 8781 2111

sydney@rissafety.com, http://www.rissafety.com/our-company.html

Product: Permanently installed fall arrest system.

Accessories: To include all necessary harnesses, anchor points, cables, ladders, gutter level ladder supports brackets, walkways and all necessary equipment to comply with Australian standards and relevant Occupational and Health & Safety Acts.

1.3 CROSS REFERENCES

General

Requirement: Conform to the following work section(s):

- *General requirements*.

1.4 INSPECTION

Notice

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

- 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

Installation
Seamed roofing: Submit evidence of experience with non-ferrous roof installation.

Samples
Requirement: Submit samples of the following, showing the range of variation available:

- Bedding and pointing mortar.
- Custom profiled flashings and cappings.
- Pre-weathered finish to sheet metal.
- Sealants.
- Sheet metal finishes showing the range of variation available.
- Shingles or shakes.
- Slate tiles.
- Tiles.
- Trims and accessories with a colour finish.

Technical data
Recycled material content: Submit documentation from the roofing material manufacturer showing the following:

Tests
Type tests: Submit results 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 to AS/NZS 1170.2: Roof sheeting and fastenings to AS 1562.1 clause 5.6.
- Fibre cement roofing: Roof sheeting and fixings to AS/NZS 1562.2 for resistance to wind forces.

Other tests: Submit results as follows:

Warranties
Requirement: Submit the following:

Roofing materials: Submit the manufacturer's published product warranties.

2 PRODUCTS

2.1 COMPONENTS

Fasteners
Finish: Prefinished 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
Type: Purpose-made closed cell polyethylene foam profiled to match the roofing profile.

Location: Provide profiled fillers under flashings to the following:

- Ridges.
- Eaves.
- Lapped joints in roof sheeting.

Safety mesh
Standard: To AS/NZS 4389.

2.2 SHEET METAL ROOFING

Material:

Colourbond roof sheeting 'Custom Orb' profile.

Design, installation and materials: To AS 1562.1.

Colour: Surfmist.

Standards

Design, installation and materials: To AS 1562.1.

Stainless steel: To ASTM A240/A240M.

2.3 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. Refer finishes schedule for colour specification and location.

Materials

Metal rainwater goods: To AS/NZS 2179.1.

Flashings and cappings

Standard: To AS/NZS 2904.

Material and colour: To match roof system.

Rib notching: Match roof sheeting.

Ridge and barge cappings

Material and colour: Refer finishes schedule for colour specification and location.

Eaves gutters and downpipes

Down Pipes: 100mm / 150mm (refer to Hydraulic Engineers detail) internal dia. thickness 2.6mm Circular Hollow Section galvanised steel PPC finish, welded assembly to suit site conditions refer documentation.

Eaves Gutters: Colorbond: 150mm wide 85 mm half round including accessories in same material and all brackets,end sections, elbows, connectors. Refer finishes schedule for colour specification and location.

2.4 PLASTIC SHEET ROOFING

Materials

General: Polycarbonate sheet. Provide the necessary trim, flashings and sealants. Install in to be in accordance with manufacturers specification. Profile to match roof sheeting, use single sheet to achieve curved profile.

Polycarbonate: To AS 4256.5.

Manufacturer: Danpalon Australia Pty Ltd, NSW 02-9475 2000 http://danpalon.com.au/colour

Profile:DP10 Honeycombe

Colour: Reflective Grey

Thickness: 6mm

Width: 600mm

Curved to Radius as dimensioned

Sealants: Neutral curing silicone or modified silane (MS) polymer based sealant to the roofing manufacturer's recommendations.

3 EXECUTION

3.1 STORAGE AND HANDLING

Sheet metal and metal tile roofing

Storage: Store metal roofing materials away from uncured concrete and masonry, on a level base. Do not store materials in contact with other materials which may cause staining, denting or other surface damage.

Handling: Handle roofing materials as follows:

- Use gloves when handling precoated metal roofing material.
- Use soft soled shoes when fixing or working on roofs.
- Protect edges and surfaces from damage. Do not drag sheets across each other or over other materials.

3.2 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

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

Pan type sheets

Removal: Install sheets so that individual sheets can be 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

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

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

Tolerances

Sheet metal: To AS 1562.1 clause 4.2.

Shingles, shakes and slate: To AS 4597 clause 3.2.

Tiles: To AS 2050 clause 3.2.

3.3 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.
- Ritek; Closing off of roof sheeting to be in accordance with manufactures recommendations.
- At gutters: Project bottom of 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.

3.4 BUILDING ELEMENTS

Ridges and eaves

Sheet ends: Treat as follows:

- Project bottom of 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 foam.

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: If end laps are unavoidable, and the sheet profile is not suitable for interlocking or contact end laps, construct a stepped type lap.

3.5 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 if 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.

Large penetrations in low pitch roofs: Extend the base flashing over the roofing ribs to the ridge to prevent ponding behind the penetrating element.

Wall abutments: Where a roof abuts a wall, provide as follows:

- In masonry walls, planked cladding or concrete: Step in courses to the roof slope. Interleave with damp proof course, if any.
- Raking in masonry: Build into the full width of the outer leaf. Turn up within cavity, slope inward across the cavity and fix to or build into the inner leaf at least 75 mm above the roofing line.
- Raking in concrete: Turn 25 mm into joints or grooves, wedge at 200 mm centres with compatible material and point up.

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: Material and colour: prefabricated stainless steel, grade 304, half round including accessories in same material 300mm wide 150 mm deep all brackets, end sections, elbows, connectors and down pipes to top of external brickwork to be stainless steel.(nom 2100mm) PVC-U downpipes from top of brickwork to slab level. Refer finishes schedule for colour specification and location.

Form stop ends, downpipe nozzles, bends and returns. Dress downpipe nozzles into outlets. Provide overflows to prevent back-flooding.

Expansion joints in guttering longer than 30 m: Provide as follows:

Downpipes
General: 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.

3.6 PLASTIC SHEET ROOFING

Installation
Standard: To AS 1562.3.

3.7 TESTING

Site tests
Internal downpipes: Test each stack hydrostatically in stages, each test to run over two storeys high for two hours. Remedy defects and retest if necessary.

3.8 COMPLETION

Cleaning

Remove: Excess debris, metal swarf, solder, sealants and unused materials.

Clean off: Exposed metal surfaces that interfere with uniform weathering or oxidisation.

Replace: Materials that have been damaged or deteriorated.

Roof plumbing: Clean out spoutings, gutters and rainwater pipes after completion of roof installation.

Maintenance manual

On completion: Submit a manual of recommendations from the roofing 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 RESPONSIBILITIES

General

Requirement: Provide lightweight external wall cladding and associated work, as documented.

Location: Above brickwork level (nom 2100mm AFFL) to soffit level/ underside of Ritek roofing.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.

1.3 INSPECTION

Notice

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

- Framing, sarking, vapour barrier and insulation before they are covered up or concealed.

1.4 TOLERANCES

Permitted deviations

Metal sheet cladding: To AS 1562.1 clause 4.2.

Other sheet cladding: 5 mm from a 1.8 m straightedge.

Cladding panels: To manufacturer's recommendations.

Plank cladding: 5 mm from a 1.8 m straightedge.

Pre-assembled cladding systems: To manufacturer's recommendations.

2 PRODUCTS

2.1 FIBRE CEMENT CLADDING

Fibre cement

Manufacturer: James Hardie

Product:

Walls: JH HardiFlex 6mm panel – refer to finishes schedule.

Ceiling: JH Versilux 6mm panel – refer to finishes schedule.

Soffit: JH Villaboard 6mm panel – refer to finishes schedule.

Finish: Factory finished. Refer finishes schedule for colour specification and location: Appendix C Graffiti resistant top-coat.

Install in accordance with manufactures recommendations

Standard: To AS/NZS 2908.2.

Cladding: Type A Category 3 (modulus of rupture ≥ 7 MPa).

Compressed cladding: Type A Category 5 (modulus of rupture ≥ 18 MPa).

- Edges: Square.

Sheet cladding

General: Manufacturer: James Hardie

Product: Eco Tec Compressed Fibre Cement system

Arrangement: Set out in even panels with joints coinciding with framing. Submit shop drawings for Architects approval.

2.2 COMPONENTS

Flashings
Standard: To AS/NZS 2904.

3 EXECUTION

3.1 CONSTRUCTION GENERALLY

Substrates or framing
Requirement: Before fixing cladding, check the alignment of substrates or framing and adjust if necessary.

Fixing
Method: Screw to steel framing.

Accessories and trim
Requirement: Provide accessories and trim necessary to complete the installation.

Metal separation
Requirement: 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.

Proprietary systems or products
Product fixing: Fix proprietary systems to the manufacturer's recommendations.

3.2 COMPLETION

Warranties
Warranty: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the supplier and installer.

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

0451B WINDOWS AND GLAZED DOORS

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide windows and glazed doors, as documented.

Performance
Product design: Provide windows with sashes capable of being opened to satisfy the documented maintenance requirements.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following worksection(s):

- *General requirements*.

1.3 STANDARDS

General
Selection and installation: To AS 2047.

Glazing
Glass type and thickness: To AS 1288, if 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

Certification
Sealant compatibility: Submit statements from all parties to the installation certifying the compatibility of sealants and glazing systems to all substrates.

