

Architectural Specification

W366

Project:
Tumut Multipurpose and Evacuation Centre

Site:
RICHMOND PARK, TUMUT NSW
Lot 1 Section 81 DP 759004 and Lot 701, DP 1059193



Issue	Date	Approved by
Tender	01.07.2025	S.J.



FACILITY
DESIGN GROUP
Architecture & Construction

P: 02 4446 0777
E: info@fdg.com.au
A: PO Box 82, Cambewarra, NSW 2540
ABN: 75 083 999 624

CONSULTANTS LIST:

Architects

FACILITY DESIGN GROUP PTY LTD

19 The Terrace

PO Box 82

CAMBEWARRA NSW 2540

Phone: 02 4446 0777

Structural & Civil Engineer

PM DESIGN GROUP

100-104 Pipe Road, Laverton North VIC 3026

Phone: 03 5249 4800

Hydraulic + Fire Engineers

GLENN HAIG & PARTNERS

PO Box 192

SAWTELL, NSW, 2452

Phone: 02 6658 2444

Electrical Engineer

SPECTRUM ENGINEERING SOLUTIONS

Level 2, 121 Walker Street

North Sydney NSW 2060

Phone: 02 9922 5200

Mechanical Engineer

WEBB AUSTRALIA GROUP (NSW)

LEVEL 2 17 BOLTON STREET

NEWCASTLE NSW 2300 AUSTRALIA

Phone: +61 2 4929 5225

Acoustic Engineer

NOISE & SOUND

3, Cassandra Avenue,

St Ives, NSW 2075

Phone: 02 9449 6499

Section J

PARTNERS ENERGY

PO BOX 7209

EAST BALLINA, NSW 2478

Phone: 0488129546

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0131 PRELIMINARIES

1 GENERAL

1.1 GENERAL

General conditions

Contract: AS.4000

Interpretation

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

Cross reference: **INTERPRETATION** in 0171 *General requirements* also applies.

WHEN IN DOUBT ASK

General Scope of Work:

The proposal forms part of the TUMUT EVACUATION MULTI-PURPOSE CENTRE Project, it includes the construction a new dedicated evacuation centre and indoor sports facility. is to be constructed on the lower north east end of Richmond Park, Tumut. The site is bounded by Richmond Street, Russell Street and Robertson Street.

Building Classification – 9b

Works will include the following but not be limited to and not necessarily in the sequence shown –

1. Services disconnection as required, site mobilisation, all measures to make site safe to adjoining residences.
2. Demolition/removal of abandoned brick bowling club building, retaining walls, paths/driveways, trees as described on demolition plan including one street tree in Russell Street.
3. Excavation and removal as required, including all low quality fill beneath bowling green. Ensure excavation adjacent to amenities is safe and not prone to collapse in all weather conditions.
4. Construct perimeter wall footings and drainage, construct retaining walls as required by structural drawings. Waterproof and backfill as required. Ensure all trunk services are brought through walls to service the proposed building.
5. Construct stormwater detention systems/pits as required. Perimeter stormwater systems to be connected.
6. Construct building footings, floor slabs, precast walls, structural steel in a sequence to allow efficient constructability. Tenderers to ensure crane requirements are met to allow for precast slabs/delivery/installation.
7. Construct lightweight steel framing to front of house and rear storage as required.
8. Install all roofing and insulation, gutters, box gutters, cappings, flashings. Install approved roof safety access systems.
9. Install doors and windows. Install all wall cladding/insulation/trims/flashings as required
10. Provide as part of your works a new electrical substation.
11. Rough-in of all electrical/data, hydraulic/fire, mechanical services.
12. All internal insulation and linings to walls and ceilings.
13. Carpentry – internal doors, roller shutters, door furniture.
14. Timber sports floor and sports equipment install, line marking , sealing. Tiered seating install and carpeting.
15. Tiling – wall and floor – supply and installation.
16. External services/rainwater goods completed, external pavements/driveways/perimeter footpaths as required.
17. External and internal painting, skirtings/sills/trims as required.
18. Mechanical, electrical, hydraulic fit-off.
19. Install of all fixed furniture and equipment.
20. Carpet and resilient floor finishes.

21. Landscaping

1.2 THE SITE**Secure areas**

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

Personnel: Submit the full name, address, and date and place of birth of persons required to enter designated secure areas.

- Purpose of submission: For review.
- Timing of submission: At least 10 working days before entry is required.

Occupied premises

General: For the parts of the site documented in the **Occupied premises schedule**:

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

Proposals: Submit details of proposed methods.

- Purpose of submission: For information.
- Timing of submission: Before commencement of work.

Reinstatement

Accessways and services: Do not obstruct or damage roadways and footpaths, drains and watercourses and other existing services in use on or adjacent to the site. Determine the location of such services. Rectify immediately any obstruction or damage to such services and provide temporary services whilst repairs are carried out.

Trees and properties: Do not interfere with or damage trees and properties that are to remain on or adjacent to the site, including adjoining property encroaching onto the site. Rectify immediately any interference or damage to such trees and properties.

Existing services

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

Trenches: If the existing service crosses the line of a required trench or will lose support when the trench is excavated, provide permanent support for the existing service.

Redundant services: Remove redundant parts and make safe.

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

Changes to existing services: Submit proposals.

- Purpose of submission: For review.
- Timing of submission: Before starting work to existing services.

Adjoining properties

Notice: At least 10 working days before commencing work, give written notice to owners and occupants of adjoining properties 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 properties onto the site or of existing site structures onto adjoining properties, immediately notify the architect and seek instruction.

Records: For each property documented in the **Adjoining properties to be recorded schedule**:

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

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

- Purpose of submission: For information.
- Timing of submission: Before commencement of work.

1.3 CONSTRUCTION PLANT

General

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

Access roads

Owner's existing roads: Use only designated roads.

Parking

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

Owner's site office

Requirement: Provide a weathertight site office for the use of the owner or the owner's agents before major site operations are started and as follows:

- Pay charges for services.
- Maintain in good order and in clean condition, with secure access, for duration of the work.
- Obtain permission for removal.
- Remove on completion.

Protective clothing

Requirement: Make available protective clothing for the use of visitors, as follows:

- Safety helmets: Type 1 to AS/NZS 1801 (1997).
- High visibility safety vests: To AS 4602.1 (2024).

Certification: Required.

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

Use of existing services

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

Project signboards

General: Provide project specific signboards and as follows:

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

Other signboards: Obtain approval before display of advertisements or provision of other signboards.

1.4 BUILDING THE WORKS

Survey marks

Definition: A survey peg, benchmark, 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 survey marks are disturbed or obliterated, immediately rectify.

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: For information.

Contractor's representative

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

Contacts: Submit names and telephone numbers of responsible persons who may be contacted after hours during the course of the contract.

- Purpose of submission: For information.
- Timing of submission: At the first site meeting.

Subcontracting

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

- Purpose of submission: For information.

Program of work

Construction program: Submit a construction program showing 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.

Purpose of submission: For information.

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 for the attendance of appropriate subcontractors, architect and appropriate consultants.

Minutes: Make a record of site meetings. Distribute a copy of the minutes to each party.

- Purpose of submission: For review.
- Timing of submission: Within 5 working days after each meeting.

Progress photographs

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

- Purpose of submission: For information.
- Timing of submission: At each site meeting.

Items supplied by owner

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

Changes to existing items

General: At least 5 working days before changing existing items, give notice.

Persons other than contractor

Facilities: Refer to person other than contractor documentation.

Contractor/person other than contractor interfaces: Refer to person other than contractor documentation.

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

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

Adjoining properties

Evaluation: At practical completion, for each property documented in the **Adjoining properties to be recorded schedule**, inspect the property with the architect and owner and occupant of the property, recording any damage that has occurred since the pre-commencement inspection.

Pest eradication

Requirement: Employ suitably qualified pest exterminators. At practical completion, verify that completed works are free of pest types documented in the **Pest eradication treatment schedule**.

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**Progress claims**

Anticipated progress claims: Submit a schedule of anticipated progress claims for the contract period.

- Purpose of submission: For information.
- Timing of submission: At commencement of the works.

Progress claim breakdown: Submit a statement of amounts claimed in respect of each worksection or trade heading designated in the specification.

- Purpose of submission: For review.
- Timing of submission: With each progress claim.

Import costs

Definition: Import costs include costs attributable to exchange rates, customs and import duty of imported content of items purchased for incorporation in the works.

Adjustment: If there are changes in rates applying to import costs of items documented in the **Import costs adjustment schedule**, add or deduct the amount of the difference to or from the contract sum, as applicable.

Method of measurement

General: In conformance with the principles of the Australian and New Zealand standard method of measurement of building works (ANZSMM) (2022).

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 enquiries from the media concerning the project to the owner.

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**.

0171 GENERAL REQUIREMENTS

1 GENERAL

1.1 PRECEDENCE

General

Order of precedence: If there is conflict or inconsistency between the worksections of this specification, the requirements of worksections take the following order of precedence:

- All worksections other than those listed below.
- *0701 Mechanical systems, 0801 Hydraulic systems, 0901 Electrical systems and 1001 Fire services systems.*
- *018 Common requirements* worksections.
- *0171 General requirements.*

1.2 CROSS REFERENCES

Common requirements

Requirement: Conform to the following worksections:

- *0181 Adhesives, sealants and fasteners.*
- *0182 Fire-stopping.*
- *0183 Metals and prefinishes.*
- *0184 Termite management.*
- *0185 Timber products, finishes and treatment.*
- *0193 Building access safety systems.*

Cross referencing styles

General: Within the text, titles are cross referenced using the following styles:

- Worksection titles are indicated by *Italicised* text.
- Subsection titles are indicated by CAPITAL text.
- Clause titles are indicated by **BOLD CAPITAL** text.
- Subclause titles are indicated by **Bold Sentence case** text.

1.3 REFERENCED DOCUMENTS

General

Precedence: The requirements of worksections override conflicting requirements of their referenced documents. The requirements of the referenced documents are minimum requirements.

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

Current editions: All referenced documents are the editions, with amendments, current on 1st September 2024.

Exception to current editions: If statutory requirements reference other editions or standards, conform to those other editions or standards. If the NCC (2022) references editions other than the current edition, the same editions cited in the NCC (2022) are referenced in each worksection.

Maintenance and repair works: If statutory requirements applicable to the maintenance or repair works reference other editions or standards, conform to those other editions or standards.

European standards: Any national European Standard (e.g. IS EN or DIN EN) may be used in place of the equivalent referenced European Standard (EN).

1.4 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.

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

1.5 INTERPRETATION

Abbreviations

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

- 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.
- GRP: Glass Reinforced Plastic.
- IP: Ingress protection.
- NATA: National Association of Testing Authorities.
- NCC: National Construction Code.
- PCA: National Construction Code Series Volume 3: Plumbing Code of Australia.
- PVC: Polyvinyl Chloride.
- PVC-U: Unplasticised Polyvinyl Chloride. Also known as UPVC.
- SDS: Safety data sheets.
- VOC: Volatile Organic Compound.
- WHS: Work Health and Safety.

Definitions

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

- Access for maintenance: Includes access for maintenance, inspection, measurement, operation, adjustment, repair, replacement and other maintenance related tasks.
- Accessible, readily: Readily accessible, easily accessible, easy access and similar terms mean capable of being reached quickly and without the use of a tool, without hazard, climbing over or removing obstructions, using a movable ladder and in any case not more than 2.0 m above the ground, floor or platform.
- Accredited Testing Laboratory:
 - . An organisation accredited by the National Association of Testing Authorities (NATA) to undertake the relevant tests; or
 - . An organisation outside Australia accredited to undertake the relevant tests by an authority recognised by NATA through a mutual recognition agreement; or
 - . An organisation recognised as being an Accredited Testing Laboratory under legislation at the time the test was undertaken.
 - . An organisation accredited for compliance with AS ISO/IEC 17025 (2018) to undertake the relevant tests.
- Appropriately qualified person: To NCC (2022) Schedule 1.
- Attendance: Attendance, provide attendance and similar expressions mean give assistance for examination and testing.
- Baseline data: Data derived from the final design, installation and commissioning, which serve as a basis for verification of results of routine servicing.
- Commissioning: Advancement of an installation from static completion to full working order, including verification that the systems, subsystems, and their components meet the project requirements. This includes all work described as commissioning in referenced documents, even if carried out before static completion.
- Consumable: Materials or components intended to be replaced within the service life of the associated plant or equipment.
- Contract administrator: Has the same meaning as architect, superintendent or principal's authorised person and is the person appointed by the owner or principal under the contract.
- Contractor: Has the same meaning as builder and is the person or organisation bound to carry out and complete the work under the contract.

- Default: Specified value, product or installation method that 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.
- Design parameters: Information used as the basis for design. It includes design requirements, performance criteria, performance parameters and similar terms.
- 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 the time 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.
- Errors and omissions: For the design prepared by the contractor, errors and omissions have the same meaning as defects.
- Fire hazard properties: To NCC (2022) Schedule 1.
- Gas Network Operator: Has the same meaning as network operator in AS/NZS 5601.1 (2022).
- 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 (2006) after fabrication with coating thickness and mass to AS/NZS 4680 (2006) Table 1.
- Ingress protection: IP, IP code, IP rating and similar expression have the same meaning as IP Code in AS 60529 (2004).
- Joints: Construction joint: A joint with continuous reinforcement provided to suit construction sequence.
 - . 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.
 - . Control joint: An unreinforced joint between or within discrete elements of construction that allows for relative movement of the elements.
 - . 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.
 - . Sealant joint: A joint filled with a flexible synthetic compound that adheres to surfaces within the joint to prevent the passage of dust, moisture and gases.
 - . Structural control joint: A control joint (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.
 - . 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 premoulded strip.
- Local authority (local council): 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.
- Maintenance: Work that is carried out to preserve an asset, to allow for its continued use and function over its designed service life.

- . Corrective maintenance: Maintenance initiated as a result of plant, equipment, systems, elements, before or after functional failure. This work can be planned or unplanned and includes repairs and replacement.
- . Preventive maintenance: Planned maintenance of plant, equipment and other systems or elements, including cyclical or periodic maintenance, fire safety measures and statutory requirements.
- 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 (2021). Metal thicknesses specified are base metal thicknesses.
 - . Ferrous open sections zinc coated by an in-line process: To AS/NZS 4791 (2006).
 - . Ferrous hollow sections zinc coated by a continuous or specialised process: To AS/NZS 4792 (2006).
- Network Utility Operator: To NCC (2022) Schedule 1. A person who undertakes the piped distribution of drinking water or non-drinking water for supply; or is the operator of a sewerage system or a stormwater drainage system.
- Obtain: Obtain, seek and similar expressions mean obtain (seek) in writing from the contract administrator.
- Pipe: Includes pipe and tube.
- Practical completion or defects free completion: The requirements for these stages of completion are defined in the relevant building contract for the project.
- Pre-commissioning: Verifying that the installation of a system is complete and ready for commissioning.
- 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: To NCC (2022) Schedule 1.
- Proprietary: Identifiable by naming the manufacturer, supplier, installer, trade name, brand name, catalogue or reference number.
- Prototype: A full size mock-up of components, systems or elements to demonstrate or test construction methods, junctions and finishes, and to define the level of quality.
- Provide: Provide and similar expressions mean supply and install and include development of the design beyond that documented.
- Record drawings: Record drawings has the same meaning as as-installed drawings, as-built drawings and work-as-executed drawings.
- Recovered/reclaimed materials: Material previously used in a building or project that is then re-used in another project. The material may be altered, re-sized, refinished, or adapted, but is not reprocessed in any way, and remains in its original form.
- Referenced documents: Standards and other documents whose requirements are included in this specification by reference.
- Required: Required by the contract documents, the local or statutory authorities.
 - . If required: A conditional specification term for work that may be shown in the documents or is a legislative requirement.
- Sample: A physical example that illustrates workmanship, materials or equipment, and establishes standards by which the work will be judged. It includes samples and sample panels.
- Static completion: The state of a system when installation works are complete but have not been commissioned.
- Statutory authority: A public sector entity created by legislation, that is, a specific law of the Commonwealth, State or Territory.
- Supply: Supply, furnish and similar expressions mean supply only.
- Tests - integrated system: Tests conducted on the project as a complete, integrated system to verify successful integration, interaction, and operation of all interrelated systems to the project requirements.

- Tests - production: Tests carried out on an item, before delivery to the site.
- Tests - site: Tests carried out on site.
- Tests - type: Tests carried out on an item identical with a production item, including with respect to materials, material suppliers, manufacturing processes, dimensions and marking.
- Tolerance: The permitted difference between the upper limit and the lower limit of dimension, value or quantity.
- Utility service provider: Includes Electricity distributor, Network Utility Operator, Gas Network Operator and organisations providing other reticulated utilities including data and telecommunications services.
- Verification: Provision of evidence or proof that a performance requirement has been met or a default exists.

2 SUBMISSIONS AND INSPECTIONS

2.1 SUBMISSIONS

General

Requirement: Make submissions, as documented.

Contractor review: Before submitting, review each submission item, and check for coordination with other work of the contract and conformance to contract documents.

Submission times

Default timing: Submit information or other material for information, comment or approval at least 5 working days before ordering products or starting installation of the respective portion of the works.

Proposed products schedules: Submit a schedule of proposed products that have not been specified as proprietary items within 3 weeks of starting work on site.

Identification

Requirement: Identify the project, contractor, subcontractor or supplier, manufacturer, applicable product, model number and options, as appropriate and include relevant contract document references. If the submission covers more than one item, identify the item in the contract documents the submitted items relate to.

Non-conformance: Identify proposals that do not conform with project requirements, and characteristics that may be detrimental to successful performance of the completed work.

Errors

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

Project requirements

General: Submit the following, as documented:

- Authority approvals: Notes of meetings with regulatory authorities and utility service providers whose requirements apply to the work and evidence that notices, fees and permits have been sought and paid, that utility service provider connections are complete and that statutory approvals by the authorities whose requirements apply to the work have been received.
- Baseline data: To **BASELINE DATA**.
- Building penetrations: Details of the methods to maintain the required structural, fire and other properties to **BUILDING PENETRATIONS**.
- Certification: Certificates of conformance to documented and statutory requirements.
- Commissioning plan: For the whole of the work to **COMMISSIONING**.
- Commissioning program: For the whole of the work to **COMMISSIONING**.
- Design documentation: Drawings, calculations and specifications as documented.
- Electronic facility and asset management information: For the whole of the work to **ELECTRONIC FACILITY AND ASSET MANAGEMENT INFORMATION**.
- Execution details: Execution programs, schedules and details of proposed methods and equipment. For building services include 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.
- Fire performance: Evidence of conformity to requirement for combustibility, fire hazard properties and fire-resistance of building elements.
- Marking and labelling: Samples and schedules of proposed marking and labels to **MARKING AND LABELLING**.
- Operation and maintenance manuals: For the whole of the work to **OPERATION AND MAINTENANCE MANUALS**.
- Products and materials: Products and materials data, including manufacturer's technical specifications and drawings, product data sheets, type tests results, evidence of conformity to documented requirements, product certification, performance and rating tables, service connection requirements and installation and maintenance recommendations.
- Prototypes: Prototypes of components, systems or elements.
- Records: As-built documents, photographs, system diagrams, schedules and logbooks to **RECORD DRAWINGS**.
- Safe Work Method Statement: For high risk construction works.
- Safety in design report: For the proposed work to **DESIGN DEVELOPMENT, Safety in design**.
- Samples: Representative of proposed products and materials and including proposals to incorporate samples into the works, if any to **SAMPLES AND PROTOTYPES**.
- Shop drawings: To **SHOP DRAWINGS**.
- Substitutions: To **SUBSTITUTIONS**.
- Tests: Test reports for testing performed under the contract.
- Warranties: To **WARRANTIES**.

2.2 INSPECTION

Notice

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

Notification times

Minimum notice: As documented.

Light levels

Lighting levels for inspection: To AS/NZS 1680.2.4 (2017).

Attendance

General: Provide attendance for documented inspections and tests.

3 PERFORMANCE

3.1 BUSHFIRE-PRONE AREAS

Galvanizing

Requirement: Galvanize mild steel components (including fasteners) to AS/NZS 1214 (2016) or AS/NZS 4680 (2006) 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).

3.2 NOISE LEVELS

General

Requirement: Install systems to operate within the noise level limits, as documented for the contract design and documented equipment performance.

3.3 STRUCTURE

General

Requirement: If provision of the works requires structural design, provide structures, installations and components as follows:

- Fixed accessways: To AS 1657 (2018).
- Structural design actions: To the AS/NZS 1170 series.

4 DESIGN

4.1 DESIGN DEVELOPMENT

General

Requirement: Complete the design of the work, including development of the design beyond that documented.

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.

Certification of the design

Requirement: Submit certification verifying conformance of the design to the documented and statutory requirements.

Certifier: To **DESIGNER**.

Safety in design

Requirement: Provide a design that allows for safe construction, operation and maintenance, and demolition in conformance with statutory requirements.

4.2 DESIGNER

General

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

5 PRODUCTS AND MATERIALS

5.1 GENERAL

Consistency

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

Low VOC emitting paints

Paint types: To the recommendations of AS/NZS 2311 (2017) Table 4.2.

Prohibited materials

General: Do not provide the following:

- Materials exceeding the limits of those listed in the Safe Work Australia *Hazardous Chemical Information System* (HCIS) Workplace exposure standards.
- Blowing agents:
 - . Materials that use chlorofluorocarbon (CFC) or hydrochlorofluorocarbon (HCFC) in the manufacturing process.
 - . A blowing agent with a global warming potential (GWP) not less than 700.

5.2 PROPRIETARY ITEMS

Manufacturer's or supplier's recommendations

General: Provide manufactured items to the manufacturer's or supplier's recommendations.

Proprietary items/systems/assemblies: Assemble, install or fix to substrate to the manufacturer's or supplier's recommendations.

Project modifications: Advise of activities that supplement, or are contrary to the manufacturer's or supplier's recommendations.