Ceramic-coated spandrel glass: Submit a report, from the manufacturer, certifying that the glass meets the Fallout Resistance Test requirements of ASTM C1048.

Opacified glass: Submit a report, from the manufacturer, certifying that the proposed method of opacifying the glass will not be detrimental to the glass or affect the glass product warranty.

Samples
Window and door framing: Submit the following:

- 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.

Glazing: 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.

Hardware: Submit samples of generic hardware, not documented as proprietary items, as follows:

Shop drawings

Submit shop drawings, to a scale that best describes the detail, showing the following:

- 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.

Tests

Type tests: Submit results, as follows:

- Windows and glazed doors: To AS 2047.
- Fire resistance level: To AS 1530.4.
- Weighted sound reduction index ($R_{w)}$: To AS/NZS ISO 717.1.

Warranty

General: Submit warranties as documented.

2 PRODUCTS

2.1 GENERAL

Standards

Flashings: To AS/NZS 2904.

Aluminium extrusions: To AS/NZS 1866.

2.2 MARKING

Identification

General: Deliver materials to the site in the manufacturer's original sealed containers or packaging, legibly marked to show the following:

- Manufacturer's identification.
- Product brand name.

- Product type.
- Quantity.
- Product reference code and batch number.
- Date of manufacture.
- Material composition and characteristics such as volatility, flash point, light fastness, colour and pattern. Provide technical data sheets if not shown on labels.
- Handling and installation instructions.
- Material safety data sheets.

2.3 GLASS

Glass and glazing materials
Glass: Free from defects which detract from appearance or interfere with performance under normal conditions of use.

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 to AS 1288.

Heat soaking
Requirement: All toughened glass products.

Standard: To EN 14179-1.

Unacceptable blemishes in heat-treated flat glass (including tinted and coated glass)
Standard: To AS/NZS 4667.

Insulating glass units (IGUs)
Selection and installation: To AS/NZS 4666.

U-Value / SHGC to G-1 Multi-Purpose Space

As per BCA requirements.

2.4 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
Requirement: 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.

Elastomeric sealants
Sealing compound (polyurethane, polysulfide, acrylic): To ASTM C920 or ISO 11600.

Sealing compound (silicone): To ASTM C920 or ISO 11600.

Sealing compound (butyl): To ASTM C1311.

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

Control 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.

2.5 GLASS IDENTIFICATION

Safety glazing materials
Identification: To AS 1288.

Noise reducing glazed assemblies
Labelling: Label each panel with a legible non-permanent mark, stating and certifying the R_w rating, and identifying the testing authority. Remove when directed.

2.6 ALUMINIUM FRAME FINISHES

Powder coatings
Standard: To AS 3715.

Grade: Architectural coating.

Anodised
Standard: To AS 1231.

Thickness: ≥ 15 microns to 20 microns.

2.7 ANCILLARY MATERIALS

Trims
Timber: Solid timber at least 19 mm thick, mitred at corners.

Extruded gaskets and seals
General: Provide seals as documented in the **Window and door seal schedule**.

Materials: Non-cellular (solid) elastopressive seals as follows:

- Flexible polyvinyl chloride (PVC): To BS 2571, 100% solids with high consistency, ultraviolet stabilised.
- Rubber products (neoprene, ethylene propylene diene monomer (EPDM) or silicone rubber): To BS 4255-1.

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.

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
Standard: To AAMA 701/702.

Materials: Polypropylene or equivalent pile and backing, low friction silicone treated, ultraviolet 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.

Weather bars
General: Provide a weather bar under hinged external doors, locate under the centres of closed doors.

2.8 HARDWARE

Hardware documented generically
General: Provide hardware of sufficient strength and quality to perform its function, appropriate to the intended conditions of use, compatible with associated hardware, and fabricated with fixed parts firmly joined. Refer door hardware schedule.

Locks and latches
Standard: To AS 4145.3.

Performance:

Window catches: Provide 2 catches per sash to manually latched awning or hopper sashes over 1000 mm wide.

Sash balances
Requirement: Match the spring strength of the balances to the sash weight they support.

Sash operators
Requirement: As documented.

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 openings and speaking holes. Process exposed glass edges to a finish not inferior to ground arrised.

3.2 INSTALLATION

Glazing
General: Install the glass as follows:

- Permanently fix in place each piece of glass to withstand the normal loadings and ambient conditions at its location without distortion or damage to glass and glazing materials.
- No transfer of building movements to the glass.
- Watertight and airtight for external 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.

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
Minimum dimensional requirements. Conform to the following:

External timber framed glazing: Glaze with putty.

Windows and glazed doors
General: Install windows and glazed doors frames as follows:

- Plumb, level, straight and true within acceptable building tolerances.
- Fixed or anchored to the building structure in conformance with the wind action loading requirements.
- Isolated from any building loads, including loads caused by structural deflection or shortening.
- Allow for thermal movement.

Weatherproofing
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: Make sure 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.

Repair of finish

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 HARDWARE

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.

Proprietary window systems

Requirement: Provide the standard hardware and internal fixing points for personnel safety harness attachment, where required by and conforming with the governing regulations.

Operation

General: Make sure 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, as follows:

- Clearly labelled with the intended location.
- In a separate dust and moisture proof package.
- Including the necessary templates, fixings and fixing instructions.

3.4 COMPLETION

Hardware

Adjustment: Leave the hardware with working parts in working order, and clean, undamaged, properly adjusted, and lubricated where appropriate.

Keys

Contractor’s keys: Immediately before the date for 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.

Maintenance manual

Window and door assemblies: Submit the window and glazed door manufacturer's published instructions for operation, care and maintenance.

Hardware: Submit the manufacturer's published recommendations for use, care and maintenance.

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

Window and door assemblies: Submit the manufacturer's published product warranties.

Hardware: Submit the manufacturer's published product warranties.

0453B DOORS AND ACCESS PANELS

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide doors, frames, door-sets, security screen doors and fire door-sets, as documented.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following work section(s):

- *General requirements*.
- *Door hardware*

1.3 INTERPRETATION

Definitions
General: For the purposes of this work section the following definitions apply:

- Balanced construction: Flush door construction where the facings on one side of the core are nominally equal in thickness, grain direction, properties and arrangement to those on the other side of the core, 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 with two plane faces which entirely cover and conceal its structure. It includes doors with intermediate rail, cellular, blockboard, medium density fibreboard (MDF) 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 with either stiles and rails, or stiles, rails and muntins, framed together. A joinery door may also incorporate glazing bars.
  - . Louvred door: A joinery door with spaces filled in with louvre blades.
  - . Panelled door: A joinery door with spaces filled in with panels including glass.

1.4 INSPECTION

Notice
Inspection: Give 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

Tests
Type tests: Submit results, as follows:

- Fire and smoke doors: To AS 1905.1 and BCA Spec C3.4.
- Weighted sound reduction index (R_w): To AS/NZS ISO 717.1.

2 PRODUCTS

2.1 FRAMES

Aluminium frames

General: Assembled from aluminium sections, including accessories such as buffers, pile strips, strike plates, fixing ties or brackets and cavity flashing, with provision for fixing documented hardware.

Threshold: If the frame includes a threshold member, provide a self-draining section with anti-skid surface.

Steel frames

General: Continuously welded from metallic-coated steel sheet sections, including accessories such as buffers, strike plates, spreaders, mortar guards, switch boxes, fixing ties or brackets, and cavity flashing with provision for fixing documented 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 4 mm backplates and lugs for fixing hardware including hinges and closers. Screw fix the hinges into tapped holes in the backplates.

Base metal thickness:

- General: Minimum 1.1 mm.
- Fire rated doorsets: Minimum 1.5 mm.
- Security doorsets: Minimum 1.6 mm.

Metallic-coated steel sheet: To AS 1397.

- Coating class interior: ZF100.

Timber frames

Hardwood: To AS 2796.1:

- Grade: Select.

Softwood: To AS 4785.1:

- Grade: Select.

Joints:

- Morticed head and through tenons.
- Trenched head:
  - . Bare faced tenons on jambs.
  - . Full let-in jambs.

2.2 DOORS

General

Doors: Proprietary products manufactured for interior or exterior applications and for the finish required. Refer to Door & Window schedule.

Materials

Standards: Conform 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

Panel doors: Provide panels branded 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.

Joinery doors
General: Provide joinery doors, as documented.

Flush doors
General: Provide flush doors 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.

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.
- Flush doors with particleboard: Core plate of particleboard fully bonded to facings each side of no less than two sheets of timber veneer.

Medium density fibreboard doors: Single thickness of moisture resistant general purpose medium density fibreboard with the same surface finish to both sides, for internal use.

Smoke doors: Solid core not less than 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.

Cut outs: If openings are required in flush doors (e.g. for louvres or glazing), do not make cut outs closer than the width of the stiles at the edges of the doors.

Edge strips: Minimum thickness 10 mm. Increase overall thickness to greater than 15 mm to accommodate the full depth of the rebate in rebated doors. Apply to the external edges of door after the facings are bonded to the door framing/core and finish flush with outside surface of the facings.

Louvre grilles: Construct by inserting the louvre blades into a louvre frame, and fix the frame into the door.

Double doors
General: Bevel square edged doors as necessary to prevent binding between the leaves.

Rebated meeting stiles: If not double acting doors, provide rebated meeting stiles or fix equivalent metal T stop to one leaf. Form rebates to suit standard rebated hardware.

Tolerance
Squareness: The difference between the lengths of diagonals of a door: Maximum 3 mm.

Twist: The difference between perpendicular measurements taken from diagonal corners: Maximum 3 mm.

Nominal size (mm):

- Height: ± 2.
- Width: + 2, - 0.

2.3 ANCILLARY MATERIALS

Trims
Timber: Solid timber at least 19 mm thick, mitred at corners.

Extruded gaskets and seals
General: As documented in the **Door seal schedule**.

Materials: Non-cellular (solid) elastopressive seals as follows:

- Flexible polyvinyl chloride (PVC): To BS 2571, 100% solids with high consistency, ultraviolet stabilised.
- Rubber products (neoprene, ethylene propylene diene monomer (EPDM) or silicone rubber): To BS 4255-1.

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, ultraviolet stabilised.

Standard: To AAMA 701/702.

Weather bars
General: Provide a weather bar under hinged external doors, locate under the centres of closed doors.

Hardware documented generically

General: Provide hardware of sufficient strength and quality to perform its function, appropriate to the intended conditions of use, compatible with associated hardware, and fabricated with fixed parts firmly joined. Refer door hardware schedule: Appendix D

3 EXECUTION

3.1 FRAMES

General
Frames: Install the frames as follows:

- Plumb, level, straight and true.
- Fixed or anchored to the building structure.
- Isolated from any building loads, including loads caused by structural deflection or shortening.

Frame fixing
Brackets: Metallic-coated steel:

- Width: Minimum 25 mm.
- Thickness: Minimum 1.5 mm.

Depth of fixing for building into masonry:

- Brackets: Minimum 200 mm.
- Expansion anchors: Minimum 50 mm.
- Plugs: Minimum 50 mm.
- Rods: Minimum 60 mm.

Jamb fixing centres: Maximum 600 mm.

Joints
General: Make accurately fitted joints where fasteners, pins, screws, adhesives and pressure indentations are not visible on exposed surfaces.

Aluminium frames
Building into masonry: Screw galvanized steel brackets twice to jambs and build in.

Fixing to masonry openings: Build in seasoned timber plugs to masonry joints or use proprietary expansion anchors and screw twice through jambs at each fixing.

Fixing to stud frame openings: Screw once to studs at each fixing.

Steel frames
Building into 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.

Finishing

Trim: Provide mouldings, architraves, reveal linings, and other internal trim using materials and finishes matching the door frames to make neat and clean junctions between the frame and the adjoining building surfaces.

Seals

General: Provide the fixings, rebates, grooves, and clearances required for installation and operation of the seals. Allow seals unwound from coils to settle before use.

Weatherproofing

Flashings and weatherings: Install flashings, weather bars, drips, storm moulds, caulking and pointing to prevent water from penetrating the building between the door frame and the building structure under the prevailing service conditions, including normal structural movement of the building.

3.2 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 the date for practical completion, or before joining up to other surfaces, remove all traces of temporary coatings used as a means of protection.

0454B OVERHEAD DOORS

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide overhead doors, as documented.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following work section(s):
- *General requirements*.

1.3 STANDARDS

General
Garage doors and other large access doors: To AS/NZS 4505.

1.4 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of the following:
- Framing or structure to receive tracks and motor.
- Tracks and guides installed before doors or shutters are hung.

1.5 SUBMISSIONS

Tests
Type tests: Submit results, as follows:
- Fire shutters: Submit certification from an independent testing authority showing compliance with the required fire-resistance level.
- Acoustic doors: If a door has a weighted sound reduction index (R_w) rating, submit certification from an independent testing authority showing compliance with the requirement.

2 PRODUCTS

2.1 ROLLING CURTAIN AND ROLLING SHUTTER DOORS

Types

Rolling shutter:
- Standard: To AS 1905.2.

Bottom rail
Requirement: Provide a stiffening member as follows:
- Interlocking with the bottom edge or lowest part of the curtain.
- Extending between the inner faces of the vertical guides.
- Formed or adapted as required to follow the contour of a sloping floor or threshold.
- Adapted to house a locking device, if required.

Wind locks
General: Provide wind lock end clips and guides to retain the curtain in wide openings or under extreme wind conditions.

Drum
Maximum drum deflection: 1/360th of the span.

Springs: Helical torsion springs housed in the drum and arranged to counterbalance the curtain weight without exceeding the safe working stress of the spring material.

Wickets

General: Provide doors with metal frame and facings to match the curtain, and manufacturer's standard lockset and furniture.

Operation method

General: Method of opening and closing the door:

- Manual:
  - . Hand stick (for high openings): By a boat hook type pole supplied with the installation.
  - . Chain: By pulling on a chain passing over a sprocket on the drum, with reduction gears where necessary.
  - . Crank handle: By a removable crank handle inserted into a gearbox mounted above the opening.
- Motorised: If a wicket is fitted to the shutter, provide a limit switch device to prevent motor operation until wicket and the frame are hinged clear of the curtain

2.2 OPERATION

Manual operation

General: Install so that the force required to operate the door manually does not exceed 220 N.

Motorised operation

General: Provide a motorised door operating system incorporating the following:

- An electric motor with limit switches, and of adequate capacity to operate the specified door smoothly and without strain.
- Overload cutout.
- Automatic safety system to stop and reverse door if obstructed while closing, or stop door if obstructed while opening.
- Photocell or IR beam safety device.
- Manufacturer's standard light fixture, automatically switched on when opener is activated, and switched off by timer.
- Manual release handle to disengage door from drive mechanism in the event of a power failure.
- Operation by battery-powered radio remote controller, supplied as part of the system.
- Additional operation by push-button or key switch, located 1500 mm above floor level. Hardware documented generically
- **General:** Provide hardware of sufficient strength and quality to perform its function, appropriate to the intended conditions of use, compatible with associated hardware, and fabricated with fixed parts firmly joined. Refer door hardware schedule: Appendix D

3 EXECUTION

3.1 INSTALLATION

General

Requirement: Install overhead doors in conformance with the manufacturer's recommendations and as documented.

Preparation

Substrate: Before start of installation, check the alignment of substrates or framing and adjust if required.

Frames

Requirement: Install frames as follows:

- Plumb, level, straight, true, and within tolerances and clearances recommended by the manufacturer.
- Fixed or anchored to the building structure using mechanical fixings suitable for the substrate and the imposed loads.
- Isolated from any building loads, including loads caused by structural deflection or shortening.

3.2 COMPLETION

Operation

General: Make sure moving parts operate freely and smoothly, without binding or sticking, at correct tensions or operating forces and that they are lubricated where appropriate.

Safety: Make sure all safety features are operating.

Remote control devices: Make sure devices are programmed and operating.

Protection

Temporary coating: On or before the date for practical completion of the works, or before joining up to other surfaces, remove all traces of temporary coatings used for protection.

Maintenance manual

General: Submit the manufacturer's published instructions for operation, care and maintenance.

Warranties

General: Submit the manufacturer's published product warranties.

0455 LOCKWOOD DOOR HARDWARE

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide Lockwood door hardware, as documented.

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: Make sure 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.

Replacement items

Door hardware: Match items being replaced with existing unless documented otherwise. Upgrade hinges as necessary to conform to **Hinges table A** and **Hinges table B.**

COMPANY CONTACTS

Lockwood Australia

60/7-9 Percy Street, Auburn, NSW 2144

Phone: 02-8745 7000 http://www.lockweb.com.au/en/site/lockweb/

1.2 CROSS REFERENCES

General

Requirement: Conform to the following work section(s):

- *General requirements*.

1.3 INTERPRETATION

Abbreviations

General: For the purposes of this work section the abbreviations given in AS 4145.1 Appendix D apply.

Definitions

General: For the purposes of this work section the general definitions given in AS 4145.1 Section 2 apply.

Lock function: For the purposes of this work section the general definitions given in AS 4145.1 Appendix E apply.

1.4 SUBMISSIONS

Door-by-door schedule

General: Submit a door-by-door hardware schedule prepared using KABA products.

Information source: This work section and the contract drawings.

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.

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.

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.

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.

Samples
Generic items: Submit samples of hardware items offered as meeting the description of items not specified as proprietary items.

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.

Warranties
Requirement: Submit the following:

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.

2 PRODUCTS

2.1 GENERAL

Product substitution
Other products: Conform to **PRODUCTS**, **GENERAL**, **Substitutions** in the *General requirements* work section.

2.2 LOCKS AND LATCHES

Standard
General: To AS 4145.2.

Refurbishment and alteration work
Reuse of recovered hardware: Subject to approval of a proposal describing the standard of cleaning, repair and testing of recovered items and the location where each is to be reused.

2.3 DOOR HARDWARE HINGES

Butt hinge sizes
Size for door types: 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.

Measurement: 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.

Butt hinge materials

Doors fitted with closers: Provide low friction ball bearing hinges.

Fire doors: To AS 1905.1.

Power transfer hinges: Make sure they do not assume any load and are installed with other compatible hinges.

Lift-off doors: If toilet cubicles require lift-off doors provide lift-off hinges, detail the door panel with clearance at the head, and provide appropriate handles for lifting.