Identification of proprietary items

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

Other items: Marked to show the following, as applicable:

- Manufacturer's identification.
- Brand name.
- Product type.
- Quantity.
- Reference code and batch number.
- Date of manufacture.

5.3 SUBSTITUTIONS**General**

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

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

- Product, method or system identification.
- Product data sheets.
- Manufacturer's contact details.
- Detailed comparison between the properties of the documented product and proposed substitution.
- Details of manufacturer and/or installer warranty.
- Statement of NCC compliance, if applicable.
- Evidence of conformity to a cited standard or code of practice.
- Evidence that the performance is at least equal to that specified.
- Samples.
- Essential technical information, in English.
- Comparison between the products in relation to assembly method, finishes, installation methods and any protection/packaging.
- 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.
- Statement of consequent maintenance conditions of warranty.

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.

5.4 SAMPLES AND PROTOTYPES**General**

Incorporation of samples: Only incorporate samples that have been endorsed for inclusion in the works. Do not incorporate other samples.

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

Unincorporated samples: Remove on completion.

5.5 SHOP DRAWINGS

General

Standard: To AS 1100.101 (1992), AS 1100.201 (1992), AS 1100.301 (2008), AS 1100.401 (1984) and AS/NZS 1100.501 (2002) as applicable.

Documentation: 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 prepare dimensioned set-out drawings.

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

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

Commissioning requirements: Show provisions for testing and commissioning on the drawings.

Access for maintenance: Show space and provisions for access for maintenance.

Building work drawings for building services: On dimensioned drawings show the following:

- 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.

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

6 ANCILLARY BUILDING WORK

6.1 WALL CHASING

Holes and chases

General: If holes and chases are required in masonry walls, make sure structural integrity of the wall is maintained. Do not chase walls with a fire-resistance level or an acoustic rating.

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

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

Concrete blockwork chasing table

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

6.2 FIXING

General

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

Fasteners

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

6.3 BUILDING PENETRATIONS

Penetrations

Requirement: Maintain the required structural integrity, fire performance, waterproofing performance and other properties when penetrating or fixing to the following:

- 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.

Sealing

Fire-resisting building elements: Seal penetrations with a system conforming to AS 4072.1 (2005).

Non fire-resisting 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, cables or conduits penetrate 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-resisting building elements): Sufficient to provide a ring shaped space around the pipe or pipe insulation of at least 12 mm.
- Ferrous surfaces: Prime paint.
- Sealing: Seal between pipes or conduits and sleeves to prevent the entry of vermin.
- Terminations:
 - . Cover plates fitted: Flush with the finished building surface.
 - . Fire-resisting and acoustic rated building elements: 50 mm beyond finished building surface.
 - . Floors draining to floor wastes: 50 mm above finished floor.
 - . Other locations: 5 mm beyond finished building surface.
 - . Termite management: To AS 3660.1 (2014).
- Thickness:
 - . Metal: 1 mm or greater.
 - . PVC-U: 3 mm or greater.

6.4 SUPPORT OF PLANT AND EQUIPMENT

Concrete plinths

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

- Surround: Zinc (hot-dipped) coated steel, at least 75 mm high and 1.6 mm thick. Fix to the floor with masonry anchors. Fill with concrete.
- Height: 75 mm or greater, as documented.
- Reinforcement: Single layer of F62 fabric.
- Concrete: Grade N20.
- Finish: Steel float, flush with top edge of the surround.

Support of ground level plant and equipment

Ground level: Conform to the following:

- If the ground slope is 15° or more, or the area of the plant and equipment is extensive, obtain the advice of a professional engineer for the documentation of a suitable slab or platform.
- In all other cases, provide proprietary plastic or concrete supports installed with falls that achieve a raised, impervious and water shedding bearing surface.

Balustrades: If balustrades or screening are required, obtain the advice of a registered architect.

Support of plant and equipment mounted on roofs or elevated platforms

Platforms: If a platform is required, or the area of the plant and equipment mounted on roofs or elevated platforms is extensive, obtain the advice of a professional engineer for the documentation of a suitable platform.

Balustrades: If balustrades or screening are required, obtain the advice of a registered architect.

Roof level support: If any of the following apply to roof level support, obtain the advice of a professional engineer:

- The total load from any unit of plant or equipment exceeds 500 kg.
- The load from a unit of plant or equipment to any single support point exceeds 100 kg.
- The average loading of plant and equipment over the area extending 1 m on all sides beyond the plant and equipment exceeds 25 kg/m².

6.5 RESTRAINT OF NON-STRUCTURAL PARTS AND COMPONENTS

Wind restraint

General: Provide restraints to resist the effect of ultimate limit state wind pressures.

Wind pressure: To AS/NZS 1170.2 (2021).

7 BUILDING SERVICES

7.1 SERVICES CONNECTIONS

Connections

General: Connect to utility service provider services or service points. Excavate to locate and expose connection points. Reinstall the surfaces and facilities that have been disturbed.

Utility service provider requirements

General: If the utility service provider elects to perform or supply part of the works, make the necessary arrangements. Install equipment supplied, but not installed, by the utility service provider.

7.2 SERVICES INSTALLATION

General

Installation: Install equipment and services as follows:

- Plumb and securely fixed.
- Allow for movement in both structure and services.
- Arrange services running together, parallel to each other and adjacent building elements.

Concealment: Conceal all cables, ducts, trays and pipes except where installed in plant spaces, ceiling spaces and riser cupboards or documented to be exposed. If alternative routes are available, do not locate on external walls.

Lifting: Provide heavy items of equipment with permanent fixtures for lifting to the manufacturer's recommendations.

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

Dissimilar metals

Joining: 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 as follows:

- If practicable, long radius elbows or bends and sets, and swept branch connections.
- If pipes are led up or along walls and then through to fixtures, provide elbows or short radius bends.
- Do not provide mitred fittings.

Vibration: Arrange and support piping to prevent vibration whilst permitting necessary movement.

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.

Support and structure

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

Pipe support systems

Standard: To AS 4041 (2006) clause 3.28.

General: Provide hangers, brackets, saddles, clips, and support system components to resist live and dead loads and to control pipe movement caused by thermal and water pressure effects. Incorporate provisions for adjustment of spacing, alignment, grading and load distribution. Support pipework from associated equipment or building structure. Support valves, strainers and major line fittings so that no load is placed on connected piping or transmitted to it during operation and maintenance.

Fixings: Provide fixings to the associated equipment or building structure designed to withstand the loads imposed by the pipe supports.

Channel section supports: Proprietary channel section with clamps and hangers sized to match external diameter of pipe being supported. Provide all components from the same manufacturer.

Channel and fixing material: Metallic-coated steel.

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

Saddles: Do not use saddle type supports for pipes larger than DN 20.

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 fasteners of electrolytically compatible material.

Fixing to masonry and concrete: Provide metallic-coated steel or non-ferrous metal bolts or screws into chemical or expanding metal masonry anchors.

Uninsulated pipes: Clamp piping supports directly to pipes. Provide electrical isolation of dissimilar metals.

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.
- Vapour barriers: For cold pipes, apply aluminium foil tape over the circumference of the spacer to form a vapour barrier. Fit to spacer before installation of the bracket on the pipe.
- Metal sheathing: If metal sheathing is documented, provide a band of the documented sheathing materials between the aluminium foil tape and the support for the full width of the spacer.

Hanger sizes: Conform to the following:

- Gas installations: To AS/NZS 5601.1 (2022) Table 5.8.3.
- Other pipes: Provide hangers sized to the manufacturer's recommendations to suit operating conditions and regulatory requirements including the loads due to valves and other attached components, pipe material, pipe contents and temperature and seismic loads.

Support spacing: Provide supports at no greater spacing than the following:

- Cold and heated water: To AS/NZS 3500.1 (2021) Table 5.7.4.
- Sanitary plumbing: To AS/NZS 3500.2 (2021) Table 10.2.1.
- Stormwater: To AS/NZS 3500.2 (2021) clause 4.9.
- Fuel gas: To AS/NZS 5601.1 (2022) Table 5.8.2.
- Fire sprinklers and combined wet suppression systems: To AS 2118.9 (1995) Table 2.6.1.
- Fire hydrants:
 - . Metal piping: To AS 2419.1 (2021) clause 10.6.
 - . Plastic piping: To AS/NZS 3500.1 (2021).
- Gaseous fire suppression systems:
 - . General gaseous fire suppression systems: To AS 4214 (2018) clause 6.3.4.

- Carbon dioxide fire suppression systems: To AS 6183 (2011) clause 6.3.4.
- Medical gases: To AS 2896 (2021) Table 4.1.
- Refrigerant: To AS/NZS 5149.2 (2016) Tables 5 and 6.
- Other ferrous pipes under pressure: To AS 4041 (2006) Table 3.28.2.
- Other copper pipes: To AS 4809 (2017) Table 6.2.
- ABS pipes: To AS/NZS 3690 (2009) Table 6.2.
- PVC pipes: To AS/NZS 2032 (2006) Table 6.3.
- Polyolefin including PE and PP pipes: To AS/NZS 2033 (2024) clause 7.3.2.
- Other non-ferrous pipe carrying liquids: To AS/NZS 3500.1 (2021) Table 5.7.4.
- Other pipes carrying air or gases: To AS/NZS 5601.1 (2022) Table 5.8.2.
- Proprietary grooved piping systems: To the manufacturer's recommendations.

Additional supports: Provide additional supports as follows:

- Proprietary grooved piping systems: To the manufacturer's recommendations.
- Valves and other heavy pipe mounted components: Adjacent to the valve or component.
- Adjacent pipe mounted components requiring regular maintenance.
- At changes of direction and adjacent to wall or floor penetrations.
- Where required to anchor piping or control thermal or other movement.

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.

7.3 PLANT AND EQUIPMENT

General

Location: Locate so failure of plant and equipment (including leaks) does not create a hazard for the building occupants and causes a minimum or no damage to the building, its finishes and contents including water sensitive equipment or finishes.

Safe tray and an overflow pipe: Provide to each tank, hot water heater and storage vessel.

7.4 ACCESS FOR MAINTENANCE

General

Requirement: Provide access for maintenance of all items requiring inspection, measurement, operation, adjustment, repair, replacement and other maintenance-related tasks.

Standards: Conform to the relevant requirements of AS 1657 (2018), AS 1892.1 (2018), AS 2865 (2009) and AS/NZS 3666.1 (2011).

Work Health and Safety: Conform to the requirements of the applicable Work Health and Safety regulations.

Access safety systems: Provide access safety systems to *0193 Building access safety systems*.

Refrigerated or cooling plant: If the space is a refrigerated or cooling chamber inside a duct, air handling plant or similar, provided with an access door or personnel access panel and of sufficient size for a person to enter, provide the following to BCA (2022) G1D3:

- An access door.
- Internal lighting with external indicator lamp.
- An alarm.

Protection from injury: Protect personnel from injury caused by contact with objects including those that are sharp, hot or protrude at low level.

Plant room flooring surfaces: R10 Slip resistance classification to AS 4586 (2013).

Trip hazards: Do not run small services including drains and conduits across floors where they may be a trip hazard.

Manufacturer's standard equipment: If necessary, modify manufacturer's standard equipment to provide the plant access documented.

Clearances

Minimum clearances for access: Conform to the following:

- Vertical clearance: Not less than 2100 mm, vertically above horizontal floors, ground and platforms.
- Horizontal clearance: Preferably not less than 750 mm clear, but in no case less than 600 mm between equipment or between equipment and building features including walls.
- If tools are required to operate, adjust or remove equipment, provide sufficient space so the tools can be used in their normal manner and without requiring the user to employ undue or awkward force.
- Hinged or removable components: To the manufacturer's recommendations.
- Within plant items: Conform to the preceding requirements, and not less than the clearances recommended in BS 8313 (1997).

Elevated services other than in occupied areas

Access classifications:

- Access class A: Readily accessible. Provide clear and immediate access to and around plant items. If plant or equipment is located more than 2.0 m above the ground, floor or platform, provide a platform with handrails accessible by a stair, all to AS 1657 (2018).
- Access class B: If the plant item requiring access is located more than 2.0 m above the ground, floor or platform, provide a platform with handrails accessible by a non-vertical ladder, all to AS 1657 (2018).
- Access class C: Locate plant so temporary means of access conforming to Work Health and Safety regulations can be provided.

Temporary means of access: Make sure there is adequate provision in place, which is safe and effective.

Areas in which access is restricted to authorised maintenance personnel: Provide access as follows:

- Instruments, gauges and indicators (including warning and indicating lights) requiring inspection at any frequency: Readily accessible.
- Access required monthly or more frequently: Access class A.
- Access required between monthly and six monthly: Access class A or B.
- Access required less frequently than six monthly: Access class A, B or C.

Other areas: Provide access as follows:

- Locate to minimise inconvenience and disruption to building occupants or damage to the building structure or finishes.
- In suspended ceilings, locate items of equipment that require inspection and/or 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.
- Do not locate equipment requiring access above partitions.
- Instruments, gauges and other items requiring inspection at any frequency: Readily accessible.
- Labelling: If equipment is concealed in ceilings, provide marking to **MARKING AND LABELLING, Equipment concealed in ceilings**.

Facilities for equipment removal and replacement

Requirement: Provide facilities to permit removal from the building and replacement of plant and equipment, including space large enough to accommodate it and any required lifting and/or transportation equipment. Arrange plant so large and/or heavy items can be moved with the minimum changes of direction.

Removal of components: Allow sufficient space for removal and replacement of equipment components including air filters, tubes of shell and tube heat exchangers, removable heat exchanger bundles, coils and fan shafts. Provide access panels or doors large enough to permit the safe removal and replacement of components within air handling units.

Facilities for access

Equipment behind hinged doors: Provide doors opening at least 150°.

Equipment behind removable panels: Provide panels with quick release fasteners or captive metal thread screws.

Removable panels: Provide handles to permit easy and safe removal and replacement.

Insulated plant and services: If insulation must be removed to access plant and services for maintenance, arrange it to allow for removal and replacement without damage.

Piping

Requirement: Conform to the following:

- Provide access and clearance at fittings that require maintenance, inspection or servicing, including control valves and joints intended to permit pipe removal.
- Arrange piping so it does not interfere with the removal or servicing of associated equipment or valves or block access or ventilation openings.
- Preferably run piping, conduits, cable trays and ducts at high level and drop vertically to equipment.

Electrical equipment and controls

Electrical equipment: Provide clearances and access space to AS/NZS 3000 (2018).

Switchboards and electrical control equipment: Locate near the main entrance to plant space and with switchboards visible from the plant being operated.

Control panels: Locate near and visible from the plant being controlled.

7.5 VIBRATION SUPPRESSION

General

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

Standard

Machinery noise and vibration: Vibration severity in Zone A to ISO 20816-1 (2016) and ISO 20816-3 (2022).

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 to prevent placing stress 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 to the following:

- Construction: Steel or steel-framed reinforced concrete with reinforcing bars welded between base sections. 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:

- Static deflections less than 15 mm: Single or double deflection neoprene in-shear mountings incorporating steel top and base plates and a tapped hole for bolting to equipment.
- Static deflections not less than 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: Not less than 12 mm between springs and other members such as bolts and housing.
- High frequency isolation: 5 mm neoprene acoustic isolation pads between base plate and support.
- Levelling: Provide bolts and lock nuts.
- Minimum travel to solid: Not less than 150% of the designated minimum static deflection.

- Ratio of mean coil diameter to compressed length at the designated minimum static deflection: Not less than 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.

7.6 FINISHES TO BUILDING SERVICES

General

Requirement: If exposed to view (including in plant rooms), paint building services and equipment.

Surfaces painted or finished off-site: Conform to *0183 Metals and prefinishes*.

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: Conform to the recommendations of AS/NZS 2311 (2017) Sections 3, 6 and 7 or AS 2312.1 (2014) Sections 6, 7 and 8, as applicable.

Inaccessible surfaces: If surfaces are inaccessible after installation, complete finish before installation.

Painting systems

New unpainted interior surfaces: To AS/NZS 2311 (2017) Table 5.1.

New unpainted exterior surfaces: To AS/NZS 2311 (2017) 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

Requirement: Provide corrosion protection for the following:

- Underground ferrous piping.
- Underground non-ferrous metal piping in chemically aggressive soils and environments.

Corrosion protection: 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 (2015).
- Continuous wrapping using proprietary petroleum taping material.
- Impermeable flexible plastic coating.
- Sealed polyethylene sleeve.

Aggressive soils: If metallic piping or components are installed in chemically aggressive soil, provide additional protection as follows:

- Material: Continuous polyethylene sleeve to ASTM D1248 (2016) with a minimum thickness of 0.25 mm.
- Installation: Wrap or sleeve pipes and components. Tape joints between sections of polyethylene and between polyethylene and piping.

Repairs to finishes

Requirement: Repair damaged finishes to restore their corrosion protection, appearance and service life.

Painting of pipe threads: After pipe installation and before other finishes or insulation are applied, paint exposed threads in metallic-coated steel pipe with zinc rich paint.

7.7 MARKING AND LABELLING

General

Requirement: Mark and label services and equipment for identification purposes as follows:

- Locations exposed to weather: Provide durable materials.

- Pipes, conduits and ducts: To AS 1345 (1995) 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.

Label samples and schedules

Requirement: For each item or type of item, prepare a schedule of marking and labelling, including the following:

- A description of the item or type of item for identification.
- The proposed text for marking or labelling.
- The proposed location of the marking and labelling.

Submission timing: Before marking or labelling.

Electrical accessories

Circuit identification: Label isolating switches and outlets to identify circuit origin.

Operable devices

Requirement: Mark to identify the following:

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

Equipment concealed in ceilings

Location: Provide a label on the ceiling, to indicate the location of each concealed item requiring access for routine inspection, maintenance and/or operation and as follows:

- Tiled ceilings, locate the label on the ceiling grid closest to the concealed item access point.
- Flush lined ceilings, locate adjacent to closest access panel.

Concealed equipment: Label items including the following:

- Fan coil units and terminal equipment (e.g. VAV terminals).
- Fire and smoke dampers.
- Isolating valves not directly connected to items otherwise labelled.
- Motorised dampers.

Wall mounted equipment in occupied areas

Location: 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 and include terminal numbers, point addresses, short and long descriptors in the lists. Store in a pocket on the door of the panel.

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.

Plastic pipe: Provide a detectable marker tape with trace wire to identify the route of buried piping. Terminate with 1000 mm coil in a readily accessible location. Tag to match the record drawings.

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 (1994).

Colours: Generally to AS 1345 (1995) 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.

Labelling text and marking: To correspond to terminology and identifying number of the respective item as documented 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 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 10 mm.
- Switchboards, sub assembly designations: Minimum 15 mm.
- Valves:
 - . Not less than DN 65: Minimum 25 mm.
 - . Less than DN 65: Minimum 10 mm.
- Self-adhesive flexible plastic labels:
 - . Labels less than 2000 mm above floor: 5 mm.
 - . Labels minimum 2000 mm above floor: 10 mm.
 - . Other locations: Minimum 5 mm.

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

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.

Vapour barriers: Do not penetrate vapour barriers.

8 COMPLETION

8.1 TOOLS AND SPARE PARTS

Spare parts

General: Provide spare parts listed as documented.

Replacement: Replace spare parts used during the maintenance period.

Tools and spare parts schedule

Submission timing: At least 8 weeks before the date for practical completion.

Requirement: Prepare a schedule of tools, portable instruments and spare parts necessary for maintenance of the installation. For each item state the recommended quantity and the manufacturer's current price. Include the following in the prices:

- Checking receipt, marking and numbering in conformance with the spare parts schedule.
- Packaging and delivery to site.
- Painting, greasing and packing to prevent deterioration during storage.
- Referencing equipment schedules in the operation and maintenance manuals.
- Suitable means of identifying, storing and securing the tools and instruments. Include instructions for use.

8.2 TRAINING

General

Standard: To SA TS 5342 (2021).

Duration: Instruction to be available for the whole of the commissioning and running-in periods.

Format: Conduct training at agreed times, at system or equipment location. Also provide seminar instruction to cover all major components.

Operation and maintenance manuals: Use items and procedures listed in the final draft operation and maintenance manuals as the basis for instruction. Review contents in detail with the principal's staff.

Certification: Provide written certification of attendance and participation in training for each attendee. Provide register of certificates issued.

Demonstrators

General: Use only qualified manufacturer's representatives who are knowledgeable about the installations.

Operation

General: Explain and demonstrate to the principal's staff the purpose, function and operation of the installations.

Maintenance

General: Explain and demonstrate to the principal's staff the purpose, function and maintenance of the installations.

Seasonal operation

General: For equipment requiring seasonal operation, demonstrate during the appropriate season.

8.3 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 visible labels not required for maintenance.

Removal of material

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

8.4 WARRANTIES

General

Requirement: If a warranty is documented, name the principal as warrantee. Register with manufacturers as necessary. Retain copies delivered with components and equipment.

Approval of applicator or installer: If the warranty is conditional on the manufacturer's approval of the applicator or installer, submit the manufacturer's written approval of the installing company, and

authorised personnel, with evidence of qualifications and experience in the specific use of the product, material or system.

Principal's responsibilities: Submit details of responsibilities of the principal required to keep warranties in force.

Warranty types

Manufacturer's warranty: Warranty to cover manufacturing defects and defects with products and materials delivered to site.

Manufacturer and applicator's/installer's interlocking warranty: Interlocking warranty to cover manufacturing defects and defects with products and materials delivered to site, including their application or installation.

Supplier's warranty: Warranty to defects in materials delivered to site.

9 TESTING AND COMMISSIONING

9.1 TESTING - GENERALLY**Inspection and testing plan**

Requirement: Provide inspection and testing plan consistent with the construction program including details of test stages and procedures.

Notice

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

Inspection: Give sufficient notice for inspection to be made of the commissioning, testing and verification tests on completion of commissioning.

Attendance

General: Provide attendance at tests.