2.4 HINGE TABLES

Solid core doors

Number of hinges: Provide hinges to solid core doors to **Hinges table A**. Determine the number of hinges required based on the nominated door leaf size and weight only. For other door leaf sizes or for doors with applied finishes use the weight of the door to determine the number of hinges required. For a door leaf over 80 kg, use pivot hinges.

Size of hinges: Determine the size of the hinge based on the door leaf thickness:

- 35 to 43 mm thick door: 100 x 75 mm butt hinges with a minimum thickness of 2.5 mm.
- 44 to 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: Supply fixed pins to doors opening out or designated as a security doors. For all other doors, allow for loose pins.

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.

Hinge table A

Nominal door leaf size l x w x t (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
2400 x 1220 x 50	≤ 72	5
2040 x 920 x 70	≤ 88	Nominate pivot hinges

Aluminium doors
Application: Provide aluminium hinges for aluminium doors, or for doors of other materials in aluminium frames of a weight of 40 kg or less to **Hinge table B**.

Hinge table B

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

2.5 DOOR HANGING SYSTEMS

General
Requirement: Provide sliding door tracks as documented in the **Sliding track schedule**.

2.6 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.

2.7 DOOR CONTROLLERS

Standard
General: To AS 4145.5.

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.

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.

2.8 KEY AND CYLINDER SYSTEMS

Temporary construction keys and cylinders
Requirement: Provide one of the following:

- Loan cylinder: Install for construction locks and replace at practical completion.
- Construction keys: Keep up-to-date records of keys issued including recipient’s name, company and contact details, date issued and date returned.

Delivery of keys
Great grandmaster, grandmaster and master keys: Arrange for the manufacturer or supplier to deliver direct to the principal.

Number of keys: Two per code.

Group keying
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.

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

Labelling: 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.

3 EXECUTION

3.1 INSTALLATION

Locks

Cylinders: Fix vertically and with consistent key alignment.

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 make sure the exclusion of the contractor’s keys.

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.

0461B GLAZING

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide glazing, as documented.

Performance
Thermal qualities: U-value and Solar heat gain coefficient as documented.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following worksection(s):

- *General requirements*.

1.3 STANDARDS

Glazing
Glass type and thickness: To AS 1288, if 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.

Roof glazing: To AS 1288 Section 6.

Terminology for work on glass: To AS/NZS 4668.

2 PRODUCTS

2.1 GENERAL

Heat soaking
Requirement: All toughened and heat strengthened glass products.

Standard: To EN 14179-1.

Heat strengthening
Requirement: Heat strengthen all glass that requires extra strength and thermal resistance.

2.2 GLASS

Glass and glazing materials
Glass: 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.

U-Value / SHGC to G-1 Multi-Purpose Space

As per BCA requirements.

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 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.

Compounds, sealants and tapes
Glazing tapes: To AAMA 800, Products coded 804.3, 806.3, or 807.3, as applicable.

Glazing compounds: To AAMA 800 Products coded 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 Products coded 808.3.

Non-drying sealant: To AAMA 800 Products coded 809.2.

Expanded cellular glazing tape: To AAMA 800 Products coded 810.1.

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

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, stating and certifying the R_w rating, and identifying the testing authority. Remove when directed.

2.5 ANCILLARY MATERIALS

Extruded gaskets and seals
Materials: Non-cellular (solid) elastopressive seals as follows:

- 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.

Pile weather strips
Standard: To AAMA 701/702.

Material: Polypropylene or equivalent pile and backing, low friction silicone treated, ultraviolet 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.

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 openings and speaking holes. Process exposed glass edges to a finish not inferior to ground arrised.

3.2 INSTALLATION

Glazing
General: Install the glass as follows:

- Permanently fix in place each piece of glass to withstand the normal loadings and ambient conditions at its location without distortion or damage to glass and glazing materials.
- No transfer of building movements to the glass.
- Watertight and airtight for external glazing.

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.

3.3 COMPLETION

Maintenance manual

Requirement: Submit manufacturers' published recommendations for service use.

Replacement

Requirement: Replace damaged glass and leave the work clean, polished, free from defects, and in good condition.

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

Glazing subcontractor's warranty: Provide an undertaking conditional only on compliance with the manufacturers' recommendations for maintenance, to repair or replace glass and glazing materials that become defective or prove unsuitable for the nominated application; during the warranty period.

Glass manufacturer's warranty: Provide 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 super insulating glass units): Units in which the metallic coating shows evidence of manufacturing defects, including but not necessarily limited to cracking or peeling, as determined in conformance with ASTM C1048.

Toughened glass warranty: Provide a manufacturer's warranty certifying that toughened glass supplied for use in curtain walls has been subjected to a heat soaking process that has converted at least 95% of the nickel sulfide content to the stable beta-phase.

0471 THERMAL INSULATION AND PLIABLE MEMBRANES

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide insulation and pliable membrane systems, as documented and as follows:

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

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.

1.3 INTERPRETATION

Definitions

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

- Thermal insulation: To AS/NZS 4859.1.
- Pliable building membrane: To AS/NZS 4200.1 and equivalent to sarking-type materials as defined in the BCA.
- Fire hazard properties: To BCA A2.4.
- Fibre batts: Flexible insulation supplied as factory cut pieces and composed of mineral wool (glass and rock fibre) or polyester fibre.
- FBS-1 (fibre-bio-soluble) mineral wool: Insulation composed of bio-soluble glass or rock fibres.
- Vapour permeable (breathable) membrane: A flexible membrane material, normally used for secondary waterproofing that allows for the transmission of water vapour.

1.4 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the pliable membrane and insulation before they are covered up or concealed.

1.5 SUBMISSIONS

Fire hazard properties

General: Submit evidence of conformance to **INSULATION AND PLIABLE MEMBRANE MATERIALS**, **Fire hazard properties**.

Thermal insulation properties

Evidence required: Conformance to AS/NZS 4859.1.

Warranties

Manufacturer's published product warranties: Submit on completion.

2 PRODUCTS

2.1 MARKING

Identification

General: Deliver materials to the site in the manufacturer’s original sealed packaging, legibly marked to show the following:

- Manufacturer’s identification.
- Product brand name.

- Product type.
- Quantity.
- Product reference code and batch number.
- Date of manufacture.
- Material composition and characteristics such as volatility, flash point, light fastness, colour and pattern. Provide technical data sheets if not shown on labels.
- Handling and installation instructions.
- Material safety data sheets.

2.2 INSULATION AND PLIABLE MEMBRANE MATERIALS

Fire hazard properties

Insulation: Fire hazard indices for all materials when tested in conformance with AS/NZS 1530.3:

- Spread of flame index: ≤ 9.
- Smoke developed index: ≤ 8 if spread of flame > 5.
- Materials with reflective facing: Test to AS/NZS 1530.3 and the recommendations of clause A6.

Pliable membranes: Flammability index < 5 when tested in conformance with AS 1530.2.

Insulation

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

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

Polyester: To AS/NZS 4859.1 Section 7.

Polyisocyanurate (rigid cellular RC/PIR): To AS 1366.2.

Polystyrene (extruded rigid cellular RC/PS-E): To AS 1366.4.

Polystyrene (moulded rigid cellular RC/PS-M): To AS 1366.3.

Polyurethane (rigid cellular RC/PUR): To AS 1366.1.

Polyurethane (sprayed): To AS 1366.1 Table 2.

Wet processed fibreboard (including softboard): To AS/NZS 1859.4.

Wool: To AS/NZS 4859.1 Section 6.

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

Certification: Required.

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

Pliable membranes

Standard: To AS/NZS 4200.1.

Vapour barrier:

- Vapour barrier classification: High.

Sarking membrane (other than walls and gables):

- Water barrier classification: High.

Vapour permeable (breathable) membrane:

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.

Refer to Architecture 1:20 scale Sections for Min R.Value performance requirements.

3 EXECUTION

3.1 ROOF INSULATION

General

Location: The whole of the roof area including skylight shaft walls, except the following:

- Eaves, overhangs, skylights, vents and openings.
- Roofs to outbuildings, garages, and semi-enclosed spaces such as verandahs, porches and carports.

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/NZS 4389.

Pliable membranes

Sarking membrane:

- Location: Provide sarking under tile and shingle roofing.

Vapour barrier:

- Installation: Lay over the roof framing with sufficient sag to allow the bulk insulation to achieve its full thickness. Overlap all edges 150 mm and seal all joints with pressure sensitive adhesive tape.

3.2 COMPLETION

Warranties

Insulation and pliable membranes: Submit the manufacturer's published product warranties.

4 SELECTIONS

4.1 SCHEDULES

Insulation Schedule

Code	**INS-01**
Company	Kingspan Insulation or equal to
Product	Air-Cell Retroshield XL
Thickness	50 mm blanket (R1.3)
Application	For underside of roof over G-1 Multi-Purpose Space + G-2 Unisex Access W.C.

0551B JOINERY

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide joinery, as documented.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following worksection(s):
- *General requirements*.

1.3 STANDARDS

General
Tactile indicators: To AS/NZS 1428.4.1.

1.4 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.
- 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.

1.5 TOLERANCES

General
Requirement: Fabricate and install joinery items to substrates undamaged, plumb, level, straight and free of distortion and to the **Tolerances table.**

Tolerances table

Property	Tolerance
Plumb and level	1:800
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	0
Joints in finished surfaces	0

1.6 SUBMISSIONS

Installation of proprietary items
General: Submit the manufacturer's standard drawings and details showing:
- Methods of construction.
- Assembly and fixing, with dimensions and tolerances.