Suppliers: If necessary to carry out documented tests, arrange equipment suppliers to assist.

Testing authorities

Requirement: Have tests carried out by an Accredited Testing Laboratory, accredited for the documented test method, except for site tests or test methods that do not have an Accredited Testing Laboratory.

Test equipment

Accuracy: Use testing equipment designed to test and/or measure system performance within the documented tolerances.

Calibration: Use only instruments that have current calibration certificates issued by an Accredited Testing Laboratory. Tag or label instruments with calibration date and calibration authority name. Provide copies of certification if requested.

Maximum period since last calibration: As recommended by the manufacturer but less than 12 months, except as documented.

Recalibration: If dropped or damaged, recalibrate instruments.

Testing equipment: Provide test equipment and tools to perform documented tests as follows:

- Special testing equipment: If documented, provide special equipment, tools and instruments required for testing or calibration.
- Other testing equipment: Provide standard testing equipment.

Testing procedures

Verification: Verify test procedures by:

- Manual testing.
- Monitoring performance and analysing results using the control system trend logs.
- A combination of the above methods.

Sampling: Sampling may be used subject to the following:

- Use a sampling strategy only for multiple identical pieces of non-life-safety or otherwise non-critical equipment.
- If at any point, more than one identical item has failed, stop testing, determine the cause, rectify and document changes made to remaining units, before continuing with functional testing of the remaining units.

Type tests

Type test reports: Required, as evidence of conformance of proprietary equipment.

Sound pressure level measurements

Requirement: Conform to the following:

- Correction for background noise: To AS/NZS 2107 (2016) Table B1.
- External: To AS 1055 (2018).
- Internal: To AS/NZS 2107 (2016).
- Measurement positions: If a test position is designated only by reference to a room or space, do not take measurements less than 1 m from the floor, ground or walls. For large equipment items including chillers, measure at 2 m and 7 m from the equipment item.
- Sound pressure level analysis: Measure the sound pressure level and the background sound pressure level over the full range of octave band centre frequencies from 31.5 Hz to 8 kHz at the designated positions.
- Sound pressure levels: Measure the A-weighted sound pressure levels and the A-weighted background sound pressure levels at the designated positions.

Test outcome

Requirement: Test as documented and achieve the following:

- Pass the documented Pass/Fail test, and/or
- Values that meet documented requirements, and/or
- Verification of manufacturer's claimed performance.

Failure of multiple items

Requirement: If 10% or 3, whichever is greater, of identical pieces (size does not constitute a difference) of equipment fail to perform as documented for any reason, treat all identical units as having failed. Submit notice of failure and conform to the following:

- Within one week of notification, examine all other identical units and record the results. Submit a report of the findings within two weeks of the original failure notice.
- Within two weeks of the original failure notification, submit a signed and dated explanation of the problem, including the cause of failure, the proposed solution, full equipment details and any other information. Do not exceed the documented requirements of the original installation with the proposed solution.

Rectification of failure under test

Requirement: If an item fails a documented test, rectify the cause of failure and repeat the test.

Submissions: If submission of test results is documented, submit results of both successful and unsuccessful tests.

Test reports

Requirement: Include the following:

- Documented performance criteria including, if documented, tolerances.
- Observations and results of tests and conformance or non-conformance with documented requirements.

Test validity period

Requirement: As documented or, if no validity period is documented, no older than 5 years.

Controls

General: Calibrate, set and adjust control instruments, control systems and safety controls.

Circuit protection

General: Confirm that circuit protective devices are sized and adjusted to protect installed circuits.

Certification

General: On satisfactory completion of the installation, testing and commissioning and before the date for practical completion, certify that each installation is operating correctly.

Integrated system tests

Requirement: Conduct integrated system tests as documented.

Tests: Provide the following:

- Test the integrated operation of the systems listed in each mode documented.
- Restoration of the systems to their pre-test condition on completion of the tests above.

Failure: If any of the systems fails to perform as documented, including return to normal operation, rectify the cause and repeat the integrated system test.

Deferred and seasonal tests

Deferred tests: If documented testing cannot be completed at the scheduled or documented time, the Superintendent may direct that they be deferred to a later time but as soon as possible after the scheduled or documented time.

Seasonal tests: If documented tests are dependent on specific weather conditions, they may be deferred to a time when weather conditions are close to the documented test conditions. Complete seasonal testing as soon as possible but no later than one month before the end of the defects liability period.

Functional tests

Function: Carry out functional and operational tests on each energised equipment item and circuit.

9.2 COMMISSIONING

Standard

Requirement: Conform to SA TS 5342 (2021).

Static completion

Requirement: Systems, components and building elements are statically complete when:

- Their construction and installation is complete and as documented, including completion of all systems, components and building elements on which they are dependent for commissioning.
- All pre-commissioning tests have been successfully completed.
- They are safe and ready for commissioning.
- All cleaning that may adversely affect commissioning is complete.
- They have been inspected and all outstanding remedial work that may adversely affect commissioning is complete.
- All spaces required for access for commissioning are safe to use and cleared of obstructions that may adversely affect commissioning.

Commissioning plan

Requirement: Provide a commissioning plan to SA TS 5342 (2021) including the following:

- A summary of the work covered by the commissioning plan.
- The parties responsible for this work and any commissioning interrelationships.
- The basis of the design.
- General sequence of commissioning.
- Project specific commissioning methodologies for each system and building element to be commissioned.
- Pre-commissioning requirements.
- Project specific commissioning procedures for each commissioning activity including integrated system tests, deferred and seasonal tests.
- A project specific building tuning plan for all commissioned systems. Include building tuning procedures and tuning team members.
- Requirements for witnessing of tests and documented demonstrations of completion of commissioning.
- Commissioning program to **COMMISSIONING, Commissioning program**.

Commissioning program

Submissions: Submit a program consistent with, and forming part of, the construction program as follows:

- Set out the proposed program for completion, commissioning, testing and instruction.
- Identify related works and timing of the works prerequisite to successful and timely completion of the works.

Revisions: Submit revisions of the program as the project proceeds.

Plant operating period: Include time in the program for the documented plant operating period before the date for practical completion.

Commissioning activities

Requirement: Provide the following to SA TS 5342 (2021):

- Manage the commissioning process.
- Establish and manage the completion process.
- Review design documents for commissionability. Submit a report including any recommended changes.
- Review documented commissioning requirements. Submit a report including any recommended changes.
- Review construction documents for commissionability. Submit a report including any recommended changes.
- Develop, review and update the commissioning plan and commissioning program.
- Develop, review and update commissioning methodologies.
- Develop, review and update commissioning procedures.
- Report on interdependencies between trades that may affect commissioning.
- Develop, review and update procedures for initial start-up of systems.
- Develop, review and update integrated system test procedures.
- Carry out pre-commissioning activities. Record results and submit pre-commissioning records.
- Conduct commissioning activities to the commissioning methodologies and procedures. Record and submit commissioning records.
- Facilitate and conduct integrated system tests and demonstrations. Record and submit integrated system test records.
- Conduct documented demonstrations of completion of commissioning.
- Report on the progress of commissioning work.
- Report on conformance to the commissioning plan and program.
- Report on commissioning defects and issues and progress on their resolution.
- Develop, review and update commissioning report.
- Develop, review and update training materials, conduct training sessions to **TRAINING**.
- Develop, review and update operation and maintenance manuals to **OPERATION AND MAINTENANCE MANUALS**.
- Manage and report deferred and seasonal testing activities to **TESTING - GENERALLY**.
- Management and reporting of building tuning process.
- Periodically review performance data.

Verification of commissioning

Requirement: On completion of commissioning of the equipment or system, provide additional tests to verify that it is fully commissioned and operating to documented requirements.

9.3 BUILDING TUNING**General**

Standard: To SA TS 5342 (2021).

Frequency: Three monthly or more frequently.

Duration: Until the end of the maintenance period. Provide last building tuning in the month before the end of the maintenance period.

Requirement: Provide the following:

- Review data from all recording systems against documented requirements.
- Review of building occupant feedback.
- If discrepancies are identified from the above, take corrective action to rectify them.
- Report on the findings of the reviews, corrective action and effect of corrective action.
- Recommend other action to improve the effectiveness, reliability and efficiency of systems.

10 PROJECT RECORDS

10.1 TACTICAL FIRE DRAWINGS

General

Requirement: Provide sets of colour coded tactical fire drawings, showing all items and systems relevant in a fire to BCA (2022) Spec 19.

Scale: 1:200 or larger if required to be easily read under emergency conditions.

Coordination: Agree the format, colour coding and contents of the tactical fire plans with the Local Fire Authority before beginning documentation.

Location: Provide one set of the laminated drawings fixed to the wall or supplied in a vertical plan hanger in the fire control room.

Loose set: Provide a second set of identical drawings.

Operation and maintenance manuals: Provide a set of colour coded tactical fire drawings in each copy of the operating and maintenance manual.

Inclusions

Requirement: Include the following on the tactical fire drawings:

- Legend sheet at front of set.
- Colour coding key.
- Building: As follows:
 - . Floor plans.
 - . Pressurised and non-pressurised fire isolated stairs and passages.
 - . Smoke and fire compartments.
 - . Special risk areas.
- Fire services: As follows:
 - . Automatic fire detection systems.
 - . Automatic suppression systems including gas flooding systems.
 - . Communications including warden intercommunication points.
 - . Fire control room.
 - . Fire equipment including booster connections.
 - . Fire hydrants, hose reels, portable fire extinguishers.
 - . Fire detection control and indicating equipment (FDCIE).
 - . Fire service lifts.
 - . Fire telephone and control panel.
 - . Hydrant and sprinkler pumps.
 - . Hydrant/hose reels.
 - . Sprinkler and hydrant, suction and booster connections.
 - . Sprinkler control valves.
- Electrical services: As follows:
 - . Emergency power supplies.
 - . Essential services switchboards.
 - . Evacuation warning panel.
 - . Stand-by power plant.
 - . Substations/transformers.
 - . Switchboards, main switchroom.
- Mechanical ventilation and air handling equipment: As follows:
 - . Air intakes, fans, ducts, shafts.
 - . Conditioners and mixing boxes.
 - . Fire dampers.
 - . General exhaust air fans, ducts, shafts, discharges.

- . Smoke dampers.
- . Smoke fans including exhaust fans, zone and stair pressurisation fans.
- . Stair pressurisation systems.
- . Supply air system.
- Mechanical ventilation and air handling equipment operation: As follows:
 - . Statement of normal condition.
 - . Condition upon fire alarm.
 - . Manual controls available.
- Hydraulic services: As follows:
 - . Gas meters.
 - . Gas supply control.
 - . Incoming water supplies and valves for the sprinkler, hydrant and fire hose reel systems.
 - . Water tank.

10.2 RECORD DRAWINGS

General

Requirement: Prepare record drawings showing the following:

- Installed locations of building elements, services, plant and equipment.
- Off-the-grid dimensions and depth if applicable.
- Any provisions for the future.

Recording, format and submission

Requirement: Record changes made during the progress of the works on a set of drawings kept on site for that specific purpose.

Drawing layout: Use the same borders and title block as the contract drawings.

Quantity and format: Conform to **SUBMISSIONS**.

Endorsement: Sign and date all record drawings.

Accuracy: If errors in, or omissions from, the record drawings are found, amend the drawings and re-issue in the quantity and format documented for **SUBMISSIONS**.

Date for submission: Not later than 2 weeks after the date for practical completion.

Services record drawings

General: To **RECORD DRAWINGS**, **General** and **Recording, format and submission** and the following:

- Extensions and/or changes to existing: If a drawing shows extensions and/or alterations to existing installations, include sufficient detail of the existing installation to make the drawing comprehensible without reference to drawings of the original installation.
- Detention: If on-site detention tanks or pondage are provided, include the volume required on the drawing and the permitted flow rate to the connected system.
- Domestic cold water or fire mains: Show the pressure available at the initial connection point and the pressure available at the most disadvantaged location on each major section of the works.
- Stormwater: If storm water pipes are shown, include the pipe size and pipe grade together with the maximum acceptable flow and the actual design flow.

Diagrams: Provide diagrammatic drawings of each system including the following:

- Controls.
- Piping including all valves and valve identification tags.
- Principal items of equipment.
- Single line wiring diagrams.
- Acoustic and thermal insulation.
- Access provisions and space allowances.
- Fasteners.
- Fixtures.

- Switchgear and control gear assembly circuit schedules including electrical service characteristics, controls and communications.
- Charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

Subsurface services: Record information on underground or submerged services to the documented quality level, conforming to AS 5488.1 (2022).

10.3 BASELINE DATA

General

Requirement: Provide baseline data to permit routine service of fire protection systems and equipment to AS 1668.1 (2015), the NCC cited AS 1670.1 (2018), AS 1851 (2012) and AS/NZS 2293.1 (2018). Include baseline data for the following:

- Active fire and smoke systems including automatic fire sprinkler systems, fire pumpsets, fire hydrant systems and water storage tanks for fire protection systems.
- Fire detection and alarm systems.
- EWIS, exit signs and emergency lighting.
- Stand-by generator sets and batteries.
- Lay flat fire hose, fire hose reels, portable and wheeled fire extinguishers and fire blankets.
- Passive fire and smoke systems, including the following:
 - . Fire and smoke elements (vertical and horizontal) - walls, floors, ceilings, access panels and hatches.
 - . Structural fire-resistant elements - beams, columns, girders and trusses.
 - . Fire-resisting doorsets - hinged, pivoted and horizontal sliding.
 - . Smoke doors - hinged and pivoted.
 - . Fire shutters.
 - . Fire-resisting glazing.
 - . Ducts.
 - . Dampers.
- Fire and smoke control features of mechanical services.
- Emergency planning in facilities.

Format: Provide baseline data in a format that facilitates the carrying out and recording of routine service tasks including drawings showing the extent and location of items to be serviced, schedules of items and unique identification of each item.

10.4 OPERATION AND MAINTENANCE MANUALS

General

Standard: To SA TS 5342 (2021).

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 worksections require submissions of manuals, include corresponding material in the operation and maintenance manuals.

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

Revisions: Amend the operation and maintenance manuals to include changes made to the installation during construction and maintenance including changes to software and commissioning records.

Contents of manual

Table of contents: Include a table of contents in each volume. Title to match cover.

Table of amendments: Include a table of amendments.

Directory: Include names, addresses, email addresses and telephone and facsimile numbers of principal consultant, subconsultants, contractor, subcontractors and names of responsible parties.

Record drawings: Include complete set of record drawings, full size.

Drawings and technical data: Include as necessary for the efficient operation and maintenance of the installation.

Installation description: Include a general description of the installation.

Systems descriptions and performance: Include a technical description of the systems installed including the basis of design, the interrelation with other systems and the building and mode of operation, presented in a clear and concise format readily understandable by the principal's staff. Identify function, normal operating characteristics, safety features and limiting conditions.

Baseline data: Include the baseline data to **BASELINE DATA**.

Commissioning records: Include commissioning records to SA TS 5342 (2021). Link commissioning records to item codes on the record drawings.

Training material: Include materials used to provide training, to **TRAINING**, in a form that can be used to train others.

Fire systems and equipment: Include documentation to AS 1851 (2012), including the schedule of essential functionality and performance requirements.

Digital photographic and video records: Provide documented digital photographic and video records, keyed to the drawings.

Equipment: Include schedules with the following details for installed equipment:

- Item code for use on record and diagrammatic drawings, and spare parts schedule.
- Equipment name plate data including serial number, if any.
- Name and contact details of the manufacturer and supplier.
- Catalogue list number(s).
- Location.
- Function.
- Performance figures and capacity data.
- Date of manufacture.
- Manufacturer's product data sheets including only relevant matter for the project. Mark each product data sheet to clearly identify specific products and component parts used in the installation, and data applicable to the installation.
- Additional information and commentary to illustrate relations of component parts.

Certificates:

- Certificates from authorities.
- Product certification.
- Test certificates for each service installation and all equipment.
- Warranties.

Trends: 7 day record of all trends at commissioning.

Operation procedures: Include for systems installed:

- Manufacturer's technical literature as appropriate.
- Safe starting up, running-in, operating and shutting down procedures. Include logical step-by-step instructions for each procedure.
- Control sequences and flow diagrams.
- Legend for colour-codes services.
- Schedules of fixed and variable equipment settings established during commissioning and maintenance.
- A list of special safety devices and their set points.
- Procedures for seasonal changeovers.
- Warnings to operators.
- Procedures for identifying and rectifying common faults.
- Recommendations for efficient plant operation.
- If the installation includes cooling towers, recommendations for water efficiency.
- Building tuning plan and procedure to **COMMISSIONING, Commissioning plan**.

Building occupants' guide: Include a concise guide written and illustrated for building occupants with no technical background. Include the following:

- Security provisions.

- Safety and access.
- Environmental features, including energy and water efficiency and waste management.
- Occupant relevant information on design and operation.
- Information for occupants on environmental systems that rely partially or wholly on local controls for heating, lighting, cooling, and ventilation.
- Contact details for faults, maintenance and emergencies.

Maintenance procedures:

- Detailed recommendations for periodic maintenance and procedures, including schedule of maintenance work with frequency and manufacturers' recommended tests.
- Manufacturer's technical literature as appropriate. Register with manufacturer as necessary. Retain copies delivered with equipment.
- Safe trouble-shooting, disassembly, repair and reassembly, cleaning, alignment and adjustment, balancing and checking procedures. Provide logical step-by-step instructions for each procedure.
- Schedule of spares, recommended to be held on site, for those items subject to wear or deterioration and that may involve the principal in extended deliveries when replacements are required. Include complete nomenclature and model numbers, and local sources of supply.
- Schedule of normal consumable items, local sources of supply, and expected replacement intervals up to a running time of 40 000 hours. Include lubrication schedules for equipment.
- Instructions for use of tools and testing equipment.
- Troubleshooting procedures.
- Emergency procedures, including telephone numbers for emergency services, and procedures for fault finding.
- Safety data sheets (SDS).
- Instructions and schedules conforming to AS 1851 (2012), AS/NZS 3666.2 (2011), AS/NZS 3666.3 (2011) and AS/NZS 3666.4 (2011).

Maintenance records:

- Prototype routine service records conforming to AS 1851 (2012) prepared to include project specific details.
- Prototype periodic maintenance records and report to AS/NZS 3666.2 (2011), AS/NZS 3666.3 (2011) and AS/NZS 3666.4 (2011) as appropriate, prepared to include project specific details.
- Hard copies: Binders to match the manuals, containing loose leaf logbook pages designed for recording completion activities including operational and maintenance procedures, materials used, test results, comments for future maintenance actions and notes covering the condition of the installation. Include completed logbook pages recording the operational and maintenance activities performed up to the date for practical completion.
- Number of pages: The greater of 100 pages or enough pages for the maintenance period and a further 12 months.

Emergency information: For each type of emergency, including fire, flood, gas leak, water leak, power failure, water failure, system or subsystem failure, chemical release or spill, include the following:

- Emergency instructions.
- Emergency procedures including:
 - . Instructions for stopping or isolating.
 - . Shutdown procedures and sequences.
 - . Instructions for actions outside the property.
 - . Special operating instructions relevant to the emergency.
 - . Contact details relevant to the emergency.

Emergency information manual

Form of emergency information: Provide one of the following:

- An index and coloured tabs identifying emergency information for each type of emergency within the Operation and maintenance manual.

- A separate Emergency manual containing copies of emergency information from the main Operation and maintenance manual.

Format – electronic copies

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

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

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

Format – hard copies

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

Draft submission: The earlier of the following:

- 4 weeks before the date for practical completion.
- Commencement of training.

Final submission: Within 2 weeks after practical completion.

10.5 ELECTRONIC FACILITY AND ASSET MANAGEMENT INFORMATION

11 MAINTENANCE

11.1 PERIODIC MAINTENANCE**General**

Requirement: Provide documented maintenance so that the condition and performance of the maintained work throughout and at the end of the maintenance period is equal to or better than that at the beginning of the maintenance period including with respect to the following:

- Performance, service delivery.
- Service life and reliability.
- Compliance with statutory requirements.
- Compliance with building rating requirements.
- Energy and water efficiency.
- Environmental impact.
- Health and safety.
- Risk management.

Inclusions: Include the following:

- Periodic and statutory maintenance, cleaning and replacement of consumables.
- Emergency repairs.
- Condition reporting.

Duration: From the time systems and equipment are put into service to the end of the maintenance period.

Maintenance period: The greater of the defects liability period and the period documented.

Faults: Rectify promptly.

Emergencies: Attend emergency calls promptly.

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

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 the operation and maintenance manuals.

Referenced documents: If referenced documents or technical worksections require that logbooks or records be submitted, include this material in the maintenance records.

Certificates: Include test and approval certificates.

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.

11.2 STATUTORY INSPECTIONS AND MAINTENANCE

General

Duration: From the time systems and equipment are put into service to the end of the maintenance period.

Requirement: Provide inspections and maintenance of safety measures required by the following:

- AS 1851 (2012).
- 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.

Annual inspection: Perform an annual inspection and maintenance immediately before the end of the maintenance period.

0181 ADHESIVES, SEALANTS AND FASTENERS

1 GENERAL

1.1 RESPONSIBILITIES

General

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

Performance

Requirements: Conform to the following:

- Fitness for purpose: Suitable for particular use, capable of transmitting imposed loads, sufficient to maintain the rigidity of the assembly, or integrity of the joint.
- Finished surface: That will not cause discolouration.
- Compatibility: Compatible with the products to which they are applied.
- Sealant replacement: Capable of safe removal 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 certified to accommodate the projected movement under the conditions of service.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

1.3 SUBMISSIONS

Products and materials

Adhesives and sealants: Submit product data sheets.

Type tests: 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.

Samples

Requirement: Submit samples to PRODUCTS, **GENERAL**, **Samples**.

Warranties

Requirement: Submit warranties to **COMPLETION**, **Warranties**.

2 PRODUCTS

2.1 GENERAL

Samples

Visible joint sealants: Provide colour samples.