Maintenance manual
General: Submit manufacturer's published recommendations for service use.

Samples - clear finished
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 that best describes the detail, showing the following:
- 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.
- Details of fabrication involving other trades or components.
- 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: Before fabrication.

Subcontractors
General: Submit names and contact details of proposed suppliers and installers.

2 PRODUCTS

2.1 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.

Deficiencies: Examine joinery units for completeness and remedy deficiencies.

2.2 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 for trim: To AS 2796.1.

Hardwood for furniture: To AS 2796.3.

Seasoned cypress pine: To AS 1810.

Softwood for trim: To AS 4785.1.

Softwood for furniture: To AS 4785.3.

Finished sizes of milled timbers: Not less than the documented dimensions unless qualified by a term such as nominal, out of or ex to which industry standards for furnished 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 B.

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.

Stone facings
General: Provide stone or engineered stone slabs within the visual range of the approved samples. Repair mud veins or lines of separation that are integral to the selected pattern with resin fillers and back lining.

Splashbacks
Glass: 6 mm toughened colourback glass.

- Standard: To AS/NZS 2208.

Stainless steel: Grade 304, fine linished finish.

2.3 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.

Requirement: 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.

2.4 JOINERY ITEMS

General
Refer to documents as follows:

- Drawings: Joinery units and their location, indicative construction details, scribes and trims, materials, dimensions and thicknesses, and finishes.
- Drawings: Confirm on site all dimensions noted, after the completion of partitions.
- Finishes schedules or drawings: Finishes selections.
- Specification: Joinery hardware fittings and systems.

2.5 JOINERY 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:

- Overlaid high moisture resistant particleboard.
- 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: Not exceeding 2400 mm high, 900 mm wide, 1.5 m^2 on face.

Drawer fronts: Rout for drawer bottoms.

Drawer backs and sides

Material: PVC film wrapped particleboard.

Thickness: 12 mm.

Installation: Mitre corners leaving outer skin of foil intact, finish with butt joints, glue to form carcass and screw to drawer front. Rout for drawer bottoms.

Drawer bottoms

Material: PVC film laminated hardboard.

Thickness: 3 mm.

Drawer and door hardware

Hinge types: Concealed metal hinges with the following features:

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

Angle of opening: [complete/delete]

- Nickel plated.

Piano hinges: Chrome plated 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.

2.6 WORKING SURFACES

Laminated benchtops

Finish: High-pressure decorative laminated sheet.

Exposed edges: Extend laminate over shaped nosing, finishing more than 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.

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.

Acclimatisation: Acclimatise the joinery items by stacking in the in-service conditions with air circulation to all surfaces after the following are complete:

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

Concealed surfaces: Prime surfaces concealed by substrates.

Substrate: Damp clean and vacuum substrate surfaces that will be permanently concealed.

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 substrates 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.

Benchtops

Installation: Fix to carcass at least twice per 600 mm length of benchtop.

Joint sealing: Fill joints with sealant matching the finish colour and clamp with proprietary mechanical connectors.

Edge sealing: Seal to walls and carcasses with a sealant, which matches the finish colour.

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 walnuts of adhesive together with double sided adhesive tape for temporary support, and affix directly to the substrate.

Labelling

General: Permanently mark each unit of furniture with the manufacturer's name, on an interior surface.

3.2 TRIM

General

General: Provide trim such as beads, mouldings, stops and skirtings to make neat junctions between lining components, finishes and adjacent surfaces.

Fixing

To masonry walls: Wall plugs at 600 centres.

To stud walls: Nail to plate or framing at 600 centres.

3.3 COMPLETION

Protection

Timber treads: Provide full timber or plywood casing.

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 powder coated metals, sanitaryware, glass, tiles and laminates.

0552B METALWORK - FABRICATED

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide metal fixtures that are:
- Undamaged, plumb, level and straight.
- Free of surface defects or distortions.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following worksection(s):
- *General requirements*.

1.3 STANDARDS

General
Access for maintenance: To AS 1657.
Tactile indicators: To AS/NZS 1428.4.1.

1.4 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.

1.5 SUBMISSIONS

Installation of proprietary items
General: Submit the manufacturer’s standard drawings and details showing:
- Methods of construction.
- Assembly and fixing, with dimensions and tolerances.

Maintenance manual
General: Submit manufacturer’s published recommendations for service use.

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.

Shop drawings
General: Confirm on site all dimensions and 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.

Subcontractors
General: Submit names and contact details of proposed suppliers and installers.

2 PRODUCTS

2.1 MATERIALS AND COMPONENTS

Metals and components
Performance: Provide metals in sections of strength and stiffness suited to their required function, finish and method of fabrication.

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.

Tolerances: ± 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 use butt joints relying on the filler metal fillet only.

Filler metal: [complete/delete]

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 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 piping to the building structure with fixings, including bolts into masonry anchors, and coach screws or bolts into timber, of metal compatible with the piping.

Galvanizing

General: If possible, complete fabrication before galvanizing; otherwise apply a zinc-rich primer to affected joint surfaces

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

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.

0581B SIGNS AND DISPLAY

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide signage systems, as documented and as follows:

- Appropriately secured.
- Located within a clear line of vision.
- To contrast with the background.
- With clean, well defined edges or arises, and free from blemishes.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.

1.3 STANDARDS

Signs

Safety signs - design and use: To AS 1319.

Signs and graphics for disabled access: AS 1428.1 and AS 1428.2.

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.

Photoluminiscent exit signs: To BCA E4.8(b).

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: Cut lettering to expose the lower laminate.

Engraved and filled: Lettering precision cut 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

Exit signs, Class 2, in lieu of illuminated exit signs

Position	On, above, or adjacent every door in BCA clause E4.5
Message	EXIT
Letter height (minimum)	25 mm
Sign type	
Compliance	BCA E4.5 and BCA E4.7

Braille and tactile exit signage-buildings required to be accessible

Position	To BCA Spec D3.6 for every door in BCA E4.5
Message	Exit (and) Level (followed by the floor level number)
Letter height (minimum)	BCA Spec D3.6
Sign type	
Compliance	BCA E4.5, BCA D3.6 and BCA Spec D3.6

Portable fire extinguishers – cabinet

Position	Cabinet
Message	FIRE EXTINGUISHER
Letter height (minimum)	32 mm
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 height (minimum)	16 mm

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 height (minimum)	
Sign type	Computer generated adhesive backed vinyl graphic
Compliance	BCA E1.6 AS 2444 clauses 6.3, 6.4 and Fig 6.1 Fire Brigade

Unisex accessible sanitary facilities

Position	To BCA Spec D3.6
Message	Braille and tactile signage incorporating the international symbol of access. Indicate suitability for left or right handed use.
Symbol size	AS 1428.2 clause 16, Table 1.
Letter height (minimum)	Braille: BCA Spec D3.6 Raised characters: Sans serif type font 20 mm.
Sign type	
Compliance	AS 1428.1 BCA D3.6

Ambulant sanitary facilities

Position	To BCA Spec D3.6
Message	Braille and tactile signage incorporating the male/ female ambulant symbol.
Symbol size	AS 1428.2 clause 16, Table 1.
Letter height (minimum)	Braille: BCA Spec D3.6 Raised characters: Sans serif type font 20 mm.
Sign type	
Compliance	AS 1428.1 BCA D3.6

Non-accessible sanitary facilities

Position	At each bank of sanitary facilities that are not provided with an accessible unisex sanitary facility.
Message	Braille and tactile signage incorporating the international symbol of access. Indicate location of the nearest accessible unisex sanitary facility.
Letter height	AS 1428.2 clause 17, Table 2.
Symbol size	AS 1428.2 clause 16, Table 1.

Sign type	
Compliance	AS 1428.1 BCA D3.6

Non-accessible pedestrian entrance

Position	At each non-accessible pedestrian building entrance.
Message	Signage incorporating the international symbol of access to direct a person to the location of the nearest accessible pedestrian entrance
Letter height	AS 1428.2 clause 17, Table 2.
Symbol size	AS 1428.2 clause 16, Table 1.
Sign type	
Compliance	AS 1428.1 BCA D3.6

Hearing augmentation

Position	Where hearing augmentation is installed to BCA D3.7
Message	Braille and tactile signage incorporating the international symbol of deafness. Identify: Type of hearing augmentation. Area covered within the room. If receivers are being used and where the receivers can be obtained.
Letter height (minimum)	BCA Spec D3.6
Symbol size	AS 1428.2 clause 16, Table 1
Sign type	
Compliance	BCA D3.7 BCA Spec D3.6 AS 1428.1

0611 RENDERING AND PLASTERING

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide plaster finishes as documented and 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.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.

1.3 INTERPRETATION

Abbreviations

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

- W.REN-01: Acrylic render – finish painted colour tbc by architect.
- W.PNT-02: Cement render – finish painted colour tbc by architect.