2.2 ADHESIVES

Standards

Gypsum plaster adhesive: To AS 2753 (2018).

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, paints and unfinished metals.
 - . Lower energy surfaces including many plastics, most paints and powder coatings, and unfinished metals.

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

Total VOC limits

Requirement: Conform to the following maximum limits:

- General purpose adhesives: 50 g/L.
- Structural glazing adhesive, timber flooring and laminate adhesives: 100 g/L.

2.3 SEALANTS**Standards**

General: To ISO 11600 (2002).

External masonry joints

General: Provide sealant and bond breaking materials that 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.

Lightweight building element joints

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

Floor control joints

General: Provide trafficable sealants.

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.

Total VOC limits

Requirement: Conform to the following maximum limits:

- General purpose sealants: 50 g/L.
- Acoustic sealants, architectural sealants, waterproofing sealants: 250 g/L.
- Wood flooring and laminate sealant: 100 g/L.

2.4 FASTENERS**General**

Masonry anchors: Proprietary expansion or bonded type anchors, as documented.

Plain washers: To AS 1237.1 (2002).

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

Plugs: Proprietary purpose-made plastic.

Stainless steel fasteners: To ASTM A276/A276M (2024).

Steel nails: To AS 2334 (1980).

- 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 (1999).

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

Bolts

Coach bolts: To AS/NZS 1390 (1997).

Hexagon bolts Grades A and B: To AS 1110.1 (2015).

Hexagon bolts Grade C: To AS 1111.1 (2015).

Nuts

Hexagon chamfered thin nuts Grades A and B: To AS 1112.4 (2015).

Hexagon nuts Grade C: To AS 1112.3 (2015).

Hexagon nuts Style 1 Grades A and B: To AS 1112.1 (2015).

Hexagon nuts Style 2 Grades A and B: To AS 1112.2 (2015).

Screws

Coach screws: To AS/NZS 1393 (1996).

Hexagon screws Grades A and B: To AS 1110.2 (2015).

Hexagon screws Grade C: To AS 1111.2 (2015).

Hexagon socket screws: To AS 1420 (2008).

Self-drilling screws: To AS 3566.1 (2002).

Self-tapping screws:

- Cross-recessed countersunk (flat – common head style): To AS/NZS 4407 (2015).
- Cross-recessed pan: To AS/NZS 4406 (2015).
- Cross-recessed raised countersunk (oval): To AS/NZS 4408 (2015).
- Hexagon: To AS/NZS 4402 (2015).
- Hexagon flange: To AS/NZS 4410 (2015).
- Hexagon washer: To AS/NZS 4409 (2015).
- Slotted countersunk (flat – common head style): To AS/NZS 4404 (2015).
- Slotted pan: To AS/NZS 4403 (2015).
- Slotted raised countersunk (oval – common head style): To AS/NZS 4405 (2015).

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 prepainted steel.
- Stainless steel for stainless steel sheet.
- Copper for copper sheet.

Size:

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

Corrosion resistance

Atmospheric corrosivity category: To 0171 *General requirements*.

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 category to AS 4312 (2019)	Threaded fasteners and anchors		Powder actuated fasteners
	Material	Minimum local metallic coating thickness (µm)	Material
C1 and C2	Electroplated zinc or Hot-dip galvanized	30	Stainless steel Type 316
C3	Hot-dip galvanized	45	Stainless steel Type 316
C4	Stainless steel Type 316	-	Stainless steel Type 316

Note: For categories C5, CX and T to the AS/NZS 2312 series, seek specialist advice.

Finishes

Electroplating:

- Metric thread: To AS 1897 (2016).
- Imperial thread: To AS 4397 (2007).

Galvanizing:

- Threaded fasteners: To AS/NZS 1214 (2016).

- Other fasteners: To AS/NZS 4680 (2006).

Mild steel fasteners: Galvanize if:

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

Epoxy coated: CCA treated timber.

3 EXECUTION

3.1 ADHESIVES

General

Requirement: Install to the manufacturer's recommendations.

Preparation

Substrates: Conform to the following:

- Remove any deposit or finish that 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.

Application to copper, brass, plasticised vinyl and hydrophilic surfaces such as glass and ceramics in a high humidity environment: Conform to manufacturer's recommendations.

Applied lamination pressure: Make sure the tape experiences 100 kPa.

Application temperature: Generally above 10°C and to the manufacturer's recommendations.

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

3.2 JOINT SEALING

General

Requirement: Install to the manufacturer's recommendations.

Joint preparation

Cleaning: Cut flush joint surface protrusions and rectify if required. Mechanically clean joint surfaces free of any deposit or finish that 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 FASTENERS

General

Requirement: Install to the manufacturer's recommendations.

Fastening to wood and steel

Timber substrates: To AS 1720.1 (2010) Section 4.

Self-drilling screws: To AS 3566.1 (2002) for timber and steel substrates.

Masonry anchors

Installation: To the manufacturer's recommendations.

0182 FIRE-STOPPING

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide fire-stopping, as documented.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

1.3 STANDARDS

General

Service penetration fire-stopping systems: To AS 4072.1 (2005) and BCA (2022) C4D15.

Control/construction joint fire-stopping systems: To AS 4072.1 (2005) and BCA (2022) C4D16.

1.4 INTERPRETATION

Definitions

General: For the purposes of this worksection, the definitions given in AS 4072.1 (2005) apply.

1.5 SUBMISSIONS

Certification

General: Submit evidence of conformity with the recommendations of AS 4072.1 (2005) Appendix B.

Certification: Submit a completed statement of compliance and schedule of installed fire-stopped penetrations and control/construction joints.

- Schedule: To AS 4072.1 (2005) Figure B1.
- Statement of compliance: To AS 4072.1 (2005) Figure B2.

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION, Operation and maintenance manuals**.

Products and materials

General: Submit the following:

- Evidence that systems conform to documented requirements.
- Copies of relevant manufacturers' instructions.
- Product data sheets (PDS).
- Safety data sheets (SDS), if applicable.

Type tests: Submit type test reports including drawings detailing the tested system as evidence of conformance for each combination of fire-stopping system, application, type of service, substrate and penetration orientation. Conform to PRODUCTS, **GENERAL, Tests**.

Samples

Requirement: Submit samples to PRODUCTS, **GENERAL, Samples**.

Subcontractors

General: Submit names and contact details of proposed suppliers and installers.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties**.

1.6 INSPECTION

Notice

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

- Service penetrations completed and ready for fire-stopping.
- Control/construction joints completed and ready for fire-stopping.

- Finished fire-stopping, before being concealed.

2 PRODUCTS

2.1 GENERAL

Samples

Requirement: Provide a sample panel of each fire-stopping assembly, on representative substrates. If built into the works, identify by marking it as a control sample.

Size: 500 mm run for junction seals and 500 x 500 mm area for penetration seals.

Tests

Service penetration fire-stopping systems: Fire-resistance tested to AS 1530.4 (2014).

Fire-stop mortars: Resistance to explosive spalling to AS 1774.36 (2019).

Control joint fire-stopping systems: Fire-resistance tested to AS 1530.4 (2014).

2.2 MATERIALS

Storage and handling

General: Deliver, unload and store products and accessories in unbroken manufacturer's packaging in a dry, well-ventilated and secure storage area, unaffected by weather.

Shelf life: Use materials that have not exceeded their shelf life.

Control joints

General: To AS 4072.1 (2005) clauses 2.3 and 4.7 and Appendix C.

Toxicity

Toxic materials: Free of asbestos and lead, and free of, nor requiring the use of, toxic solvents.

Toxicity in fire: Non-toxic.

Toxicity before curing: Select products with very limited, or no health hazards, where applicable.

Total VOC limits

Requirement: Conform to the following maximum limits:

- Fire stopping sealants: 250 g/L.

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.

2.3 FIRE-STOPPING PRODUCTS

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.

Non-combustible mineral fibre stuffing

Material: Mineral fibre stuffing insulation, dry and free of other contaminants.

Standard: To AS/NZS 4859.1 (2018) Section 7.

Intumescent fire pillows

Material: Self-contained self-locking intumescent fire pillows for medium to large openings, where no additional support is required.

Fire-stop composite sheets

Material: Composite system comprised of a number of components, including a fire-resistive elastomeric sheet, bonded on either side with layers of sheet steel and/or steel-wire mesh covered with aluminium foil.

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 that 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.

Cavity barriers

Cavity barrier: Formed compressible fire-stopping strip.

Intumescent cavity barrier: Formed fire-stopping strip with high expansion intumescent seal.

2.4 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.

Multi-service cable transit box

Material: Mechanical device consisting of a sheet steel sleeve containing heat reactive intumescent polymer, including intumescent seals and smoke rated brushes. The insulation rating can be increased by the incorporation of other fire-stopping products.

Control joint insert – elastomeric foam strip

Material: Elastomeric foam strip laminated with a graphite based intumescent compound on both sides, which is a water resistant seal that expands when exposed to heat.

Accessories

Permanent dam material: Non-combustible.

Stickers and labels: To **COMPLETION, Labelling**.

Installation accessories: Provide clips, collars, fasteners, stainless steel cable ties, temporary stops and dams, backing rods and other devices required to position, support and contain fire-stopping and accessories.

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

General: Give notice, if substrates or penetrants or both are not suitable for fire-stopping.

Cleaning: Clean substrates of dirt, dust, grease, oil, loose material, and other matter that may affect the bond of fire-stopping products.

Primer: 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 INSTALLATION

General

Extent: Fire-stop and smoke-stop interruptions to fire-resistance rated assemblies, materials and components, including penetrations through fire-resisting elements, breaks within fire-resisting elements such as expansion joints, and junctions between fire-resisting 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.

Fire-resistance level (FRL): Install products to the manufacturer's recommendations. Install to achieve the documented FRL in accordance with the manufacturer's tested system.

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

Density: Apply fire-stopping material to a 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).

Environmental management: To the manufacturer's Safety Data Sheets for WHS and environmental management of the materials.

Penetrations: Provide structural support around the opening.

3.3 FIRE-STOPPING SYSTEMS

Control joint insert – elastomeric foam strip

Site conditions: Make sure that the application area is free from dust, oil, solvents or any other foreign substances.

Installation: To the manufacturer's recommendations to completely close and seal the joint.

Fire-stop mortars

Ambient conditions: Do not install below 5°C.

Installation: To the manufacturer's recommendations to completely close and seal the opening.

Formulated compound of incombustible fibres

Installation: To the manufacturer's recommendations to completely close and seal the opening.

Non-combustible mineral fibre stuffing

Installation: Install in accordance with a type-tested installation to achieve the required FRL. Completely close and seal the opening.

Fire-stop composite sheets

Installation: To the manufacturer's recommendations to completely close and seal the opening.

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.

Installation: To the manufacturer's recommendations to completely close and seal the opening.

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 to the manufacturer's recommendations. 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.

Installation: To the manufacturer's recommendations to completely close and seal the opening.

Fire-stop collars

Installation: To the manufacturer's recommendations.

Fire-stop pillows

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

Installation: To the manufacturer's recommendations to completely close and seal the opening.

Cavity barriers

Installation: To the manufacturer's recommendations.

Multi-service cable transit box

Installation: To the manufacturer's recommendations.

3.4 COMPLETION**Cleaning**

Requirement: Clean the finished surfaces and remove spilled and excess fire-stopping materials without damaging other work.

Labelling

Requirement: To the recommendations of AS 4072.1 (2005) Appendix B.

Additional marking: Include the following text in addition to the above: CAUTION – FIRE BARRIER MUST REMAIN SEALED.

Location: Attach labels to cables, conduits, pipes and ducts on both sides of and close to, the control joint or penetration. On large items, provide multiple labels.

Operation and maintenance manuals

General: Prepare a manual that includes schedules showing type of system installed, fire rating, location, date of installation and inspection requirements. For fire-stopping systems that are intended to be modified in service, include the manufacturers' data as follows:

- Recommendations for changes in service and reinstallation.
- Recommendations for service use, care and maintenance.
- List of manufacturers and suppliers for replacement parts.

0183 METALS AND PREFINISHES

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirements: Provide metal and prefinishes, as documented.

Performance

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

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

1.3 SUBMISSIONS

Samples

Requirement: Submit samples to PRODUCTS, **GENERAL**, **Samples**.

2 PRODUCTS

2.1 GENERAL

Samples

Requirement: Provide samples of the following:

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

2.2 METALS

Aluminium and aluminium alloys

Drawn pipe: To AS/NZS 1867 (1997).

Drawn rod, bar and strip: To AS/NZS 1865 (1997).

Extrusions: To AS/NZS 1866 (1997).

Plate and sheets: To AS/NZS 1734 (1997).

Copper and copper alloys

Casting: To AS 1565 (2023).

Plate, sheet and strip: To AS 1566 (1997).

Rods, bars and sections: To AS/NZS 1567 (2023).

Composition and designations: To AS 2738 (2023).

Stainless steel

Bars: To ASTM A276/A276M (2024).

Plate, sheet and strip: To ASTM A240/A240M (2024).

Welded pipe (plumbing applications): To AS 1769 (1975).

Welded pipe (round, square, rectangular): To ASTM A554 (2021).

Steel

Sheet: To AS/NZS 1595 (1998).

Structural bars and sections: To AS/NZS 3679.1 (2016).

Structural hollow sections: To AS/NZS 1163 (2016).

Steel for prefinishes

Cold-rolled bar: Bright bars to AS 1443 (2004).

Cold-rolled sheet: To AS/NZS 1595 (1998).

Electric resistance welded tube: To AS 1450 (2007).

3 EXECUTION

3.1 GENERAL

Metal separation

Incompatible sheet metals: Prevent direct contact between incompatible 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, non-conductive separation layer such as polyethylene film, adhesive tape, neoprene, nylon or bituminous felt.

Incompatible fixings: Do not use.

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

Brazing

Lap-joints: Make sure brazed lap-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 ISO 17672 (2023).

Soldering

Lap-joints: Provide a mechanically sound soldered joint with sufficient lap for roofing, guttering, metalwork.

Pipes: Make a leakproof soldered joint using joiners for copper pipes.

Solder: To AS 1834.1 (1991).

Welding

Aluminium: To AS/NZS 1665 (2004).

Stainless steel: To AS/NZS 1554.6 (2012).

Steel: To AS/NZS 1554.1 (2014).

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 prefinishes to metal components, complete welding, cutting, drilling and other fabrication, and prepare the surface using a suitable method.

Standard: To the 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 unprimed surfaces.

3.2 FERROUS STEEL FINISHES

Metallic-coated steel

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

- Electrogalvanized (zinc) coating on ferrous hollow and open sections: To AS 4750 (2003).
- Ferrous open sections by an in-line process: To AS/NZS 4791 (2006).
- Ferrous hollow sections by a continuous or specialised process: To AS/NZS 4792 (2006).
- Steel sheet and strip: To AS 1397 (2021).
- Steel wire: To AS/NZS 4534 (2006).

3.3 STAINLESS STEEL FINISHES

General

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

Pre-assembly

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 stainless steel to equalise induced stress.

Post-assembly pre-treatment

Heat discolouration: Remove by pickling to ASTM A380/A380M (2017).

Welds: Grind excess material, brush, and polish to match the pre-assembly finish.

Post-assembly finish

Electropolish finish: Provide an electro-chemical process to stainless steel Type 316.

Brushed electropolish finish: Conform to the following:

- Pre-assembly finish: No. 4 polished.
- Post-assembly finish: Provide an electro-chemical process to achieve a surface roughness R_a , no greater than 0.50 μm .

Mirror finish: Conform to the following:

- Pre-assembly finish: 2B cold-rolled finish.
- Post-assembly finish: Apply a polishing and buffing process 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.

3.4 NON-FERROUS METAL FINISHES

Mechanical finishes

Bright finished copper alloy surfaces: For indoor applications, apply a clear lacquer protective coating.

3.5 ELECTROPLATED FINISHES

Electroplated coatings

Chromium on metals: To AS 1192 (2004).

- Service condition number: At least 2.

Nickel on metals: To AS 1192 (2004).

- Service condition number: At least 2.

Zinc on iron or steel: To AS/NZS 1789 (2023).

3.6 ANODISED FINISHES

General

Standard: To AS 1231 (2000).

Thickness grade: To the recommendations of AS 1231 (2000) Appendix H.

3.7 METAL SPRAYED FINISHES

Metal spray

Standard: To ISO 2063-2 (2017).

Minimum thicknesses:

- Indoor applications: 125 μm .
- Outdoor applications: 175 μm .

Process: Electric arc.

Seal coat: Cover the metal spray finish with two coats of vinyl seal to a total dry film thickness of 80 μm .

3.8 PREPAINTED FINISHES

Air-drying enamel

Application: Spray or brush.

Finish: Full gloss.

General use:

- Primer: Two-pack epoxy primer to AS/NZS 3750.13 (1997).
- Topcoats: 2 coats to AS 3730.6 (2006).

Oil resistant use:

- Primer: Two-pack epoxy primer to AS/NZS 3750.13 (1997).
- Topcoats: 2 coats to AS/NZS 3750.22 (2008).

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 (2008), two coats.
- Prime coat to metal surfaces generally: To AS/NZS 3750.19 (2008) or AS/NZS 3750.20 (2008).
- Prime coat to zinc-coated steel: To AS 3730.15 (2006) or AS/NZS 3750.16 (1998).
- Undercoat: To AS/NZS 3750.21 (2008).

Prepainted metal products

Standard: To AS/NZS 2728 (2013).

Product type: To AS/NZS 2728 (2013): Not lower than the type appropriate to the documented atmospheric corrosivity category.

Stoving enamel

Application: Spray or dip.

Two-pack liquid coating

Application: Spray.

Finish: Full gloss.

Primer: Two pack epoxy primer to AS/NZS 3750.13 (1997).

Topcoat:

- Internal use: Proprietary polyurethane or epoxy acrylic system.
- External use: Proprietary polyurethane system.

3.9 COMPLETION

Damage

Damaged prefinishes: Remove and replace items, including damage caused by unauthorised site cutting or drilling.

Repair

Anodising: Use sprayers or pens for minor scratches and mitre cuts as required.

Metallic-coated sheet: If 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 (2009).

Cleaning

General: On completion, clean all surfaces. Do not use abrasive cleaners.

0193 ROOF ACCESS SAFETY SYSTEMS
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1 GENERAL

1.1 Responsibilities

General

General: Design and Construct the fall protection system.

It is the designer's responsibility to document a general arrangement to fulfil the WHS requirements of the appropriate state and territory authorities.

Outcomes: Maintain the waterproofing integrity of roofing and cladding without damage or distortion. Maintain the structural integrity of the supporting elements and including

- Fabricate and install Con-Form EasyMech MR – Surface mounted HVAC Plant Platforms with EasyScreen perimeter screens and Louvres as documented. Include all connecting walkway platforms
- Fabricate and install Roof Access Ladders to provide for servicing access to Roof Mounted HVAC systems.

Supply

Design: The design, supply, installation, testing, certification, user manuals and training.

Delivery: Deliver the fall protection assembly ready for installation 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.

Cross references

General

Requirement: Conform to the following worksection(s):

0171b General requirements.

0342 Light Steel Framing

0421 Roofing Combined

0552 Metalwork Fabricated

1.2 DESIGN BY CONTRACTOR

Access: Make provision for three workers to access the system at any one time, and provide access as follows:

- 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.

Means of access: Nominate permanent means of access as appropriate.

1.3 MANUFACTURER'S DOCUMENTS

Technical manuals

Website: Visit <http://www.safemasterhs.net.au/>

Website: <https://con-formgroup.com.au/easymechplatformrange/>

Website: <https://anchorsafe.com.au/products/ladder-systems/>

1.4 CROSS REFERENCES

1.5 STANDARDS

General

Fixed platforms, walkways, stairways and ladders for use by operating, inspection, maintenance and servicing personnel: To AS 1657 (2018).

Personal equipment for working at height: To AS/NZS 1891.1 (2020), AS/NZS 1891.2 (2001), AS 1891.3 (2020), AS/NZS 1891.4 (2009) and AS 1891.5 (2020).

Rope access system: To AS/NZS 4488.1 (1997), AS/NZS ISO 22846.1 (2020) and AS/NZS ISO 22846.2 (2020).

1.6 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.

2 PRODUCTS

2.1 FALL PROTECTION SYSTEMS

Fall restraint systems

Description: Cable based systems positioned so that the user cannot reach a fall hazard when continuously connected to the system using a standard 2 m shock absorbing lanyard. Adjustment of the Personnel Protective Equipment (PPE) is not required whilst connected to the system.

Demonstrators: Use only manufacturer's representatives competent in connecting the appropriate travelling device to and from the cable.

Fall arrest systems

Description: Either cable based where the user is continuously attached to the system, rope based series of anchor points or a single anchor point from which the users can attach themselves when working at height. Whilst attached to these systems they are at risk of falling. The system relies on a rescue plan being in place.

Ladder access

Product: Vertical systems comprising top, intermediate and bottom anchor sets and 8 mm 1 x 19 grade 316 stainless steel cables.

Personal protective equipment (PPE)

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

Cable attachment:

Storage: PPE storage holdall supplied by the manufacture.

Certificates

Provide compliance certification with AS NZS 5532 - 12 Feb 2015 including a minimum warranty of 1 year for the installation.

3 EXECUTION

3.1 INSTALLATION

Standard

Installation: To AS/NZS 1891.2.

Contractor

Installer: Registered Installer approved by the manufacture.

3.2 MAINTENANCE

General

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

Check list for all inspections: To AS/NZS 1891.2 Table 8.

The installer/competent person: To AS/NZS 1891.2 clause 1.3.1.

Routine 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
 - . 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.
- Note 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 clause 9.3.

Proof testing of drilled-in anchorages

Standard: To AS/NZS 1891.2 clause 9.4.

On-going maintenance

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

0195P TACTILE SYSTEMS TGSi AND STAIR NOSING

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide TACTILE SYSTEMS tactile indicators and stair nosing, as documented – to the Sport Hall Bleacher Steps.