Definitions

General: For the purposes of this worksection the following definitions 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 before 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 coating system.
- Finishing treatment: The treatment applied to a finish coat which may include processes and results as follows:
- Wood float: Plaster laid on with a trowel and finished with a dry wood float as soon as the wet sheen has disappeared from the surface.
- Sponge: Plaster laid on thinly with a trowel, floated up with a wood float and lightly finished with a sponge.
- Smooth (dado) finish: Cement based plaster laid on with a trowel, skimmed with a wood float and trowelled down. Surface is trowelled to a smooth, dense finish as the plaster stiffens and no water 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.
- 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: Contains Portland cement as the principal binder.
  . Gypsum plaster: Contains 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.

1.4 INSPECTION

Notice

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

- Prototypes ready for inspection.
- Substrates immediately before applying base coats.
- Finish treatments before decoration.

1.5 SUBMISSIONS

Prototypes

Plaster systems: Prepare prototypes of each plaster system complete with beads and other embedded items:

- Size: 1200 x 2400 mm.

2 PRODUCTS

Refer to Finishes schedule.

2.1 MATERIALS AND COMPONENTS

Accessories

Beads: Provide metal proprietary sections manufactured to be fixed to substrates and/or embedded in the plaster to form and protect plaster edges and junctions.

Lath: Provide a proprietary product manufactured from raised expanded metal for use with plaster:

- Mass/unit area: 1.84 kg/m^2 or greater.
- Material thickness: 0.70 mm or greater.
- 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: 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

Sieve size	Percent passing	
	Minimum	**Maximum**
300 µm	10	30
150 µm	0	5
75 µm	0	3

Plaster for autoclaved aerated concrete

General: Provide a proprietary product manufactured for use with the wall system.

Bonding products

General: Provide proprietary products manufactured for bonding cement-based plaster to solid substrates.

Cement

Standard: To AS 3972.

Type: GP.

Colouring products

General: Provide proprietary products manufactured for colouring cement plaster.

Integral pigment proportion: 5% maximum weight of cement.

Cornice cement

General: Provide a proprietary product manufactured for use with the cornice.

Cornices

Cast plaster: Proprietary item.

Corrosion resistance and durability

Compliance: 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:

- Galvanize: To AS/NZS 4680.

Corrosion resistance and durability table – Atmospheric corrosivity category - A and B to AS/NZS 2312

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 Stainless 316	CRW
	Powder coated aluminium	CRM

Corrosion resistance and durability table – Atmospheric corrosivity category - C to AS/NZS 2312

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	CRM
External	Stainless 316 Powder coated aluminium	CRM

Corrosion resistance and durability table– Atmospheric corrosivity category - D and F to AS/NZS 2312

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	CRS
[1] Avoid organic coating in Category F zones.		

Curing products

General: Provide proprietary products manufactured for use with the plaster system.

Gypsum plaster

General: Provide a proprietary product containing calcium sulfate hemihydrate with additives to modify setting.

Lime

Limes for building: To AS 1672.1.

Lime putty

General: Prepare lime putty as follows:

- Stand dry hydrate of lime to AS 1672.1 and water for 24 hours or more without drying out.
- Stand quicklime and water for 14 days or more without drying out.

Metal lath

Internal: Expanded metal to AS 1397 coating class Z350.

External: Stainless steel or PVC-U.

Mixes

General: Select a mix proportion to suit the conditions of application conforming to the **Mix proportion tables**.

Measurement: Measure binders and sand by volume using buckets or boxes. Do not allow sand to bulk by absorption of water.

Plaster mixing: Machine mix for 3 to 6 minutes.

Strength of successive coats: Make sure successive coats are no richer in binder than the coat to which they are applied.

Mix proportion table – Cement render, by volume

Mix type		Substrate	Upper and lower limits of proportions by volume		
Mix type		**Substrate**	**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 -	CRF	Cement render	1	1	5

Mix type		Substrate	Upper and lower limits of proportions by volume		
External		base coats	1	2	6

Mix proportion table – Gypsum finish coat, by volume

Mix type		Substrate	Upper and lower limits of proportions by volume			
			Gypsum	Cement	Lime putty	Sand
Gypsum finish coats	GPF	Cement render base coats	1 1	- -	1.5 2	- -

Mix proportion table – Gypsum finish coat, by weight

Gypsum plaster (kg)	Lime putty (kg)
17	25
34	50
51	75

Control joint products

General: Provide proprietary products manufactured for use with the plastering system and to accommodate the anticipated movement of the substrates and/or the plaster.

Water

General: Clean and free from any deleterious matter.

3 EXECUTION

3.1 PREPARATION

Substrates

General: Provide substrates as follows:

- Clean and free from any deposit or finish which may impair adhesion of plaster.
- If framed or discontinuous, support members in full lengths without splicing.
- If solid or continuous, remove excessive projections hacked off and fill voids and hollows with plaster stronger than the first coat and not weaker than the substrate.

Absorbent substrates: If suction is excessive, control it by dampening without 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 before applying a bonding treatment.

Painted surfaces: Remove paint and hack the surface at close intervals.

Untrue substrates: If the substrate is not sufficiently true for conformity with the thickness limits for the plaster system, or has excessively uneven suction resulting from variations in the composition of the substrate, apply additional coats without exceeding the thickness limits for the substrate or system.

Beads

Location: Fix beads as follows:

- Angle beads: At all external corners.
- Drip beads: At all lower terminations of external plaster.
- Beads for control of movement: At all control joints.
- Stop beads: At all terminations of plaster and junctions with other materials or plaster systems.

Joints in beads: Provide dowels to maintain alignment.

Mechanical fixing to substrate: ≤ 300 mm centres.

Bonding treatment

General: If bonding treatment is required, throw a wet mix onto the background. Mix proportions to the following:

- Cement plaster (cement:sand): 1:2.
- Gypsum plaster (gypsum:sand): 1:2.

Curing: Keep continuously moist for 5 days or more and allow to dry before applying plaster coats.

Thickness: ≥ 3 < 6 mm.

Embedded items

General: To the **Corrosion resistance and durability table**. If there are water pipes and other embedded items, sheath them to permit thermal movement.

Lath

Location: Provide lath as follows:

- Chases: If chases or recesses are 50 mm wide or greater, fix metal lath extending 75 mm or more beyond each side of the chase or recess.
- Fit metal lath to masonry and concrete substrates:
- Metal and other non-porous substrates: Fix metal lath to provide a key.

Installation: Fix lath as follows:

- 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 at centres of 150 mm or less. 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.

3.2 APPLICATION

Plastering

Base coats: Scratch-comb each base coat in two directions when it has stiffened.

Metal lath: Press the plaster through the apertures of expanded metal lath and wings of beads.

Finishing treatments

Plain:

- Bag: Rub the finish coat when set firm.
- Carborundum stone: Rub the finish coat when set hard with a carborundum stone to achieve a finish free from sand.
- Foam float: Float finish coat on application with a wood or plastic float to an even surface and finish with a foam float to achieve a fine sand textured finish.
- Steel trowel: Steel trowel finish coat to a smooth dense surface which is not glass-like and is free from shrinkage cracks and crazing.
- Wood or plastic float: Float the finish coat on application to an even surface with a wood or plastic float.

Incidental work

General: Return plaster into reveals, beads, sills, recesses and niches. Plaster faces, ends, and soffits of projections in the substrate, such as string courses, sills, pilasters and corbels. Run neatly finished throating on soffits of external projections. Trim around openings. Plaster exposed internal surfaces of built-in cupboards.

Joining up

General: If joining up is required, make sure joints are imperceptible in the finished work after decoration.

Control joints

General: Provide joints in the finish to coincide with control joints in the substrate. Make sure that the joint in the substrate is not bridged during plastering.

Size:

- Depth: Extend the joint right through the plaster and reinforcement to the substrate.
- Width: 3 mm, or the same width as the substrate joint, whichever is greater.

Damp-proof courses: Do not continue plaster across damp-proof courses.

Plastering on metal lath: Provide control joints to divide the plastering area into rectangular panels of 10 m^2 or less.

V-joints: Provide V-joints, cut right through the plaster to the substrate, at the following locations:

- Abutments with metal door frames.
- Abutments with other finishes.
- Junctions between different substrates.

Cornices

General: Accurately cut and mitre corners. Match and align ornament. Do not make butt joints in the length of a cornice unless required, or full lengths are not available, .

Installation: Butter edges, mitres and joins for the full length of the cornice with adhesive.

Mechanical fixing: If cornice projects across a ceiling 400 mm or more, provide additional mechanical fixing:

- Fixing centres: ≤ 600 mm.

Plaster thickness

General: 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 less or 30ºC or more make sure that the temperature of mixes, substrates and reinforcement at the time of application are between 5ºC and 35ºC.

3.3 TOLERANCES

General

Tolerances: 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 up to 300 mm	Square	3 mm max
Reveals, piers, beams, wall stop ends over 300 mm	Square	5 mm max
Radius of corners	Round	Should not vary by more than ± 10% over the length of the arris.

3.4 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 a cornice projects across a ceiling 400 mm or more, 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.

0621 WATERPROOFING – WET AREAS

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide wet area waterproofing systems as documented which:
- Are graded to floor wastes to dispose of water without ponding.
- Prevent moisture entering the substrate or adjacent areas.
- Refer finishes schedule for colour specification and location: Appendix C

1.2 CROSS REFERENCES

General
Requirement: Conform to the following worksection(s):
- *General requirements*.

1.3 STANDARDS

Wet areas
Standard: To AS 3740.

1.4 INTERPRETATION

Definitions
General: For the purposes of this worksection the definitions given in AS 3740 and the following apply:
- Substrates: The surface to which a material or product is applied.
- Bond breaker: A system preventing a 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.
  . Applied in liquid or gel form and air cured to form a seamless film.
  . Applied in sheet form with joints lapped and sealed.
- Preformed shower base: A preformed, prefinished vessel (including integral upstands) installed as the finished floor of a shower compartment, and provided with a connection point to a sanitary drainage system.
- Shower tray: An internal or external liquid or sheet membrane system used to waterproof the floor and the wall/floor junctions of a shower area.
- 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 that inspection may be made of the following:
- Substrate preparation completed.

- Secondary layers preparation completed.
- Before membranes are covered up or concealed.

1.6 SUBMISSIONS

Execution records
Placing records: Photographically record the application of membranes and information as follows:
- Date.
- Portion of work.
- Substrate preparation.
- Protection provided from traffic.

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.

Samples
General: Submit 300 x 300 mm samples of each type of membrane.

Shop drawings
Submit shop drawings showing:
- Junctions with vertical surfaces and upstands.
- Junctions at perimeters.
- Drainage details.
- Control joints.
- Flashings.
- Penetrations.
- Corners.
- Terminations and connections.

2 PRODUCTS

2.1 PRODUCTS

Membranes
Standard: To AS/NZS 4858.

Membrane systems
Requirement: Provide a proprietary membrane systems certified as suitable for the intended wet area waterproofing.

Shower tray
General: Purpose-made jointless shower tray, with wall upstands at least 50 mm higher than the hob upstands. Set hob masonry on the inside of the tray upstands.

Water stop angles
Material: Rigid, corrosion resistant angles compatible with the waterproof membrane system.

Bond breakers
Requirement: Compatible with the flexibility class of the membrane to be used.

Material: Purpose made bond breaker tapes and closed cell foam backing rods or fillets of sealant.

Flashings
Requirement: Flexible waterproof flashings compatible with the waterproof membrane system.

Liquid membrane reinforcement
Requirement: Flexible fabric compatible with the waterproof membrane system.

Sealants
Requirement: Waterproof, flexible, mould-resistant and compatible with host materials.

Adhesives
Requirement: Waterproof and compatible with host materials.

3 EXECUTION

3.1 PREPARATION

Substrates
General: Make sure substrates are as follows:

- Clean and free of any deposit or finish which may impair adhesion of membranes.
- If walls are plastered, remove loose sand.
- If walls or floors are framed or discontinuous, support members are in full lengths without splicing.
- If floors are solid or continuous:
  - Excessive projections are removed.
  - Voids and hollows greater than 10 mm with abrupt edges are filled with a cement:sand mix not stronger than the substrate nor weaker than the bedding.
  - Depressions less than 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.

External corners: Round or arris edges.

Moisture content
Concrete substrates: Cure for at least 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 1884 Appendix A.

Test type:

- Hygrometer test: Seal a hygrometer to the substrate for at least 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, make sure the fall in the substrate conforms to the fall nominated for the finish.

Sheet substrate fastening
Requirement: Fasten or adequately fix to the supporting structure.

Control joints
Finishes: Align control joints in finishes and bedding with control joints or changes in materials in the substrate.

Water stop angles
Requirement: Provide water stop angles at door thresholds and shower enclosures to support the waterproof membrane at junctions between waterproofed and non-waterproofed areas.

Sizing: Size the vertical leg of the water stop angle to conform to the requirements of AS 3740.

Corners: Cut the horizontal leg and bend the vertical leg at corners instead of forming vertical joints between separate lengths of angle.

Fixing: Fix water stop angles to the substrate with compatible sealant or adhesive and corrosion-resistant countersunk or wafer head screws.

Priming
General: If required by the membrane manufacturer, prime the substrates with a primer compatible with the membrane system.

Bond breakers
Requirement: After the priming of surfaces, provide bond breakers at all wall/floor, hob/wall junctions and at control joints where the membrane is bonded to the substrate.

Sealant fillet bond breakers:

- Application: Form a triangular fillet or cove of sealant to internal corners within the period recommended by the membrane manufacturer after the application of the primer.
- Widths: 5 mm x 5 mm to vertical corners. 6 mm x 6 mm – 9 mm x 9 mm to horizontal corners.

Backing rod bond breakers: Retain in position with continuous length of tape pressed firmly in place against the surfaces on each side of the rod.

3.2 APPLICATION

Protection

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

Extent of waterproofing

Waterproof or water resistant surfaces: To the requirements of BCA F1.7.

Sheet membrane joints

Bituminous sheet membranes:

- Side laps at least 75 mm.
- End laps at least 100 mm.

Synthetic rubber membranes:

- Factory-vulcanized laps at least 40 mm.
- Field side laps at least 50 mm for side laps.
- Field end-laps at least 100 mm for end laps.

PVC membranes:

- Factory welded laps at least 30 mm.
- Field–welded laps at least 75 mm.

Vertical membrane terminations

Upstands: At least 150 mm above the finished tile level of the floor or 25 mm above the maximum retained water level, whichever is the greater.

Anchoring: Secure sheet membranes along the top edge.

Edge protection: Protect edges of the membrane.

Flashings

Junctions between waterproof surfaces: Provide a bond breaker at internal corners behind flashings.

Junctions between waterproof surfaces and other surfaces: Provide a bead of sealant at the following junctions:

- Waterproof and water-resistant surfaces.
- Water-resistant and water-resistant surfaces.
- Water-resistant and non water-resistant surfaces.

Perimeter flashings: Provide continuous flashings to the full perimeter of waterproof areas at wall/floor junctions and to water stop angles.

Vertical flashings: Provide vertical corner flashings continuous across wall/wall junctions to at least 1800 mm above finished floor level.

Vertical liquid applied flashings:

- Return legs at least 40 mm on each wall.
- Overlap the vertical termination of the floor waterproofing membrane at least 20 mm.

Vertical sheet flashings:

- Return legs at least 50 mm on each wall.
- Overlap shower tray upstands at least 50 mm.
- Do not penetrate flashing with wall lining fasteners.

Reinforcement: At coves, corners and wall/floor junctions with gaps greater than 3 mm reinforce liquid applied membranes with reinforcement fabric tape recommended by the membrane manufacturer. Fold the tape in half lengthways and imbed it in the first flashing coat of membrane with one half of the tape on each side of the corner or joint. Apply a second coat of liquid membrane to seal the fabric.

Door jambs and architraves

Requirement: If the bottom of doorjambs and architraves do not finish above the floor tiling, waterproof their surfaces below tile level to provide a continuous seal between the perimeter flashing to the wall/floor junction and the water stop angle.

Drainage connections

Floor wastes: Provide floor wastes of sufficient height to accommodate the thickness of floor finishes and bedding at the outlet position. Position drainage flange to drain at membrane level. Turn membrane down 50 mm minimum into the floor waste drainage flanges, and adhere to form a waterproof connection.

Floor wastes in shower trays: Provide drainage of the tile bed and a waterproof connection between the tray and the drain.

Preformed drainage channels with continuous drainage flanges: Provide a continuous waterproof connection between the membrane and the channel.

Preformed drainage channels without drainage flanges: Provide continuous waterproofing under the channel and terminate the membrane at a floor waste with a recessed drainage flange.

Enclosed showers with hobs

General: Construct from masonry, concrete or corrosion-resistant metal. Fix securely to the floor, seal against walls and make flush all gaps, joints and intersections before applying the membrane.

Autoclaved aerated concrete hobs: Do not use for external membrane systems. Prime before applying the membrane.

Internal membranes: Extend membrane over the hob and into the room at least 50 mm.

External membranes (hob located inside membrane tray): Dress membrane up outside of hob and finish at the underside of tiles capping the top of the hob.

Enclosed showers with step-downs

Levels: Conform to AS 3740 Figure 3.5 and as follows:

- Finish the highest level of the shower area at a level at least 15 mm below the finished floor level outside the shower.
- Extend the membrane at least 10 mm above the maximum retained water level in the area outside the shower or 150 mm above the finished floor level of the shower area, whichever is the greater.

With framed shower screens: Terminate the membrane directly below the floor tiles below the shower screen sill mounted on the upper level of the step-down. Support and adhere the membrane to a water stop angle fixed securely to the upper level substrate.

With frameless shower screens: Install the shower screen with the inside face flush with the step-down. Terminate the membrane outside the shower screen at least 1500 mm from the shower rose outlet on the wall. Support and adhere the membrane to a water stop angle fixed securely to the substrate. Finish membrane flush with the underside of tiles.

Enclosed hobless showers with framed shower screens

Requirement: Conform to AS 3740 Figure 3.6 and as follows:

- Turn the membrane up against a water stop angle fixed securely to the substrate directly below the shower screen sill.
- Size the angle so that the vertical leg finishes at least 5 mm above the level of the tiles.

Support and adhere the membrane to the angle and finish it flush with the top of the vertical leg.

Enclosed hobless showers with trench drain located below screen

With framed or frameless shower screens: Install a water stop angle where the outer edge of the trench drain to the perimeter of the shower will be installed. Size the angle so that the vertical leg finishes at the underside of the tiles. Support and adhere the membrane over the water stop angle and terminate the membrane at floor wastes as described in **Drainage connections**. Install the trench drain with the shower screen located vertically above it.