1.2 COMPANY CONTACTS

TACTILE SYSTEMS technical contacts

Website: www.tactilesystems.com.au/contact

1.3 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

1.4 STANDARDS

General

Tactile indicators: To AS/NZS 1428.4.1 (2009).

Stair nosing: To the NCC cited AS 1428.1 (2009).

1.5 MANUFACTURER'S DOCUMENTS

Technical manuals

Stair nosing: www.tactilesystems.com.au/product-category/stair-nosing-tread-tape

1.6 SUBMISSIONS

Products and materials

Type tests: Submit test results to PRODUCTS, **GENERAL**, **Tests** for the following:

- Slip resistance of tactile indicators and nosing.
- Luminance reflectance of tactile indicators and nosing.

Warranties

Requirement: Submit warranties to **COMPLETION**, **Warranties**.

1.7 INTERPRETATION

Definitions

General: For the purposes of this worksection, the definitions given in AS/NZS 1428.4.1 (2009) apply.

1.8 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the completed substrate ready for tactile indicators and nosing.

2 PRODUCTS

2.1 GENERAL

Product substitution

Other products: Conform to **SUBSTITUTIONS** in 0171 General requirements.

Tests

Slip resistance of tactile indicators and nosing: To AS 4586 (2013).

Luminance reflectance of tactile indicators and edgings: To AS/NZS 1428.4.1 (2009) Appendix E and the NCC cited AS 1428.1 (2009) Appendix B.

2.2 TACTILE SYSTEMS STAIR NOSING

Classic series

Select series 4: Surface mounted nosing with 4 strips of carborundum infill.

- Product tag: SC4-75X10.
- Slip rating to AS 4586 (2013): P5.
- Aluminium Profile Colour – Black
- Insert Type – P5 Tape
- Insert Colour - White

3 EXECUTION

3.1 GENERAL

Substrate preparation and installation of TACTILE SYSTEMS products

Requirement: To TACTILE SYSTEMS' recommendations and fitting instructions, and as follows:

- Discrete tactiles:
 - . General: Drill, apply adhesive (if required) and pressure fit.
 - . Flat back tactiles: Adhesive fix.
 - . Warning complete carpet system: Screw fix TGSi's through carpet to threads on concealed backing plate.
 - . Timber installations: Use stainless steel tactiles with screw-fit option.
- Integrated tactiles:
 - . Future-Tech: Apply construction adhesive and fix with eight stainless steel hammer fixings.
 - . Paver and ceramic TGSi's: Install flush with adjacent paving.
 - . Polyurethane: Butyl adhesive backing for 'peel & stick' installation.
 - . Stainless steel and brass: Install flush with the base surface.

3.2 COMPLETION

Warranties

Type: Manufacturer warranty.

Period: As follows:

- Stainless steel and brass TGSIs: 10 years.
- Future Tech TGSIs, ceramic TGSIs and concrete pavers: 5 years.
- Polyurethane TGSIs: 2 years.
- Stair nosing: 2 years.

0201 DEMOLITION

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Carry out demolition, as documented. Includes demolition of the existing bowling clubhouse, brick retaining walls and footings

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

1.3 STANDARDS

General

Demolition: To AS 2601 (2001).

1.4 INTERPRETATION

Definitions

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

- Demolition: The complete or partial removal of a building or structure, by pre-planned and controlled methods or procedures.
- Dilapidation record: The photographic or video and written record of the condition of the portion of the existing building retained, adjacent buildings and other relevant structures or facilities, before the start of demolition work.
- 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.
- Services disconnection as required, site mobilisation, all measures to make site safe to adjoining residences.
- Demolition/removal of abandoned brick bowling club building, retaining walls, paths/driveways, trees as described on demolition plan including one street tree in Russell Street.
- Excavation and removal as required, including all low quality fill beneath bowling green. Ensure excavation adjacent to amenities is safe and not prone to collapse in all weather conditions.
- Consider and implement the results of the "Hazardous Materials Survey" by All Clear Group 29 April 2025.

1.5 SUBMISSIONS

Authority approvals

Evidence of compliance: Before starting demolition, submit evidence of the following:

- Requirements of authorities relating to the work under the contract have been obtained.
- A permit to demolish from the appropriate authority.
- A scaffold permit from the appropriate authority, if scaffolding is proposed to be used.
- Certification that each person having access to the construction site has completed site-specific WHS induction training.
- Precautions necessary for protection of persons and property have been taken and suitable protective and safety devices have been provided to the approval of the relevant authority.
- Certificate from the relevant authority confirming treatment for any rodent infestation has been carried out.
- Fees and other costs have been paid.

Execution details

Requirement: Submit the following, as documented:

- Hazardous Substances Management Plan, including laboratory analysis of hazardous substances.
- Investigation and work plan.
- Safe Work Method Statement.

Off-site disposal locations: Submit details of the proposed locations for the disposal of material required to be removed from the site and evidence of conformance with the requirements of relevant authorities.

Recycling: Submit details of the proposed recycling facility and the following:

- Certification: Submit evidence of disposal of recycled materials.
- Concrete crushing: If proposed on site, submit details of plant and environmental controls.

Stockpile locations: Submit details of the proposed locations of on-site stockpiles for demolished materials for recycling in the works. Coordinate with the locations for storage of other waste streams. Prevent mixing and pollution.

Records

Dilapidation record:

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

Tests

Requirement: Submit compliance test results for building services components to be re-used.

1.6 INSPECTION

Notice

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

- Adjoining and adjacent structures before starting demolition.
- Services before disconnection or diversion.
- Trees documented to be retained, before starting demolition.
- Contents of building before starting demolition.
- Structure after stripping and removal of roof coverings and external cladding.
- Underground structures after demolition above them.
- Remaining excavations after removal of underground work.
- Site after removal of demolished materials.
- Services after reconnection or diversion.
- Adjoining and adjacent structures at completion of demolition.

2 PRODUCTS

2.1 DEMOLISHED MATERIALS

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

Class	Requirement	Ownership
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
Demolish for removal	Remove from site demolished materials identified in the Demolish for removal schedule . Do not burn or bury on site Transit: Prevent spillage of demolished materials in transit	Contractor

3 EXECUTION

3.1 HAZARDOUS SUBSTANCES

Identified hazardous substances

Register: Hazardous substances have been identified as present on site and a Hazardous substances register has been prepared.

Audit

Requirement: Prepare a Hazardous Substances Management Plan to AS 2601 (2001) clause 1.6.1. Include the following:

- Asbestos-containing materials.
- Flammable or explosive liquids or gases.
- Toxic, infective or contaminated materials.
- Radiation or radioactive materials.
- Noxious or explosive chemicals.
- Tanks or other containers that have been used for storage of explosive, toxic, infective or contaminated substances.
- Implement the results/recommendations of the "Hazardous Materials Survey" by All Clear Group 29 April 2025.

Removal of hazardous substances

Standard: To AS 2601 (2001) clause 1.6.2.

3.2 INVESTIGATION AND WORK PLAN

General

Requirement: Before demolition or stripping work, prepare the work plan to AS 2601 (2001) Section 2. Include the checklist items appropriate to the project from AS 2601 (2001) Appendix A and the following:

- Method of protection and support for adjoining or adjacent structures.
- Locations and details of service deviations and terminations.
- Sequence of work.
- If the demolition program results in components temporarily cantilevered, provide a certificate from a professional engineer.
- Proposals for the safe use of mobile plant on suspended structural members including provisions for the protection of lower floors in the event of structural failure.
- Structural engineering report and demolition methodology, as appropriate, if the structure is suspected to contain unbonded prestress tendons.

- If implosion methods are proposed, provide a separate report of methods and safeguards.
- Wheel loads of tipping or loading vehicles.

3.3 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 or parts of buildings being retained and which normally rely on support from work to be demolished.

Suspended slabs: If mobile plant is required for use on suspended structural members, conform to structural engineering requirements and the work plan.

Ground support: Support excavations for demolition of underground structures.

Adjoining or adjacent structures: Provide supports to adjoining or adjacent structures if necessary, sufficient to prevent damage resulting from the works.

Lateral and vertical supports: At least equal in capacity to that originally provided by the structural element or structure to be demolished.

Permanent supports

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

3.4 PROTECTION

Encroachment

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

Weather protection

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

Dust protection

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

Security

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

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. Install to shed water to avoid damage to retained existing elements and 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 doorset fitted with a rim deadlock and remove on completion of demolition.

Exposed surfaces

General: If necessary, protect and weatherproof the surfaces of adjoining structures exposed by demolition.

Existing services

Location: Before starting demolition, locate and mark existing underground services by potholing or other non-destructive digging, in the areas that will be affected by the demolition operations.

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

Essential services: Shut off, cap or control services not required for the demolition work, at or outside the building line before commencing demolition. Conform to the requirements of the relevant existing utility authority, as appropriate.

Underground utility services to be retained: Do not excavate by machine within 1 m of existing underground services.

Recovered items

General: If items are documented for recovery and re-use, minimise damage during removal and recover all associated components required for their re-use.

3.5 DEMOLITION - BUILDING WORKS**General**

Requirement: To the approved Safe Work Method Statement and work plan.

Encroachment

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

Concrete slabs

Partial demolition or penetrations: Using a diamond saw, neatly cut back or trim to new alignment with a clean true face. Do not overcut at corners. If required, provide protection to exposed reinforcement along the newly sawn concrete slab edge, as documented.

Storage: Do not store demolished materials on suspended slabs.

Material below grade

Remaining voids: Stabilise and provide barriers.

Explosives

General: Do not use explosives.

3.6 DEMOLITION - BUILDING SERVICES**General**

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

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

Demolition of refrigeration systems

Standard: To AS/NZS 5149.4 (2016).

Components for re-use

General: Before returning to service, clean components and test for conformance to Australian Standards, as required.

3.7 COMPLETION**Notice of completion**

General: Give at least 5 working days' notice of completion of demolition so that adjoining or adjacent structures may be inspected following completion of demolition.

Reinstatement

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

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

Removal of temporary supports

General: Obtain written instructions from the structural engineer at the completion of demolition before removing temporary supports.

0221 SITE PREPARATION

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide site preparation, as documented.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 *General requirements.*
- 0201 *Demolition*

1.3 INTERPRETATION

Definitions

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

- Authority: Any organisation with statutory authority relating to the project, including clearances.
- Clearances: A formal certificate, approval or condition issued by a statutory authority allowing work in a particular area.
- Plant establishment period: The period between the date of practical completion and the end of the defects liability period.

1.4 SUBMISSIONS

Certification

Vermis: Submit pest exterminator's certification as evidence that the completed site works are free from vermin.

Execution details

Requirement: Submit details of methods and equipment proposed for the following:

- Clearing and grubbing.
- Tree removal and transplanting.
- Protecting the ground within and adjacent to tree driplines from compaction by proposed earthworks machinery.

1.5 INSPECTION

Notice

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

- Enclosures around trees requiring protection.
- Trees requiring removal.
- Trees for transplanting to determine final orientation.

2 EXECUTION

2.1 COMMUNITY LIAISON

Notification

General: Notify residents about construction activities that will affect access to or disrupt the use of their properties.

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

Notification content:

- Description of the work.
- The reason for the work.
- The expected duration.

- Changes to traffic arrangements and property access.
- The 24-hour contact number of the representative responsible.

2.2 EXISTING SERVICES

General

Requirement: Before starting earthworks, locate and mark existing underground services in the areas affected by the earthworks operations including clearing, excavating and trenching.

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

Construction plant: Conform to the utility service provider requirements for the operation of construction plant within the zone of influence of existing services. Maintain the required cover and do not exceed the allowable load limit.

Excavation: Do not machine excavate within 1000 mm of existing services.

Existing service lines: If required, divert services detected during excavation, clear of the building and reconnect to the utility service provider requirements.

2.3 SITE CLEARING

Extent

Requirement: Clear only areas occupied by works such as structures, paving, excavation, regrading and landscaping or other areas documented for clearing.

Contractor's site areas: If not included within the areas documented above, clear 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 as follows:

- Below subgrade under buildings, embankments or paving: 500 mm.
- Below finished surface in unpaved areas: 300 mm.

Backfilling: Fill 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.

Redundant/decommissioned works: Remove works no longer required, including slabs, foundations, paving, drains and access chambers and covers within the works zone.

Batters

Temporary protection: If the change in level between crest and toe is more than 1500 mm, protect from erosion with geofabric, hessian and tar or heavy duty black polyethylene sheet cover. Securely fix down at crest and toe.

Surplus material

Topsoil and excavated material: Remove unwanted stripped soil and other material from the site as the work proceeds, including any material dropped on footpaths or roadways.

2.4 STORMWATER AND SEDIMENT CONTROL

General

Erosion and sediment control measures: To 0172 *Environmental management*.

Waterways and drains

Waterways: If required, temporarily divert ditches, field drains and other waterways affected by excavation and reinstate on completion.

Stormwater drains: Divert drains detected during excavation, clear of the building and reconnect as documented. Conform to the Network Utility Operator's requirements.

2.5 EXISTING WORKS TO REMAIN

Marking

Requirement: Identify existing works to remain with 1000 mm high, 50 x 50 mm timber stakes connected by yellow plastic tape to prevent accidental damage.

2.6 TREE REMOVAL

Designation

Marking: Identify trees and shrubs for removal by tagging 1000 mm above ground level.

2.7 TREE PROTECTION

General

Warning signs: Display warnings that trees and plantings require protection during the contract in a prominent position at each entrance to the site. Remove on completion.

Lettering: Road sign type sans serif letters, 100 mm high to AS 4970 (2009) Appendix C.

Protection measures: Provide before starting the earthworks.

Trees to remain

Extent: Trees not marked for removal.

Tree protection

Tree protection zone (TPZ): To AS 4970 (2009) Section 3.

Tree protection measures: To AS 4970 (2009) Section 4.

Monitoring and certification: To AS 4970 (2009) Section 5.

Work near trees

Materials placement: Conform to the following:

- Keep the area within the dripline of trees free of sheds and paths, construction material and debris.
- Do not place bulk materials and harmful materials within the dripline of 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 similar material 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, give notice. Minimise period and extent of excavation within the dripline.

Hand methods: If excavation is required within the dripline, use hand methods so that root systems remain intact and undamaged.

Roots: Do not cut tree roots exceeding 50 mm diameter. If required to cut tree roots, use cutting methods that do not excessively 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 excavations around tree roots. Place the backfill in layers of 300 mm maximum depth and compact to a dry density similar to that of the 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 by volume (topsoil: well-rotted composts): 3:1.
- Neutral pH value.
- Free from weed growth and harmful materials.

Compaction protection: Protect ground adjacent to the tree dripline.

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

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

Mulching: Spread 100 mm thick organic mulch conforming to AS 4454 (2012), to the whole of the area within the dripline of all existing trees to remain.

2.8 TEMPORARY LANDSCAPE FENCING

Fence dimensions

Height: 1200 mm.

Maximum post spacing: 5000 mm.

Component 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 plant establishment period.

2.9 TREE TRANSPLANTING**General**

Requirement: As documented.

Conditions: Select a time for transplanting based on the following criteria:

- Seasonal conditions.
- Length of operation.
- Rootball diameter and depth.
- Lifting methods.
- Weather conditions.

Preparation

Watering: Establish a temporary drip irrigation system or manually water the identified trees for two weeks before rootball excavation work.

Fertilising: Apply one application of liquid fertiliser mix, appropriate for the species, to the foliage and roots. Apply sufficient fertiliser to allow the spray to drip from the foliage and soak into the rootball. Do not apply fertiliser on excessively hot, dry or windy days.

Rootball

Root pruning: Cut the rootball to a size that maximises the rootball for each specimen and conform to the following:

- Use only sharp tools or water cutting.
- Make sure the rootball is symmetrical about the trunk and in proportion to the overall size of the tree except where limitations of individual tree planter openings require specific tailoring of the rootball dimension.
- Initial cut: Make cut 250 mm beyond the required finished rootball dimension to allow trimming of damaged roots to the final dimensions.
- Finishing: Hand trim to the required dimensions.

Trenching: Conform to the following:

- Excavation: Form trench manually or by using a chain trenching machine. Do not excavate using a backhoe or an excavator.
- Backfilling: Backfill and lightly compact with sandy loam, free of any foreign matter, pathogens or any substances that may be harmful to future root growth. Apply root inducing formulation to the manufacturer's recommended concentration, to saturate the backfill in the trench.

Maintenance of on-site plant material

General: Safeguard the health and well-being of all on-site plant material as required, before lifting and transplanting.

Watering: Maintain a temporary drip irrigation system around each tree, located within the trenched rootball perimeter. Program the system to supply water at an optimum rate to encourage growth and avoid drying out through excessive transpiration following the cutting of the roots. Monitor the system continuously until the tree is lifted and transplanted.

Branch pruning: If pruning of branches is required to balance root loss, obtain approval. Prune only as directed and as documented in **TREE MAINTENANCE**.

Fertilising: Apply fertiliser at regular intervals during this period to maintain healthy growth.

Execution

Lifting: Two days before lifting each specimen, thoroughly irrigate to the full depth of the rootball. Do not fracture the ball of soil around the root system. Maintain rootball in firm condition during transplanting by wrapping in hessian or other appropriate natural open-weave material, securely tied.

Storage: Transport trees to a designated nursery site. Store and maintain until ready for planting.

Planting hole: Excavate hole 1000 mm wider than the rootball. Make sure the hole is not deeper than the rootball height.

Planting: Avoid disturbing the rootball during moving and planting. After placement, remove the rootball wrapping and ties by cutting.

Watering: After transplanting, water the rootball thoroughly and continue to water until established.

2.10 SITE NURSERY**Temporary works**

Perimeter: Provide a bund wall of compacted fill as follows:

- Height: 400 mm.
- Batter grade (horizontal:vertical): 2:1.

2.11 TREE MAINTENANCE**General**

Requirement: As documented.

Notice: Give notice before starting tree maintenance.

Pruning: To AS 4373 (2007) using a fully qualified and experienced arborist. Carry out all required works in a safe manner.

Execution

Requirement: Rectify any damage to existing trees to remain.

Operations: Remove deadwood and decayed wood or damaged limbs. Make final cuts as close to the branch collar as possible without cutting into the branch collar. If trees show signs of deterioration after the work is completed, ameliorate the soil by soil aeration, irrigation or incorporation of organic material. Continue this program until the end of the plant establishment period.

Root pruning: Do not excessively disturb the remaining root system. Cut off damaged roots cleanly inside the exposed or damaged area. Cover exposed root area with soil immediately after pruning, do not leave roots exposed.

Wetting and new root stimulation: Form a water collecting basin and apply a rooting hormone and wetting agent to the rootball.

Precautions: Avoid damage to trees being treated and to nearby trees and surroundings. Do not use trees as anchors for winching operations or bracing. Provide bracing as necessary before cutting to prevent uncontrolled breakages and damage to surroundings.

Failure: If repair work is impracticable or is attempted and is rejected, remove the tree and root system and make restitution.

2.12 COMPLETION**Site restoration**

Requirement: Reinststate undeveloped ground surfaces to the condition existing at the commencement of the contract.

Clean up

Progressive cleaning: Keep the works clean and tidy and regularly remove waste and surplus material arising from execution of the work from the site.

Waste disposal: To 0172 *Environmental management*.

Vermin management

Requirement: Employ a suitably qualified pest exterminator to remove vermin found during site preparation.

0222 EARTHWORK

1 GENERAL

1.1 RESPONSIBILITIES

General

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

1.2 DESIGN

Requirements

General: To DESIGN in *0171 General requirements*.

1.3 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements*.
- *0172 Environmental management*.

1.4 STANDARDS

General

Earthworks: Conform to the recommendations of those parts of AS 3798 (2007) that are referenced in this worksection.

Description and classification of soils: To AS 1726 (2017).

1.5 INTERPRETATION

Abbreviations

General: For the purposes of this worksection, the following abbreviations apply:

- GITA: Geotechnical inspection and testing authority.
- OMC: Optimum moisture content.

Definitions

General: For the purposes of this worksection, the definitions given in AS 3798 (2007) and the following apply:

- Bad ground: Ground unsuitable for the works, including fill liable to subsidence, ground containing cavities, faults or fissures, ground contaminated by harmful substances and ground that is or becomes, soft, wet or unstable.
- Rock: Monolithic material with volume greater than 0.3 m³ that cannot be removed until broken up by rippers or percussion tools.
- Site topsoil: Natural soil, excavated from the site, that contains organic matter, supports plant life, conforms generally to the fine-to-medium texture classification to AS 4419 (2018) and is free from the following:
 - . Stones more than 25 mm diameter.
 - . Clay lumps more than 50 mm diameter.
 - . Weeds and tree roots.
 - . Sticks and rubbish.
 - . Material toxic to plants.
- Subgrade: The trimmed or prepared earth material on which the pavement, footing or slab is constructed. Generally taken to relate to the upper line of the earth material.
- Zone of influence: A foundation zone bounded by planes extending downward and outward from the bottom edge of a footing, slab or pavement and defining the extent of foundation material having influence on the stability or support of the footings, slab or pavement.

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 if required. Provide smoothness as normally produced by a scraper blade.

1.7 SUBMISSIONS

Design documentation

Calculations: Submit calculations by a professional engineer showing the stability and safety of proposed excavations and temporary supports, including supports required for adjacent structures.

Execution details

Report: Submit a time-based schedule detailing the methods and equipment proposed for the earthworks, 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 excavation methods proposed.

Disposal location: Submit details of the location and evidence of compliance with the appropriate authority requirements for the disposal of material requiring removal from site.

Temporary shoring: Submit a proposal for any temporary shoring required, including the progressive removal.

Proof rolling: Submit details of proposed method and equipment.

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

Site records: Submit the following to AS 3798 (2007) clause 3.4 and Appendix B:

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

Products and materials

Imported fill: Submit certification from a GITA or test results of the imported fill as evidence of conformity with the contract, including the source.