Unenclosed showers

Requirement: Extend membrane at least 1500 mm into the room from the shower rose outlet on the wall.

Preformed shower bases

Support: Fully support shower bases without causing distortion or cracking.

Junction with walls for bases with integral perimeter upstands: Conform to AS 3740 Figure 3.1 and as follows:

- Recess shower base into walls or batten off wall lining sufficiently to allow water-resistant wall finishes to overlap the integral upstands along the top edge of the shower base.
- Maintain the structural integrity of walls that are rebated.

Taps and spouts

Requirement: Waterproof penetrations for taps and spouts with proprietary flange systems or a sealant.

Provision for servicing: Install taps in a manner that allows tap washers or ceramic discs to be serviced without damaging the waterproofing seal.

Recessed soap holders

Construction: Support all faces of the recess and line with the same sheet material as the adjacent wall. Fall base of recess towards the shower area. Flash all junctions and waterproof all surfaces.

Membrane horizontal penetrations

Sleeves: Provide a flexible flange for all penetrations, bonded to the penetration and to the membrane.

Membrane vertical penetrations

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

Curing of liquid applied systems

General: To the manufacturers instructions.

Curing: Allow membrane to fully cure before tiling.

Overlaying finishes on membranes

Requirement: Protect waterproof membranes with compatible water-resistant surface materials that do not cause damage to the membrane.

Suitable materials: Conform to AS 3740.

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

3.3 FLOOD TEST

General

Application: Perform a flood test before the installation of surface finishes.

Moisture measurement method: Conform to AS/NZS 2455.1 Appendix B.

Set-up:

- Measure the wall/floor junction of adjacent spaces and the floor soffit below for dryness.
- 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 floor soffit below for obvious water or moisture.
- Test the same areas for dryness and compare the results to the measurements taken before flooding.

Compliance:

- Evidence of water from the visual test: Failure.
- No visual evidence of water: Proceed with moisture measurements.
- Test results indicating an increase in moisture 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 RESPONSIBILITIES

General

Requirement: Provide tiling systems to walls, floors and other substrates as documented and as follows:

- 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

Requirement: Conform to the following worksection(s):

- Refer finishes schedule for colour specification and location: Appendix C

1.3 STANDARDS

Tiling

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

Slip resistance

Classification: To AS 4586 for the documented classifications.

Slip resistance measurement of completed installations: To AS 4663.

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 sealant colours before application.

1.5 TOLERANCES

Completed tiling

Standard: To AS 3958.1 clause 5.4.6.

1.6 SUBMISSIONS

Samples

General: Submit labelled samples of tiles, including fittings, accessories, grout and sealants, illustrating the range of variation in colour and finish.

Tests

Type tests: Submit results, as follows:

- Type test slip resistance of tiles to AS 4586.

Other tests: Submit results, as follows:

- Site slip resistance test of completed installation to AS 4663.

2 PRODUCTS

Refer to Finishes schedule.

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 UNDERLAY

Acoustic underlay
General: Provide proprietary product recommended by the manufacturer as being intrinsic to and compatible with the tiling system.

2.3 TILES AND ACCESSORIES

Tiles
Standard: To AS ISO 13006.

Tactile ground surface indicators: To AS/NZS 1428.4.1.

Coves, nosings and skirtings: Provide matching stop-end and internal and external angle tiles moulded for that purpose.

Exposed edges: Purpose-made border tiles with the exposed edge (whether round, square or cushion) glazed to match the tile face. If such tiles are not available, mitre tiles on external corners.

2.4 ADHESIVES

Type
General: Provide adhesives 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.

2.5 MORTAR

Materials
Cement type to AS 3972: GP.

- White cement: Iron salts content ≤ 1%.
- Off-white cement: Iron salts content ≤ 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
Mix proportion (cement:sand), by volume: Select proportions from the range 1:3 to 1:4 for satisfactory adhesion. Provide minimum water.

Terra cotta tiles: Use proprietary polymer modified mortar.

Mixing: To AS 3958.1 clause 2.15.

Water
General: Clean and free from any deleterious matter.

2.6 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.

General purpose cement based grout: Mix with fine sand. Provide minimum water consistent with workability.

Mix proportions (cement:sand), by volume:

- For joints < 3 mm: 1: 2.
- For joints ≥ 3 mm: 1:3.

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.

2.7 CONTROL JOINTS

Control joint materials
General: As documented in the **Control joint schedule**.

Control 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 finished surface.

- Floors: Trafficable, shore hardness greater than 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 less than 5°C or greater than 35°C, do not lay tiles.

Substrates without wet area membranes
General: Conform to the following:

- Clean off 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:
  . Remove excessive projections.
  . Fill voids and hollows greater than 10 mm with abrupt edges with a cement:sand mix not stronger than the substrate or weaker than the bedding.
  . Fill depressions less than 10 mm with a latex modified cementitious product and eliminate feathering by scabbling the edges.

Absorbent substrates: If suction is excessive, control it by dampening but avoid over-wetting and do not apply mortar bedding to substrates showing surface moisture.

Dense concrete: If not sufficiently rough to provide a mechanical key, roughen by scabbling or the like to remove 3 mm of the surface and expose the aggregate; then apply a bonding treatment.

Substrates with wet area membranes

General: 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 FIXING UNDERLAY

Underlay fixed on joists

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.

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, fix with stainless steel countersunk head screws.

3.4 TILING GENERALLY

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 soap holders. Rub edges smooth without chipping.

Laying: Return tiles into sills, reveals and openings. Butt up to returns, frames, fittings, and other finishes. Strike and point up beds where exposed. Remove tile 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.

3.5 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.

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 a 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.

3.6 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.

3.7 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 to 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 use 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.

3.8 CONTROL OF MOVEMENT

General

General: Provide control joints carried through the tile and the bedding to AS 3958.1 clause 5.4.5 and as follows:

- Floor location:
  - . Over structural control joints.
  - . To divide complex room plans into rectangles.
  - . Around the perimeter of the floor.
  - . At junctions between different substrates.
  - . To divide large 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 control joints.
  - . At junctions with different substrate materials when the tiling is continuous.
  - . At vertical corners in shower compartments.
- Depth of joint: Right through to the substrate.
- Sealant width: 6 to 25 mm.
- Depth of elastomeric sealant: One half the joint width, or 6 mm, whichever is the greater.

3.9 GROUTED AND SEALANT JOINTS

Grouted joints

General: Commence grouting as soon as practicable after bedding has set. Clean out joints as necessary before grouting.

Face grouting: Fill the joints solid and tool flush. Clean off surplus grout. Wash down when the grout has set. When grout is dry, polish the 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.

Sealant joints

General: Provide joints filled with sealant and finished flush with the tile surface as follows:

- Where tiling is cut around sanitary fixtures.
- At corners of walls in showers.
- Around fixtures interrupting the tile surface, for example pipes, brackets, bolts and nibs.
- At junctions with elements such as window and door frames and built-in cupboards.

Material: Anti-fungal modified silicone.

Width: 5 mm.

Depth: Equal to the tile thickness.

3.10 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.

3.11 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.

0671B PAINTING

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide coating systems to substrates, as documented and 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.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following work section(s):
- Architect to confirm colour specification.

1.3 STANDARDS

Painting
General: To the recommendations of those parts of AS/NZS 2311 which are referenced in this work section.

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 conformance 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

Refer to finishes schedule

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 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 topcoats.

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: To the requirements of Appendix I Uniform Paint Standard to the Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP).

3 EXECUTION

3.1 PREPARATION

Order of work
Other trades: Before painting, complete the work of other trades as far as practicable within the area to be painted, except for installation of fittings, floor sanding and laying flooring materials.

Clear finishes: Complete clear timber finishes before commencing opaque paint finishes in the same area.

Protection
General: Before painting, clean the area and protect it against dust entry. Use drop sheets and masking to protect finished surfaces or other surfaces at risk of damage during painting.

Internal and external fixtures and furniture: 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.

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 dis-colourations, 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.

Unpainted surfaces
Standard: To AS/NZS 2311 Section 3.

Previously painted surfaces
Preparation of a substrate in good condition: To AS/NZS 2311 clause 7.4.

Preparation of a substrate in poor condition: To AS/NZS 2311 clause 7.5.

Preparation of steel substrates with protective coatings: To AS/NZS 2312 Section 10 and AS 1627.1.

Additional preparation:

- Seal stained ceilings before the application of latex paints.
- Clean PVC with methylated spirit and a nylon scouring pad.
- Remove wall paper and glue size with clean water and seal before painting.
- Remove water based kalsomine or lime wash paints by brushing with warm water.

3.2 PAINTING

Light levels

General: ≥ 400 lux.

Substrate moisture content

Requirement: 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

Standard: To AS/NZS 2311 Section 6.

Timing: Apply the first coat immediately after substrate preparation and before contamination of the substrate can occur. Apply subsequent coats after the manufacturer's recommended drying period has elapsed.

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 personal protection, 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, power tool grind to remove all rust and weld splatter. Remove all surface contaminants then immediately 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: Make sure that opening windows function correctly before and 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
Standard: To AS/NZS 2311 Section 8.

Apply the following:

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.

For paint selections refer to materials and finishes schedule in APPENDIX A