Tests

Requirement: Submit test results of the following:

- Compaction control.

1.8 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 rolling of the subgrade.
- Proof rolled subgrade before placing fill.
- Filling and compaction completed to contract levels.
- Stockpiled topsoil before spreading.

2 PRODUCTS

2.1 FILL MATERIALS

General

Suitable material: To AS 3798 (2007) clause 4.4 including inorganic, non-perishable material suitably graded and capable of compaction to the documented density.

Unsuitable materials: Do not use fill defined as unsuitable by AS 3798 (2007) clause 4.3.

Sulfur content: Do not provide material with sulfur content exceeding 0.5% within 500 mm of concrete and cement bound elements (for example masonry) unless the elements are protected by impermeable membranes or equivalent means.

Re-use of excavated material: Only re-use suitable material.

Stockpiles

General: Segregate earth and rock material and stockpile for re-use in backfilling operations.

Location: Do not stockpile excavated material against tree trunks, buildings or fences. Do not obstruct the free flow of water along drainage channels.

2.2 BORROW OR IMPORTED FILL

General

Requirement: Use only when suitable material obtained from site excavations are insufficient for completing the documented earthworks.

- Suitable material: To AS 3798 (2007) clause 4.4.

Borrow pits:

- Locate more than 3000 mm 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.

2.3 GEOTEXTILE

General

Material: UV stabilised, permeable, polymeric, woven or non-woven textile material used in contact with soil/rock material.

Identification and marking: To AS 3705 (2012).

3 EXECUTION

3.1 SITE PREPARATION

Erosion and sedimentation control

Requirement: To 0172 *Environmental management*.

3.2 GEOTECHNICAL

As found site conditions

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

- Bad ground.
- Discrepancy in expected conditions.
- Rock.
- Springs, seepages.
- Topsoil more than 100 mm deep.

Inspection and testing

Frequency of testing: To AS 3798 (2007) Table 8.1.

3.3 RECORDS OF MEASUREMENT

Excavation and backfilling

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

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

Method of measurement: By a registered surveyor.

Rock

Level and class: If rock is measured for payment purposes, either 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 classes of rock have been determined.

3.4 REMOVAL OF TOPSOIL

General

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

Maximum depth: 200 mm.

Disposal: Remove topsoil unsuitable for re-use from the site to AS 3798 (2007) clause 6.1.8.

Topsoil stockpiles

General: Stockpile site topsoil intended for re-use.

Stockpile maximum height: 1.5 m.

Identification: Mark and label stockpiles of different soil types.

Vegetation: Do not burn off or remove plant growth that occurs during storage.

Protection: Conform to the following:

- Provide 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.

3.5 EXCAVATION

Extent

Site surface: Excavate the site to the levels and profiles required for the documented structures, pavements, filling and landscaping. Make allowance for compaction, settlement or heaving.

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

Bearing surfaces

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

Rock

General: Do not use explosives.

Existing footings

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

Existing services

Location: Before starting earthworks, locate and mark existing underground services in the areas that will be affected by the earthworks operations including clearing, excavating and trenching.

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

Excavation: Do not excavate by machine within 1000 mm of existing services.

Proof rolling

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

Proof rolling method and equipment: To AS 3798 (2007) clause 5.5.

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

Subgrade replacement: Excavate the full extent and depth of bad ground. Remove and replace with selected fill. Place and compact to **PLACING FILL** to achieve the required capacity and levels.

Disposal of excess excavated material

General: If not required or unsuitable for fill, remove from site.

Standard: To AS 3798 (2007) clause 6.1.8.

3.6 REINSTATEMENT**Deterioration of bearing surfaces**

Requirement: If the bearing surface deteriorates, excavate to a sound surface before placing the loadbearing element.

Subgrades affected by moisture

Requirement: If, due to high moisture content, the subgrade cannot support construction equipment or the overlying pavement cannot be compacted, perform one or more of the following:

- Allow the subgrade to dry until it provides support for equipment and allows 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 move to spoil stockpile and backfill excavated areas.

Over excavation

Requirement: If excavation exceeds the required depths, reinstate to the correct depths, levels and bearing capacity.

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: Rectify the over excavation as follows:

- Generally: Provide selected fill compacted to the documented density.
- Less than 100 mm: Do not backfill. Increase the thickness of the layer above.

Subsoil drains: Backfill over excavation of subsoil drains using coarse filter material conforming to AS/NZS 3500.3 (2021) clause 2.13.1.

3.7 SUPPORTING EXCAVATIONS**Removal of supports**

General: Remove temporary supports progressively as backfilling proceeds.

Voids

General: If voids occur outside sheeting or sheet piling, fill and compact voids to a dry density similar to that of the surrounding material.

3.8 ADJACENT STRUCTURES**Temporary supports**

General: If required, provide supports to adjacent structures, sufficient to prevent damage arising from the works.

Lateral supports: Provide lateral support with shoring.

Vertical supports: If required, provide vertical support with piling or underpinning or both.

Permanent supports

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

Encroachments

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

3.9 ROCK BOLTING

General

Requirement: For temporary or permanent support of rock faces, provide proprietary high strength steel bars or cables anchored into holes drilled in the rock and tensioned against plates bearing on the rock face. Schedule the installation to conform to systematic bolting or calculated relief, as documented.

Standard: To AS 4678 (2002).

Protection

General: Protect permanent rock bolts by grouting the drilled hole with cement grout after tensioning the rock bolt. Protect the bearing plate and the exposed portion of rock bolt and anchorage with a protective coating or by embedment in concrete.

3.10 GEOTEXTILE

General

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

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

3.11 PREPARATION FOR FILLING

Preparation

Stripping: Prepare the ground surface before placing fill (including topsoil fill), ground slabs or load bearing elements to AS 3798 (2007) clause 6.1.5. Remove loose material, debris, organic matter and material that inhibits or prevents satisfactory placement of fill layers.

Foundation preparation: To AS 3798 (2007) clause 6.1.7.

Compaction: Compact the ground exposed after stripping or excavation, to a minimum depth of 150 mm, to the minimum relative compaction in AS 3798 (2007) Table 5.1.

Ground treatment or improvement methods:

- Scarify method: Loosen exposed excavation by scarifying to a minimum of 150 mm, moisture-condition and compact to AS 3798 (2007) Section 5.
- Impact roller and impact compaction: Use an approved method.

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: If required, 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.

3.12 PLACING FILL

General

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

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

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. If required, limit the size of compaction equipment or compact by hand.

Protective covering to membranes: Do not disturb or damage during backfilling.

Placing at structures

Fill adjacent structures and trenches: To AS 3798 (2007) clause 6.2.6.

Requirement: Place and compact fill in layers simultaneously on both sides of structures, culverts and pipelines to avoid differential loading. Commence compacting each layer at the structure and proceed away from structure.

Over the top of structures: Carefully place first layers of fill.

Retaining walls: 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.

Compaction

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

Maximum rock and lump size in layer after compaction: To AS 3798 (2007) clause 6.2.2.

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

Minimum relative compaction: To AS 3798 (2007) Table 5.1.

3.13 PLACING TOPSOIL

Stockpiled topsoil

Cultivation: Rip subgrade 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.

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.

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.

3.14 FILL MOISTURE CONTROL

General

Moisture content: Determine in conformance with AS 1289.5.1.1 (2017) or AS 1289.5.2.1 (2017), as appropriate. Adjust the moisture content of fill to $\pm 2\%$ OMC during compaction as required to achieve the documented density.

3.15 TESTING

Site tests

Compaction control tests: To AS 1289.5.4.1 (2007) or AS 1289.5.7.1 (2006).

Test frequency: To AS 3798 (2007) Table 8.1.

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.

Site restoration

Requirement: If 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.

0250 LANDSCAPE - COMBINED

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide landscaping, as documented by:

Landscape Architect – Environmental Partnership (NSW),

Civil Engineering – PM Design Group

Hydraulic Engineering – Glenn Haig & Partners

Performance

Plants: Grown to a standard that allows rapid establishment and growth to maturity.

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

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.
- 0254 Irrigation

1.3 INTERPRETATION

Definitions

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

- Ameliorant material: Additives used to make or improve soil.
- Imported topsoil: Similar to local natural soil, suitable for the establishment and ongoing viability of the selected vegetation, free of weed propagules and of contaminants and classified by texture to AS 4419 (2018) Appendix K Table K1, as follows:
 - . Fine: Clay loam, fine sandy clay loam, sandy clay loam, silty loam, loam.
 - . Medium: Sandy loam, fine sandy loam.
 - . Coarse: Sand, loamy sand.
- Investigative inspection: Any method of root inspection that involves the washing away of all or portions of the soil from the rootball to expose a section or all the roots.
- Plant establishment period: The period between the date of practical completion and the end of the defects liability period.
- Site rock: Rocks selected for salvage.
- Site topsoil: Natural soil, excavated from the site, that contains organic matter, supports plant life, conforms generally to the fine-to-medium texture classification to AS 4419 (2018) and is free from the following:
 - . Stones more than 25 mm diameter.
 - . Clay lumps more than 50 mm diameter.
 - . Weeds and tree roots.
 - . Sticks and rubbish.
 - . Material toxic to plants.
- Soil blend: A landscape soil derived from the blending of two or more of sand, natural soil material or organic materials and with a bulk density and organic matter content to meet site specific requirements.
- Top dressing: A soil that is suitable for surface application to turf and lawns.
- Topsoil: Includes landscape soil, low density soils and soils for turf and lawns.

1.4 SUBMISSIONS

Certification

Plant species: Submit the supplier's certification as evidence that plants are true to the required species and type, and free from diseases, pests and weeds at the time of delivery.

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION, Operation and maintenance manuals.**

Products and materials

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

- Material source of supply.

Samples

Requirement: Submit samples to **PRODUCTS, GENERAL, Samples.**

Subcontractors

General: Submit names and contact details of proposed suppliers and evidence of the following, if appropriate:

- Experience in the required type of work.
- Production capacity for material of the required type, sizes and quantity.
- Lead times for delivery of materials to the site.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties.**

1.5 INSPECTION

Notice

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

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

2 PRODUCTS

2.1 GENERAL

Samples

Requirement: Provide representative samples of each material, packed to prevent contamination and labelled to indicate source and content.

Bulk materials: At least 5 working days before bulk deliveries, provide a 1 kg sample of each type documented with required test results.

2.2 TOPSOIL

Standard

Site and imported topsoil: To AS 4419 (2018).

Composts, soil conditioners and mulches: To AS 4454 (2012).

Source

General: If the topsoil of documented quality cannot be provided from material recovered from site, provide imported topsoil.

Imported topsoil

Requirement: Imported topsoil to AS 4419 (2018) Tables 1, 2 and 3 and as documented.

Imported topsoil particle size table (% passing by mass)

Sieve size (mm)	Soil textures
-----------------	---------------

	Fine	Medium	Coarse
2.36	100	100	100
1.18	90 – 100	90 – 100	90 – 100
0.60	75 – 100	75 – 100	70 – 90
0.30	57 – 90	55 – 85	30 – 46
0.15	45 – 70	38 – 55	10 – 22
0.075	35 – 55	25 – 35	5 – 10
0.002		2 – 15	2 – 8

Imported topsoil nutrient level table

Nutrient	Unit	Sufficiency range
Nitrate-N (NO ₃)	mg/kg	> 25
Phosphate-P (PO ₄) – P tolerant	mg/kg	43 - 63
Phosphate-P (PO ₄) – P sensitive	mg/kg	< 28
Phosphate-P (PO ₄) – P very sensitive	mg/kg	< 6
Potassium (K)	mg/kg	178 - 388
Sulfate-S (SO ₄)	mg/kg	39 - 68
Calcium (Ca)	mg/kg	1200 - 2400
Magnesium (Mg)	mg/kg	134 - 289
Iron (Fe)	mg/kg	279 - 552
Manganese (Mn)	mg/kg	18 - 44
Zinc (Zn)	mg/kg	2.6 - 5.1
Copper (Cu)	mg/kg	4.5 - 6.3
Boron (B)	mg/kg	1.4 - 2.7

Method References

pH in H₂O (1:5), pH in CaCl₂ (1:5) and Electrical Conductivity (EC) by Rayment & Higginson (1992) method 4A2, 4B2, 3A1.

Soluble Nitrate-N by APHA 4500.

Soluble Chloride by Rayment and Lyons 2011 modified method 5A2.

Extractable P by Mehlich 3 – ICP.

Exchangeable cations – Ca, Mg, K, Na by Mehlich 3 – ICP.

Extractable S by Mehlich 3 – ICP.

Extractable trace elements (Fe, Mn, Zn, Cu, B) by Mehlich 3 - ICP.

Site topsoil

Requirement: Site topsoil, as documented.

Soil blend: If required, stripped natural soil with sand and/or organic matter and recommended ameliorant material.

2.3 GRASS**Seed mixture**

Description: Fresh, clean, uncoated new seed, thoroughly pre-mixed with a bulking material such as safflower meal, as documented.

Unacceptable seed: Wet, mouldy or otherwise impaired.

Purity (minimum): 98%.

Germination viability (minimum): 86%.

Age (maximum) from date of harvest: 2 years.

Handling: Deliver to the site in bags marked to show weight, seed species and supplier's name.

Turf

Description: Cultivated turf of even thickness, free from weeds and other foreign matter, as documented.

Supplier: A specialist grower of cultivated turf.

2.4 FERTILISER

General

Description: Proprietary fertilisers, delivered to the site in the manufacturer's labelled and unopened bags or containers, as documented.

Application rate: Vary the application rate to allow for the plant-available immediate fertiliser equivalence value of the soil conditioning compost.

Labelling

General: To the applicable statutory requirements, including manufacturer or supplier, weight, fertiliser type, N:P:K ratio, recommended uses and application rates.

Label type: To withstand transit without erasure or misplacement.

2.5 PLANTS

General

Requirement: Supply plants with the following properties:

- Stress: Free from stress resulting from inadequate watering, excessive shade or excessive sunlight experienced at any time during their development.
- Site environment: Grown and hardened off to suit anticipated site conditions at the time of delivery and prevent dieback.
- Pests and disease: Free from attack by pests or disease.
- Native species with a history of attack by native pests: Restrict plant supply to those with evidence of previous attack to less than 15% of the foliage and make sure actively feeding insects are absent.

Labelling

General: To the recommendations of the *National Plant Labelling Guidelines (2023)*.

Label type: To withstand transit without erasure or misplacement.

Label frequency: One for each plant.

Root system

Requirement: Supply plant material with a root system as follows:

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

Root inspection: If investigative inspection is required, sample as follows:

- More than 100 samples: Inspect 1%.
- Less than 100 samples: Inspect 1 sample.

Sample plants: Replace plants used in investigative inspection.

Rejection: Do not provide root bound stock.

2.6 IRRIGATION

General

Requirement: Provide automatically controlled, fixed irrigation systems, as documented.

Backflow prevention: To meet statutory requirements.

Irrigation controllers

Type: Automatic controllers that are easily programmed and include the following:

- Manual cycle and individual control valve operation.
- Manual on/off operation of irrigation without loss of program.
- ≥ 4 on/off cycles per day.
- Day omit.
- 240 V input and 24 V output capable of operating 2 control valves simultaneously.
- ≥ 24 hour battery program backup.
- Power surge protection.
- Mounted in a lockable cabinet of minimum IP54 to AS 60529 (2004) in external locations.

Micro-irrigation systems

Tubing: Polyethylene micro-irrigation pipe.

Drip irrigation systems

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

Discrete drip emitter systems:

- Tubing: Polyethylene micro-irrigation pipe.
- Drippers: Turbulent flow types, easily dismantled for cleaning.

Fittings

Type: Barbed fittings rated for the pressure class of the pipe, fastened with ratchet type clamps.

Valve boxes

Requirement: Provide the following in each valve box:

- Automatic control valve.
- Isolating valve.
- Filter:
 - . Micro-irrigation systems: 200 µm.
 - . Drip irrigation systems: 100 µm.
- Pressure-reducing valve with 170 kPa outlet pressure.

Construction: UV-resistant high impact plastic with high impact snap lock plastic cover and adequately sized for clear access.

3 EXECUTION

3.1 PREPARATION**Weed eradication**

Requirement: As documented.

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

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

Vegetative spoil

Disposal: Remove vegetative spoil from site. Do not burn.

3.2 ROCK WORK**Existing rock**

General: Protect existing rock, rock shelves and rock outcrops from mechanical damage, surface defacement and other works.

Rock surfaces: Report damage or defacement occurring to any rock faces during the course of the works.

Replacement: If restoration is not feasible, repair the rock face with replacement rocks from site or imported rocks of similar type.

New rock work

Requirement: As documented.

Erosion control: Bury rock two-thirds by volume or as appropriate for effective erosion control, with weathered faces exposed. Protect the weathered faces from damage.

Site rock: Stockpile for future placement and accessibility for lifting. Dispose of other rock off site.

Imported rock: Provide rock that has been selected before delivery.

Placing rock: Place while ground formation work is being carried out, as documented.

3.3 EARTH MOUNDS

Construction

Placing: Place clean fill in layers approximately 150 mm thick compacted to 85% of the dry density ratio of the surrounding soil tested to AS 1289.5.4.1 (2007). Minimise slumping and further compacting.

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

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

Pipes, culverts and associated structures: Construct mounding to avoid unbalanced loading.

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

3.4 SUBSOIL

Ripping

General: Rip parallel to the final contours. Do not rip when the subsoil is wet or plastic. Do not rip within the dripline of trees and shrubs to be retained.

Subsoil: Rip the subsoil to the following typical depths:

- Compacted subsoil: 300 mm.
- Heavily compacted clay subsoil: 450 mm.

Planting beds

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

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

Cultivation

Requirement: As documented.

Minimum depth: 100 mm.

Services and roots: Do not disturb services or tree roots. If required, cultivate these areas by hand.

Cultivation: Cultivate manually within 300 mm of paths or structures. Remove stones exceeding 25 mm, clods of earth exceeding 50 mm and weeds, rubbish or other deleterious material brought to the surface during cultivation. Trim the surface to design levels after cultivation.

Additives

General: Apply additives after ripping or cultivation and incorporate into the upper 100 mm layer of the subsoil as documented.

3.5 TOPSOIL

Placing topsoil

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

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

Steep batters: If using a chain drag for spreading, make sure there is no danger of batter disturbance.

Finishing: Feather edges into adjoining undisturbed ground.

Consolidation

General: Compact lightly and uniformly in 150 mm layers. Avoid differential subsidence and excess compaction and produce a finished topsoil surface that has the following characteristics:

- Finished to design levels.
- Smooth and free from stones or lumps of soil.
- Graded to drain freely, without ponding, to catchment points.
- Graded evenly into adjoining ground surfaces.
- Ready for planting.

Topsoil depths

General: Spread topsoil to the following typical depths:

- Excavated planting areas:
 - . Organic mulch: 225 mm.
 - . Gravel mulch: 250 mm.
- Irrigated grassed areas generally: 150 mm.
- Irrigated grassed areas, heavy use (e.g. playing fields, playgrounds and public parks): 200 mm.
- Non-irrigated grass areas: 100 mm.
- Earth mounds:
 - . Mass planted surfaces: 300 mm.
 - . Grassed surfaces: 100 mm.
- Top dressing: 10 mm.

Surplus topsoil

General: Spread surplus topsoil on designated areas on-site or dispose off-site.

3.6 GRASS SEEDING

Preparation

General: If a prepared area becomes compacted before sowing can begin, rework the ground surface before sowing.

Application

Ambient conditions: Do not sow in periods of extreme heat, cold or wet or when wind velocities exceed 8 km/h or if frost is likely before the grass is established.

Method: Evenly distribute the seed using purpose-made sowing machinery. Lightly rake the surface to cover the seed.

Rolling: Roll the seed bed immediately after sowing.

- Roller weight (maximum):
 - . Clay and packing (heavy) soils: 90 kg/m width.
 - . Sandy and light soils: 300 kg/m width.

Reseeding: If germination has not occurred within one month, reseed the sown areas.

Watering

Before germination: Water the seeded area with a fine spray until the topsoil is moistened to its full depth. Until germination, keep the surface damp and the topsoil moist but not waterlogged.

After germination: Water to maintain a healthy condition, progressively hardened off to the ambient climatic conditions.

Initial establishment

General: Maintain sown areas until there is a dense continuous sward of healthy grass over the whole of the seeded area, evenly green and of a consistent height.

Protection: Protect the newly sown areas against traffic until established.

Weeding: Remove weeds from the sown areas. If required, spray with a selective herbicide for broad-leaved weeds. Do not spray grass seeded areas within 3 months of germination.

Fertilising: As follows:

- Six weeks after germination: Spread fertiliser evenly over the sown area and water in. Do not apply fertiliser to wet grass.
- Ten weeks after germination: If the planting establishment period occurs during the summer months, spread pelleted sulfate of ammonia at the rate of 250 kg/ha.

3.7 TURFING

Supply

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

Application

Method: Lay the turf as follows:

- Stretcher bond pattern with the joints staggered and close butted.
- Parallel with the long sides of level areas, and with contours on slopes.

- Finish flush, after tamping, with adjacent finished surfaces of ground, paving edging or grass seeded areas.

Laying: Close butt the end joints and space the turf strips 300 mm apart. Lay top dressing between the turf strips. Finish with an even surface.

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

Stabilising on steep slopes: Peg the turf to prevent downslope movement. Remove the pegs when the turf is established.

Watering

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

Initial establishment

General: Maintain turfed areas until there is a dense continuous sward of healthy grass over the whole turfed area, evenly green and of a consistent height.

Failed turf: Lift failed turf and replace with new turf.

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

Top dressing: Mow the established turf and remove cuttings. Lightly top dress to a depth of 10 mm. Rub the dressing into the joints and correct any unevenness in the turf surface.

3.8 PLANTING

General

Plant location and spacing: If necessary to vary plant locations and spacings to avoid service lines or to cover the area uniformly or for other reasons, give notice.

Planting conditions

Weather: Do not plant in unsuitable weather conditions, including extreme heat, cold, wind or rain. In other than sandy soils, suspend excavation if the soil is wet or during frost periods.

Watering

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

Preparation

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

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

Ripline planting: Prepare for planting as follows:

- Rip the row and excavate a plant hole for each plant large enough to accept the rootball plus 0.1 m³ of backfilling with topsoil.
- Clear weeds and other vegetative material within 300 mm radius of the plants.
- If planting holes are excavated by mechanical means, increase the hole size by 100 mm and loosen compacted sides to prevent confinement of root growth.

Placing

General: Place plants as follows:

- Remove the plant from the container with minimum disturbance to the rootball. Make sure that the rootball is moist.
- If required, root prune to make sure all circling roots have been either severed or aligned radially into the surrounding soil.
- Place the plant in its final position, in the centre of the hole and plumb, and with the topsoil level of the plant rootball level with the finished surface of the surrounding soil.

Fertilising

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

Backfilling

General: Backfill with topsoil mixture. Lightly tamp and water to eliminate air pockets. Make sure that topsoil is not placed over the top of the rootball, so the plant stem remains the same height above ground as it was in the container. Avoid mixing mulch with topsoil.

Watering basins for plants in grassed areas

Location: To each individual plant not located in irrigated grassed areas or naturally moist areas.

Watering basin: Construct around the base of each individual plant, consisting of a raised ring of soil capable of holding at least 10 L.

3.9 IRRIGATION**General**

Requirement: As documented.

Micro-irrigation systems

General: Connect micro-tube laterals with proprietary push in or screw in fittings.

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

Microsprays: Mount microsprays 300 mm above ground on stakes and connect to the piping with appropriately sized micro-tubes.

Piping: Lay polyethylene micro-irrigation pipe on finished ground surface under planting bed mulch and anchor at 1500 mm maximum intervals with U-shaped stakes.

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

Drip irrigation systems

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

Piping: Lay polyethylene micro-irrigation pipe on finished ground surface under planting bed mulch and anchor at 1500 mm maximum intervals with U-shaped stakes.

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

Valve box installation

Requirement: Install with top of box flush with the surface.

Clearance: Allow 100 mm minimum clearance from filters and 50 mm minimum clearance from valves.

Base: Concrete plinth or crushed rock.

3.10 MULCHING**General**

Requirement: As documented.

Placing mulch

General: Place mulch to the required depth and clear of plant stems so that after settling it conforms to the following:

- Smooth and evenly graded between design surface levels.
- Flush with the surrounding finished levels.
- Sloped towards the base of plant stems in plantation bed.
- Gravel mulches: Not closer to the stem than 50 mm.

Extent: Provide mulch to 750 mm diameter to surrounds of plants planted in riplines and grassed areas.

Depths:

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

Stabilisation:

- Leaf litter, pine flake and pine bark: Provide stabilisation on slopes more than 1:3.
- River pebbles and gravels: Do not use on slopes more than 1:6.

Installation:

- In ripline and grassed areas: Place mulch to 750 mm diameter around plants.
- In mass planted areas: Place after the preparation of the planting bed but before planting and other work.

- In smaller areas (e.g. planter boxes): Place after the preparation of the planting bed, planting and other work.

3.11 TREATMENT

General

Pest attack or disease: If evidence of pest attack or disease of plant material is discovered, immediately give notice.

Physical removal

General: Remove pest infestation and diseased plant material by hand if appropriate.

Pesticide

Product: Spray with insecticide, fungicide or both, as required.

3.12 STAKES AND TIES

Stakes

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

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

Stake sizes and quantities:

- Plants more than 2500 mm high: Three 50 x 50 x 2400 mm stakes per plant.
- Plants 1000 to 2500 mm high: Two 50 x 50 x 1800 mm stakes per plant.
- Plants less than 1000 mm high: One 38 x 38 x 1200 mm stake per plant.

Ties

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

Tie types:

- Plants not less than 2500 mm high: Two strands of 2.5 mm galvanized wire neatly twisted together, passed through reinforced rubber or plastic hose and installed around stake and stem in a figure eight pattern.
- Plants less than 2500 mm high: 50 mm hessian webbing stapled to the stake.

Trunk protection

Collar guards: Provide proprietary collar guards or 200 mm length of 100 mm diameter agricultural pipe split lengthways.

3.13 ESTABLISHMENT

Planting

Requirement: Make sure the general appearance and presentation of the landscape and the quality of plant material at the date of practical completion is maintained for the planting establishment period.

Plant replacement: Replace failed, dead and/or damaged plants at maximum 3 weekly intervals as necessary throughout the plant establishment period.

Pruning: To AS 4373 (2007) and as documented.

Application of fertiliser: Apply either an all-purpose fertiliser or a 12 month slow release fertiliser, in two rows and cultivated into soil to a depth of 100 mm.

- Program: September and March according to seasonal growth requirement.

Weeding: Remove unwanted broad-leaf plants and grasses considered invasive to the locality.

Remulching: Maintain the original ground levels around the base of plants.

Watering: Minimum 3 complete waterings, soaking to a depth of 150 mm at fortnightly intervals for the first 6 weeks of plant establishment irrespective of natural rainfall.

Grass surfaces

Preparation: Remove litter and fallen branches before mowing.

Mowing:

- Grass height: Consistent with the growth habit of the grass variety and maintained at 25 to 40 mm throughout the year. Do not remove more than one-third of the grass height at any one time.

- Program: Weekly during the mowing season, November to March and at fortnightly intervals from April to October. Do not mow during wet conditions. Carry out last mowing not more than 7 days before end of plant establishment period.
- Clippings: Remove grass clippings from the site after each mowing.
- Raking: Once every month before mowing during the mowing season, rake the grass with a flexible rake. On alternate mowings, adopt a north-south and east-west pattern.

Weeding: Remove unwanted broad-leaf plants and grasses considered invasive to the locality.

- Program: Quarterly and as required to maintain the general lawn condition.

Edge trimming: At the same time as mowing, trim lawn edges to plant beds, pathways, base of trees and other obstacles. Do not damage trees and shrubs.

Top dressing for established lawns: Weed-free imported sandy topsoil to a depth of 5 mm.

- Program: The spring following initial establishment.

Application of fertiliser: Apply lawn fertiliser at the completion of the first and last mowings of the plant establishment period and at other times as required to maintain healthy grass cover.

3.14 COMPLETION

Irrigation

Requirement: On completion of the irrigation system, carry out the following:

- Flush system thoroughly. Check heads, sprays and drippers and clean if blocked.
- Clean strainers.
- Adjust for even distribution with no dry areas.

Cleaning

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

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

Operation and maintenance manuals

Requirement: Prepare a manual that includes recommendations for maintenance of plants.

0254 IRRIGATION

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide landscaping, as documented by:
 Landscape Architect – Environmental Partnership (NSW),
 Civil Engineering – PM Design Group
 Hydraulic Engineering – Glenn Haig & Partners

Performance

Requirements:

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

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 *General requirements*.

1.3 STANDARDS

Water supply

General: To AS/NZS 3500.1 (2021).

Backflow prevention and water efficiency: To PCA (2022).

1.4 INTERPRETATION

Abbreviations

General: For the purposes of this worksection, the following abbreviations apply:

- LDPE: Low-density polyethylene.

Definitions

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

- Emitter: A device used to control the rate at which water is applied to a specific area.

1.5 SUBMISSIONS

Shop drawings

General: Submit drawings and schedules showing the layout and details of the system, including the following:

- Micro-irrigation stake layout.
- Irrigation controller cabinets.

Tests

Site tests: Submit results to EXECUTION, **TESTING**.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties**.

1.6 INSPECTION

Notice

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

- Excavated surfaces ready for installation.
- Concealed or underground services ready for backfilling.

2 PRODUCTS

2.1 AUTOMATIC CONTROL VALVES

General

Type: 24 V solenoid actuated hydraulic valves with flow control and a maximum operating pressure rating of at least 1 MPa and able to be serviced without removal from the line.

Materials:

- $\leq$ DN 50: Dezincification resistant copper alloy body and bonnet, screwed ends. Stainless steel bonnet holding down bolts and internal metal parts.
- $\geq$ DN 65: Cast iron body and bonnet, flanged ends. Stainless steel bonnet holding down bolts and internal metal parts.

Isolating valve: Provide a ball or gate valve of the same size immediately upstream of each automatic control valve.

Housing: House both valves in the same valve box large enough to permit easy operation and servicing of the valves.

2.2 FIXED SPRINKLER SYSTEMS

Heads

Performance: Heads conforming to the following:

- Maintain a preset arc of throw.
- Adjustable for radius during watering operations.
- Vandal resistant.
- Protected from damage in normal operation.

Pop-up type heads:

- Type: Designed to rise at least 50 mm out of the housing under supply pressure and return to flush position on removal of pressure.
- Components: Provide wiper seals, stainless steel return springs and removable internal filters.
- Playing fields: Covers designed and constructed to prevent injury.

Sprinkler heads:

- Type: Gear driven and spray sprinklers with matched precipitation rates for the various areas of throw.
- Flow rate: Adjustable down to zero.

Impact sprinkler heads: Bronze bodies in high impact plastic cases with drainage holes.

Valves

Check valves: If a rotating head is more than 300 mm below the highest head on the same automatic valve, fit an internal or external anti-drain check valve to prevent low head drainage.

Pressure regulating valves: Provide pressure regulating valves at off-take points as follows:

- Adjustable between 100 and 700 kPa.
- Complete with 800 μ m filter sized to suit the flow and installed immediately upstream from the pressure regulating valve.
- Installed with isolating valves upstream from the filter and downstream from the pressure regulating valve.
- Mount the assembly in a readily accessible position in a valve box, access pit or adjacent building.

Soil moisture sensors

Type: Fixed ceramic moisture sensors.

Connection: Fit to the irrigation controller via moisture control units.

Irrigation controllers

Type: Automatic controllers that are easily programmed and include the following:

- Manual cycle and individual control valve operation.
- Manual on/off operation of irrigation without loss of program.
- $\geq$ 4 on/off cycles per day.

- Day omit.
- 240 V input and 24 V output capable of operating 2 control valves simultaneously.
- Not less than 24 hour battery program backup.
- Power surge protection.
- Mounted in a lockable cabinet of minimum IP54 to AS 60529 (2004) in external locations.
- Electrical connection: If connected to wall outlets, provide 3 core 10 A, 240 V flexible cord and plug. Provide an isolating switch at the controller.

2.3 MICRO-IRRIGATION SYSTEMS

Tubing

Type: Polyethylene micro-irrigation pipe.

Fittings

Type: Barbed fittings rated for the pressure class of the pipe, fastened with ratchet type clamps.

Valve boxes

Requirement: Provide the following in each valve box:

- Automatic control valve.
- Isolating valve.
- Filter: 200 µm.
- Pressure-reducing valve with 170 kPa outlet pressure.

2.4 DRIP IRRIGATION SYSTEMS

Integrated drip line systems

Type: Tubing with integral drippers inserted into the tube during manufacture.

Discrete drip emitter systems

Tubing: Polyethylene micro-irrigation pipe.

Drippers: Turbulent flow types, easily dismantled for cleaning.

Emitters

Type: If the difference in elevation between the control box and all emitters is:

- Less than 1500 mm: Pressure compensated or non-pressure compensated type.
- Not less than 1500 mm: Pressure compensated type only.

Fittings

Type: Barbed fittings rated for the pressure class of the pipe, fastened with ratchet type clamps.

Valve boxes

Requirement: Provide the following in each valve box:

- Automatic control valve.
- Isolating valve.
- Filter: 100 µm.
- Pressure-reducing valve with 170 kPa outlet pressure.

2.5 SUBSURFACE DRIP IRRIGATION SYSTEMS

Tubing

Collector and distributor mains: LDPE or PVC pipe.

Dripline: LDPE pipe.

Components

System requirements:

- Reduced pressure zone (RPZ) backflow prevention device.
- Electric or manual valve.
- Filter: 120 mesh screen or disc.
- Auto pressure regulator: 150 to 200 kPa.
- Air vacuum breaker.
- Automatic line flushing valve.

- Chemical injection system.

Fittings

Type: Barbed fittings rated for the pressure class of the pipe, fastened with ratchet type clamps.

Root-intrusion prevention

Requirement: To prevent root intrusion, provide one of the following:

- Herbicide impregnated emitters or filters.
- Root-intrusion chemical injection system.

Valve boxes

Requirement: Provide valve boxes for system components.

2.6 PIPING**General**

Materials: To AS/NZS 3500.1 (2021) clauses 2.4 and 2.5 and as documented.

2.7 VALVE BOXES**General**

Construction: UV-resistant high impact plastic with high impact snap lock plastic cover and adequately sized for clear access to components inside the box.

3 EXECUTION

3.1 GENERAL**Backflow prevention**

Requirement: To PCA (2022) and Network Utility Operator requirements.

3.2 FIXED SPRINKLER SYSTEMS**Control wiring**

General: Connect the automatic control valves and soil moisture sensors to the controller as follows:

- Cable type: Double insulated.
- Cable runs: Underground in PVC conduit to AS/NZS 3000 (2018) and laid alongside piping if possible.
- Connectors: Waterproof.
- Jointing: Loop cables and join only at valves, sensors and controllers.
- Movement provision: Provide expansion loops at changes of direction and at joints.

Quick coupling valves

General: Provide DN 20 double lugged bronze quick coupling valves with neoprene seats mounted on DN 20 copper risers offset at least 150 mm from the supply pipe. Install in valve boxes.

Heads

Impact sprinkler heads: Provide granular fill for at least 75 mm around the base of the case.

Risers: Mount as follows:

- Above ground heads: Mount on fixed risers.
- Galvanized steel risers: Set in 300 x 300 x 200 mm deep concrete blocks.
- In-ground heads: Mount on reticulated risers.

Piping

Mainline and submains: Install 600 mm below the finished surface and lay marker tape along the top of the line.

Lateral piping for roof and planting areas: Install below the topsoil profile and anchor at 1500 mm maximum centres with U-shaped stakes.

3.3 MICRO-IRRIGATION SYSTEMS**Installation**

General: Connect micro-tube laterals with proprietary push in or screw in fittings.

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

Microsprays: Mount microsprays 300 mm above ground on stakes and connect to the piping with appropriately sized micro-tubes.

Piping: Lay polyethylene micro-irrigation pipe on finished ground surface under planting bed mulch and anchor at 1500 mm maximum intervals with U-shaped stakes.

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

3.4 DRIP IRRIGATION SYSTEMS

Installation

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

Piping: Lay polyethylene micro-irrigation pipe on finished ground surface under planting bed mulch and anchor at 1500 mm maximum intervals with U-shaped stakes.

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

3.5 SUBSURFACE DRIP IRRIGATION SYSTEMS

Installation

Piping: Install at least 150 mm below ground.

Automatic line flushing valve:

- Location: At the furthest point from the valve on the collector main.
- Discharge point: Locate in same plane as the pipe leading to it, so water can easily be flushed out.
- Gravel bed: Install a 0.3 m³ minimum volume gravel bed in valve box. Maintain 50 mm clearance between gravel bed and the lowest discharge point of the valve.

Filter: Install in horizontal plane (or to prevent material entering mainline on cleaning) with 100 mm clearance from soil level.

3.6 VALVE BOXES

Installation

Requirement: Install with top of box, as follows:

- Within playing fields: 150 mm below the surface.
- Other locations: Flush with the surface.

Clearance: Allow 100 mm minimum clearance from filters and 50 mm minimum clearance from valves.

Base: Concrete plinth or crushed rock.

3.7 MARKING AND LABELLING

General

Requirement: To **MARKING AND LABELLING** in 0171 *General requirements*.

3.8 COMPLETION

General

Requirement: On completion of the irrigation system, carry out the following:

- Flush system thoroughly. Check heads, sprays and drippers and clean if blocked.
- Clean strainers.
- Adjust for even distribution with no dry areas.

0271 PAVEMENT BASE AND SUBBASE

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide landscaping, as documented by:

Landscape Architect – Environmental Partnership (NSW),

Civil Engineering – PM Design Group

Hydraulic Engineering – Glenn Haig & Partners

Structural Engineering- PM Design Group.

Performance

Surface level: Provide a finished surface level that is free draining and evenly graded between level points.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 *General requirements*.
- 0222 *Earthwork*.

1.3 INTERPRETATION

Definitions

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

- Base: One or more layers of material, forming the uppermost structural element of a pavement and on which the surfacing may be placed.
- Subbase: 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. Usually designated as Dense graded base (DGS), NGS 40 mm gravel, CRS, CCS or RCMS.

1.4 TOLERANCES

Surface level

Subbase: +10 mm, -25 mm.

Base: +10 mm, -5 mm.

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

Surface deviation

Base: ≤ 5 mm from a 3 m straightedge laid on the surface.

1.5 SUBMISSIONS

Execution details

General: Submit details of the proposed work methods and equipment for each pathway and roadworks operation, including the following:

- Staging of the work, access and traffic control methods.
- Disposal of surface water, control of erosion, contamination and sedimentation of the site, surrounding areas and drainage systems.

Compaction: If a layer is proposed to exceed 200 mm in thickness, submit evidence that the proposed compaction equipment can achieve the required density throughout the layer.

Products and materials

Source of material: Submit the supplier name, material type (crushed rock, natural gravel, recycled concrete aggregate) and source quarry or recycling site.

Conformance: Submit type test results for each material listed in the **Base material properties and test methods table** and **Subbase material properties and test methods table** as evidence of material conformance.

Alternative materials: If proposed, submit type test results for the relevant properties listed in the **Base material properties and test methods table** and **Subbase material properties and test methods table** as evidence of material conformance.

Tests

Compaction tests: Submit results of compaction testing to **TESTING, Site tests**.

1.6 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.

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

Requirement: Provide crushed rock as follows:

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

Recycled materials

Requirement: Provide recycled materials as follows:

- Base and subbase: Conform to the **Limits on use of recycled and manufactured materials as constituent materials table** and the **Undesirable material properties table**.

Natural gravel

Requirement: Provide unbound natural gravel materials as follows:

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

Subbase material properties and test methods table

Property and test method	Differentiating criteria	Material requirements	
		Crushed rock	Natural gravel
Particle size distribution or grading (%) passing through sieve) to AS 1289.3.6.1 (2009)	Sieve size (mm)	—	—
	53.0	100	100
	37.5	90 - 100	95 - 100
	26.5	74 - 96	80 - 97
	19.0	62 - 86	—
	13.2	—	—
	9.5	42 - 66	48 - 85
	4.75	28 - 50	35 - 73
	2.36	20 - 39	25 - 58
	0.425	8 - 21	10 - 33
	0.075	3 - 11	3 - 21
Liquid limit (w _L) to AS 1289.3.1.1 (2009)	—	max 25%	max 25%
Plasticity index (I _P) to AS 1289.3.3.1 (2009)	—	max 12%	max 12%

Property and test method	Differentiating criteria	Material requirements	
		Crushed rock	Natural gravel
Linear shrinkage (LS) to AS 1289.3.4.1 (2008)	Rainfall	—	—
	Areas with annual rainfall > 500 mm	max 4.5%	max 4.5%
	Areas with annual rainfall < 500 mm	max 6.0%	max 6.0%
Maximum dry compressive strength on fraction passing 19 mm sieve (only applies if plasticity index is less than 1) to AS 1141.52 (2019)	—	min 1.0 MPa	min 1.0 MPa
Particle shape by proportional calliper - % misshapen (2:1) to AS 1141.14 (2007)	—	max 35%	—
Aggregate wet strength ^a to AS 1141.22 (2019)	—	min 50 kN	—
Wet/dry strength variation ^a (dry - wet)/dry to AS 1141.22 (2019)	—	max 40%	—
Los Angeles value to AS 1141.23 (2021)	—	max 40%	—
4 day soaked CBR (98% modified compaction) to AS 1289.6.1.1 (2014)	—	min 30%	min 30%
a. Use the fraction with the highest wet/dry strength variation as the value for determining conformance. Test the fraction 19.0 to 9.5 mm. For blended materials, also test the fraction 9.5 to 4.75 mm. Test any other fraction if there is risk of failing.			

Limits on use of recycled and manufactured materials as constituent materials table

Recycled material	Unbound or modified base and subbase	Bound base and subbase
Iron and steel slag	100%	100%
Crushed concrete ^a	100%	100%
Brick	20%	10%
RAP	40%	40%
Fly ash ^b	10%	10%
Furnace bottom ash	10%	10%
Crushed glass fines	10%	10%
Notes:		
a. For pavements using high percentages of crushed concrete, take into account the amount of available cement that will rehydrate if subjected to moisture to create rigid or semi-rigid pavement and result in subsequent shrinkage cracking.		
b. For pavements using fly ash, take into account the possibility of hydration and binding if subjected to moisture to create rigid or semi-rigid pavement and result in subsequent shrinkage cracking.		

Undesirable material properties table

Property and test method	Differentiating criteria	Material requirements		
		Crushed rock	Recycled material	Natural gravel
Undesirable constituent materials (% retained on a 4.75 mm sieve) to TfNSW TS 02799.51 (2012)	Material type	—	—	—
	Type I - Metal, glass, stone, ceramics and slag	—	max 2.0 %	—
	Type II - Plaster,	—	max 0.5%	—

Property and test method	Differentiating criteria	Material requirements		
		Crushed rock	Recycled material	Natural gravel
	clay lumps and other friable material			
	Type III - Rubber, plastic, paper, cloth, paint, wood and other vegetable matter	—	max 0.1%	—

Base material properties and test methods table

Property and test method	Differentiating criteria	Material requirements		
		Crushed rock	Recycled material	Natural gravel
Particle size distribution or grading (% passing through sieve) AS 1289.3.6.1 (2009)	Sieve size (mm)	—	—	—
	26.5	100	100	100
	19.0	95 - 100	95 - 100	93 - 100
	13.2	77 - 93	78 - 92	—
	9.5	63 - 83	63 - 83	71 - 87
	4.75	44 - 64	44 - 64	47 - 70
	2.36	29 - 49	30 - 48	35 - 56
	0.425	13 - 23	13 - 21	14 - 32
	0.075	5 - 11	5 - 9	6 - 20
Liquid limit (w_L) to AS 1289.3.1.1 (2009)	—	max 25%	max 30%	max 25%
Plasticity index (I_P) to AS 1289.3.3.1 (2009)	Rainfall	—	—	—
	All areas	—	—	—
	Areas with annual rainfall > 500 mm	max 6%	max 6%	max 6%
	Areas with annual rainfall < 500 mm	max 10%	max 10%	max 10%
Linear shrinkage (LS) to AS 1289.3.4.1 (2008)	Rainfall	—	—	—
	All areas	—	—	—
	Areas with annual rainfall > 500 mm	max 2.0%	max 2.0%	max 2.0%
	Areas with annual rainfall < 500 mm	max 4.0%	max 4.0%	max 4.0%
For materials with plasticity index less than 1: Maximum dry compressive strength to AS 1141.52 (2019)	—	min 1.7 MPa	min 1.7 MPa	min 1.7 MPa
Particle shape by proportional caliper (% misshapen for 2:1 caliper ratio) to AS 1141.14 (2007)	—	max 35%	max 35%	—
Aggregate wet strength ^a to AS 1141.22 (2019)	—	min 80 kN	min 80 kN	—
Wet/dry strength	—	max 35%	max 35%	—

Property and test method	Differentiating criteria	Material requirements		
		Crushed rock	Recycled material	Natural gravel
variation ^a to AS 1141.22 (2019)				
Los Angeles value (% loss or abrasion) to AS 1141.23 (2021)	—	max 35%	max 40%	—
4 day soaked CBR (98% modified compaction) to AS 1289.6.1.1 (2014)	—	min 80%	min 80%	min 80%
Unconfined compressive strength to AS 5101.4 (2008)	—	max 1.0 MPa	max 1.0 MPa	—
NOTES: a. Use the fraction with the highest wet/dry strength variation as the value for determining conformance. Test the fraction 19.0 to 9.5 mm. For blended materials, also test the fraction 9.5 to 4.75 mm. Test any other fraction if there is risk of failing.				

Tests

Material property testing: Conform to the **Base material properties and test methods table** and the **Subbase material properties and test methods table**.

Frequency of material property tests: Not less than the following:

- Particle size distribution: 1 per 1000 t (or part of).
- Liquid limit: 1 per 1000 t (or part of).
- Plasticity index: 1 per 1000 t (or part of).
- Linear shrinkage: 1 per 1000 t (or part of).
- Foreign materials content: 1 per 1000 t (or part of).
- Maximum dry compressive strength: 1 per 5000 t (or part of).
- Particle shape: 1 per 1000 t (or part of).
- Los Angeles value: 1 per 1000 t (or part of).
- Aggregate wet strength: 1 per 5000 t (or part of).
- Wet/dry strength variation: 1 per 5000 t (or part of).

3 EXECUTION

3.1 SUBGRADE PREPARATION

General

Requirement: Prepare the subgrade to 0222 *Earthwork*.

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 BASE AND SUBBASE COMPACTION

General

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

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 worksection. If dry back is not possible, remove for the full depth of layer, dispose of and replace with fresh material.

Minimum relative compaction table

Item description	Minimum dry density ratio (modified compaction) to AS 1289.5.2.1 (2017)
Subbase	95%
Base	98%

Compaction requirements

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

Rectification.

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 materials to dry to 60 to 80% of the optimum moisture content before applying the seal or wearing course.

Rectification

General: If a section of the 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, re-compact and test.

Level corrections

General: Rectify incorrect levels as follows:

- High areas: If the area can be rectified by further trimming to produce a uniform, hard surface by cutting without filling, trim so that the rectified area conforms to **TOLERANCES**.
- Low areas and high areas not rectifiable by further trimming: Remove layers to a minimum depth of 75 mm and replace with new material and re-compact.

3.4 TESTING

Site tests

Compaction control tests: To AS 1289.5.4.1 (2007) and AS 1289.5.4.2 (2007).

Frequency of compaction control tests: Not less than the following (whichever requires the most tests):

- 1 test per layer per 100 lineal metres for two-lane roads.
- 1 test per layer per 2000 m² for car parks.
- 3 tests per layer.
- 3 tests per visit.

0274 CONCRETE PAVEMENT

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide concrete pavement, as documented:

Landscape Architect – Environmental Partnership (NSW),

Civil Engineering – PM Design Group

Hydraulic Engineering – Glenn Haig & Partners

Structural Engineering- PM Design Group.

Performance

Requirement:

- Free draining and evenly graded between level points.
- Even and smooth riding surfaces.

Conformance: Conform to the local authority requirements for levels, grades and minimum thickness, reinforcement and concrete strength for pavements within the kerb-and-gutter property boundaries.

1.2 DESIGN

Requirements

General: To DESIGN in *0171 General requirements*.

Responsibility: Determine the local authority requirements that may affect grades, transitions and work zones, and coordinate including the following:

- Drainage.
- Trees (due to settlement).
- Adjacent structures.

1.3 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements*.
- *0222 Earthwork*.
- *0271 Pavement base and subbase*.

1.4 STANDARDS

Concrete

Specification and supply: To AS 1379 (2007).

Materials and construction: To AS 3600 (2018).

Residential pavements: To AS 3727.1 (2016).

1.5 INTERPRETATION

Definitions

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

- Ambient temperature: The air temperature at the time of mixing and placing of concrete.
- Concrete class – normal: Concrete that is specified primarily by a standard compressive strength grade up to 50 MPa and otherwise in conformance with AS 1379 (2007) clause 1.5.3.
- Concrete class – special: Concrete that 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 (2007) clause 1.5.4.

- Sample: A portion of material taken for assessment, representative of the larger quantity of material from which it was taken.
- Weather – cold: Ambient shade temperature less than 10°C.
- Weather – hot: Ambient shade temperature greater than 30°C.

1.6 TOLERANCES

General

Surface abutting gutters: ± 5 mm from the level of the gutter edge.

Rigid pavement surface:

- From design level: +10 mm, -0 mm.
- From a 3 m straightedge placed anywhere on surface: 5 mm.

Horizontal position of outer concrete edge: ± 20 mm from documented position.

Joint locations in plan: 10 mm from documented position.

1.7 SUBMISSIONS

Certification

Test certificates and records: Submit test certificates and also retain results on site.

Compliance certificate: If product testing is not proposed, submit a manufacturer's certificate together with results of recent tests undertaken by the manufacturer, showing compliance with test criteria.

Execution details

Concrete: Submit proposals for mixing, placing, finishing and curing concrete including the following:

- Addition of water on site.
- Changes to the concrete mix.
- Changes to documented joint locations.
- Curing and protection methods.
- Cutting or displacing reinforcement, or cutting or coring hardened concrete.
- Handling, placement, compaction and finishing methods and equipment, including pumping.
- Sawn joints: Submit details of proposed methods, timing and sequence of sawing joints.
- Sequence and times for concrete placement and construction joint locations. Include any proposed sequential placement of slab segments.
- Site storage, mixing and transport methods and equipment, if applicable.
- Temperature control methods to suit hot or cold atmospheric conditions during concrete placement.

Reinforcement: Submit the following:

- General: Details of any proposed changes to documented reinforcement.
- Damaged galvanizing: Details of proposed repair to AS/NZS 4680 (2006) 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 (2018).
- Splicing: Details of any proposed changes to documented requirements.
- Welding: Details of any proposed welding of reinforcement to AS/NZS 1554.3 (2014).

Joint sealants: Submit proposals for installation methods and sealant performance.

Crack assessment: If unplanned cracks occur in the finished pavement, submit proposals for investigation.

Surface repair method: If required, submit details of the proposed method before commencing repairs.

Products and materials

Aggregates: Nominate the source for all aggregates.

Reinforcement: Submit the manufacturer's certificate of compliance with AS/NZS 4671 (2019), or submit test certificates.

Pre-mixed supply delivery dockets: For each batch, submit a docket listing the information required by AS 1379 (2007) and the following:

- Special-class performance concrete: Documented performance and type of cement binder.

- 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.

Liquid curing compounds: Submit certified test results, including the application rate and the efficiency index to AS 3799 (1998) Appendix B.

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

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

Trial mix design report: Six weeks before commencing production, submit a report for each mix design containing the information required in AS 1012.2 (2014), the individual and combined aggregate particle size distribution and the records and reports for the tests.

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

Requirement: Submit test results of the following:

- Concrete:
 - . Compressive strength.
 - . Drying shrinkage.
 - . Flexural strength.
 - . Slump.
- Luminance contrast of completed tactile ground surface indicator installations.
- Slip resistance of completed installations.

1.8 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 placement and compaction.
- Finishing and curing of concrete.
- Evaluation of surface finish.

2 PRODUCTS

2.1 REINFORCEMENT

Steel reinforcement

Standard: To AS/NZS 4671 (2019).

Surface condition: Provide surfaces conforming to the following:

- Free of loose or flaking mill scale and rust.
- Clean from oil, grease, mud or other material that may reduce the bond between the reinforcement and concrete.

Storage: Store reinforcement above the surface of the ground and protect from damage and from deterioration by exposure.

Protective coatings

Standard: To AS 3600 (2018) clause 17.2.1.2.

Requirement: For concrete containing protective coated reinforcement, provide the same coating type to all 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 high build, high solids chemically resistant coating to AS/NZS 3750.14 (1997).

- Thickness: 200 µm minimum.

Galvanizing: To AS/NZS 4680 (2006) and as follows:

- Sequence: If fabricating after galvanizing, repair damaged galvanizing and coat cut ends.
- Zinc-coating (minimum): 600 g/m².

Fibre reinforcement

Steel fibres: To AS 3600 (2018) clause 16.7.1.

Synthetic fibres: To EN 14889-2 (2006).

Storage: Store in a dry environment. Do not stack.

Dowels

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

Standard: To AS/NZS 3679.1 (2016).

Finish: Hot-dipped galvanized.

Tie wire

General: Annealed steel 1.25 mm diameter (minimum).

External and corrosive applications: Galvanized.

Supports

Standard: To AS/NZS 2425 (2015).

2.2 CONCRETE MIX

Standard

Concrete mix and supply: To AS 3600 (2018) clause 17.1 and AS 1379 (2007).

Properties

Slump: Maximum 100 mm.

Drying shrinkage: Maximum 450 µε after 21 days of air drying.

2.3 AGGREGATE

Characteristics

Standard: To AS 2758.1 (2014).

Durability: Tested to AS 1141.22 (2019):

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

Recycled concrete aggregate (RCA): If blending coarse RCA with natural aggregates, make sure substitution rates are below 30%.

2.4 CEMENT

General

Standard: To AS 3972 (2010).

Age: Less than 6 months old.

Moisture: Protect from moisture until used. Do not use caked or lumpy cement.

Storage: Store cement bags in a dry, under cover and above ground environment.

Supplementary cementitious materials

Fly ash: To AS/NZS 3582.1 (2016).

Slag: To AS 3582.2 (2016).

Amorphous silica: To AS/NZS 3582.3 (2016).

Manufactured pozzolans: To AS 3582.4 (2022).

2.5 WATER

General

Mixing water: To AS 1379 (2007) clause 2.4.

Requirement: Clean potable water, free from any material that may be harmful to the concrete or reinforcement including oil, acid, alkali, organic or vegetable matter.

Limits of impurities in mixing water: To AS 1379 (2007) Table 2.2 and the following:

- Chloride ion: Maximum 300 parts per million to AS 1478.1 (2000) Appendix C.
- Sulfate ion: Maximum 400 parts per million to AS 1289.4.2.1 (2020).

2.6 ADMIXTURES

General

Standard: Chemical admixtures to AS 1478.1 (2000), used to the manufacturer's recommendations.

Quality: Free from calcium chloride, calcium formate, 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 factors such as air temperature, setting time and cement content to the manufacturer's recommendations.

Types of admixtures

Air entraining agent: Adjust mix for workability allowing up to 5% air entrainment.

Cool season retarder: From April to September, use a lignin or lignin-based set-retarding admixture containing maximum 6% reducing sugars, Type WRRe conforming to AS 1478.1 (2000).

Warm season retarder: From October to March, use a lignin or lignin-based set-retarding admixture, Type Re or Type WRRe, for controlling slump within the limits in **CONCRETE MIX, Properties**.

2.7 CURING COMPOUNDS

General

Curing compounds: To AS 1160 (1996) and AS 3799 (1998), Type 2.

Sheet material covering: To ASTM C171 (2020), 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 (2009).

3 EXECUTION

3.1 GENERAL

Traffic control

Traffic restriction: Do not allow traffic or construction plant other than that associated with testing, sawcutting, cleaning or joint sealing on pavement for minimum 10 days after placing, or if the concrete has reached a compressive strength of at least 20 MPa and joints have been completely sealed.

3.2 SUBGRADE

Preparation

Conformance: Prepare subgrade to *0222 Earthwork*.

Extent: Prepare a uniform subgrade for the full pavement formation, extending at least to the back of kerbs or at least 300 mm beyond each side of the carriageway if kerbs are not proposed.

Reinstatement: Make sure of uniformity for backfilling of any utility trenches.

3.3 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.

Tolerance

Subbase finished surface level: +0 mm, -10 mm.

Placement

Bound and unbound subbase materials and placement: To *0271 Pavement base and subbase*.

Friction reduction

Requirement: 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.

3.4 INSTALLATION**Junctions with existing pavements**

Trimming: If new pavement is to be joined to an existing pavement, trim the edge of the existing pavement to create a neat vertical edge for its full depth before placing new pavement material.

Fixed formwork

Type:

- Steel forms.
- Seasoned, dressed timber planks, free of warps, bends or kinks.

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

Tolerances on position:

- Level of top of form: -0 mm, +10 mm from pavement surface design level.
- Horizontal tolerance: 10 mm (maximum departure 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 if the concrete is to receive an applied finish for which there is no compatible release agent.

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

Keyways: Form the keyways of keyed construction joints using steel or timber 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 (2018).

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

Minimum cover to reinforcement: 30 mm.

Splicing mesh: Overlap a minimum of 2 crosswires.

Supports: Provide reinforcement supports as follows:

- Able 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.
- Use plastic or concrete supports with galvanized or zinc-coated reinforcement.
- Spacing:
 - . Bars: ≤ 60 diameters.
 - . Mesh: ≤ 600 mm.
- Supports over membranes: Prevent damage to waterproofing membranes or vapour barriers. If appropriate, place a metal or plastic plate under each support.

Projecting reinforcement: 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: 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.

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, 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.

3.5 CONCRETE SUPPLY

Elapsed delivery time

General: Make sure that the elapsed time between the wetting of the mix and the discharge of the mix at the site is in conformance with the **Elapsed delivery time table**. Do not discharge at ambient temperature below 10°C or above 30°C 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)
5 – 24	120
24 – 27	90
27 – 30	60
30 – 35	45

Pre-mixed supply

Transport method: Select to prevent segregation, loss of material and contamination of the environment, and not to adversely affect placing or compaction.

Site mixed supply

Emergencies: If mixing by hand, provide details.

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

3.6 TESTING

General

Reports and records of test results: To the relevant parts of the AS 1012 series. Keep results on site.

Standards

Sampling, identification, testing and recording: To the AS 1012 series.

Type and frequency: To AS 1379 (2007).

Concrete testing methods

Specimens: Sample the concrete on-site, at the point of discharge from the agitator.

Slump: To AS 1012.3.1 (2014).

Compressive strength: To AS 1012.8.1 (2014) and AS 1012.9 (2014).

Drying shrinkage: To AS 1012.8.4 (2015) and AS 1012.13 (2015).

Flexural strength: To AS 1012.8.2 (2014) and AS 1012.11 (2000).

Acceptance criterion for strength: The average strength of any set of 3 consecutive project samples must be equal to or greater than the specified minimum value.

Sampling frequency: Provide a minimum of one sample from each 50 m³ of concrete.

Slip resistance tests

Slip resistance of completed installation: To AS 4663 (2013).

Tactile ground surface indicators

Luminance contrast of completed installation: To AS/NZS 1428.4.1 (2009) Appendix E.

3.7 CONCRETE PLACING AND COMPACTION

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 placement. Hand spread concrete using shovels, not rakes.

Fibre-reinforced concrete: For pumped concrete, use a 100 to 150 mm mesh screen on the pump hopper to catch fibre balls.

Ponding: Remove any water ponding on the base or subbase before starting placement.

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

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

Compaction

Thickness 100 mm or less: Compact by 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

Logbook: Keep on site and make available for inspection a logbook, 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 surface from damage.

Placing in cold weather

Cement: Do not use high alumina cement.

Temperature limits: Maintain the following:

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

High early strength cement: If deteriorating 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 $\geq 5^{\circ}\text{C}$.

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 formwork, materials, and equipment coming in contact with the concrete free of frost and ice.

Freezing: Prevent concrete from freezing.

Placing in hot weather

Requirement: Prevent premature stiffening of the fresh mix and reduce water absorption and evaporation losses.

Severe weather: If ambient shade temperature more than 38°C, do not mix concrete.

Temperature control: Select one or more of the following methods to make sure the temperature of the concrete mix does not exceed 35°C:

- Cool the concrete using liquid nitrogen injection before placing.
- Cover horizontal transport containers.
- Forms and reinforcement before and during placing: $\leq 35^{\circ}\text{C}$.
- Spray the coarse aggregate using cold water before mixing.
- Use chilled mixing water.

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

Evaporation rate limit: $\leq 0.50 \text{ kg/m}^2/\text{h}$.

3.8 CONCRETE FINISH

General

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

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

Unformed surfaces

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

Formed surfaces

Damage: Do not strip formwork prematurely if damage to the concrete may be caused.

Curing: 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 and within an hour of exposure.

Finishing methods - primary finish

Machine float finish:

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

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 scratched finish: After screeding, use a stiff brush or rake drawn across the surface before final set to produce a coarse scored texture.

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 pattern finish: Provide finishing system.

Surface repairs

Method: If surface repairs are required, detail proposals.

3.9 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, if the concrete has set sufficiently not to be damaged by the curing process, until the minimum total cumulative number of days or fractions of days, during which the air temperature in contact with the concrete is above 10°C, conforms to AS 3600 (2018) clause 17.1.5. Cure for at least 7 days.
- End of curing period: Prevent rapid drying out at the end of the curing period.
- Protection: Maintain at a reasonably constant temperature with minimum moisture loss, during the curing period.

Curing compounds

Liquid membrane-forming compounds: Provide a uniform continuous flexible coating without visible breaks or pinholes, which remains unbroken for at least the required curing period after application. Respray defective areas within 30 minutes. Respray within 3 hours after heavy rain.

Visually important surfaces: Apply curing compounds to produce uniform colour on adjacent surfaces.

Water curing

Method: Select a method of ponding or continuous sprinkling that does not damage the concrete surface during the required curing period.

Wet hessian curing

Method: Place wet hessian sheets/bags over concrete surface. Keep hessian wet during the required curing period by regularly sprinkling with water. Protect from wind and traffic.

Impermeable sheet curing

Method: Place impermeable sheets, to ASTM C171 (2020), over concrete surface. Anchor down and tape joints in material to retain concrete moisture. Keep the concrete surface covered for the required curing period.

Cold weather curing

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

Hot weather curing

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

3.10 JOINTS**General**

Requirement: 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.

Non-dowelled contraction joints

Installation: Construct transverse and longitudinal contraction joints by early power sawing at an appropriate time, tooling or by placing an insert in the fresh concrete.

Dowelled joints

Requirement: Place dowels as documented, orthogonal to the joint direction and parallel to the pavement surface, accurate alignment is critical.

Dowel assembly: Use a dowel-assembly support frame firmly secured to the subbase during concrete placement. Prevent the dowel assembly support frame from passing through the joint. Do not insert dowels during the placement of concrete.

Debond dowel: Provide proprietary sleeves or debonding coatings to 0.5 length +25 mm and embed the dowels as follows:

- Proprietary sleeve: Cast the proprietary sleeves in the slab placed first. Insert the dowels into the proprietary sleeves before the subsequent pour.
- Coated dowel: Embed the unpainted half of the dowels in the slab placed first.

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

Movement: Do not distort or displace beyond the alignment tolerances under testing or during construction. Do not remove and replace dowels in preformed holes.

Dowel tolerances:

- Alignment: 1:150.
- Location: $\pm$ half the diameter of the dowel.

Construction joints

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

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

Joint filling: Fill with jointing materials as documented. Finish visible jointing material neatly flush with adjoining surfaces.

Jointing materials: Provide jointing materials compatible with each other and non-staining to concrete in visible locations.

Foamed materials (in compressible fillers): Closed cell or impregnated, not water absorbing.

Isolation joints

Requirement: Provide formed full depth joints, made from compressible filler material, around structures and features that project through, into or against the pavement, and elsewhere as required.

Formed joints

Full depth joints: Form the edge of the concrete placed first to provide a smooth, vertical face. After stripping and cleaning fix the joint filler with a suitable waterproof adhesive to the face of the slab and place the adjoining concrete after the adhesive has set.

Weakened plane joint: Cut a crack-inducing groove by using a suitable tool into the plastic concrete during finishing of the concrete surface. Compact and refinish the plastic concrete around the groove after forming the joint.

Rebated groove joints: Form the rebate by securely fixing removable steel or timber form strips to the form or forms on the slab that is placed first, so that the top of the strip is flush with the top of the form. After stripping and cleaning, fix the joint filler in the rebate after placing the adjoining concrete.

Sawn joints

Weakened plane joint: Saw the hardened concrete to depth at least 0.25 to 0.33 of the pavement thickness and to a uniform width in the range of 3 to 5 mm as follows:

- **Timing:** Commence sawing, regardless of time or weather conditions, as soon as the concrete has hardened sufficiently to permit cutting with only minor raveling of the edges of the saw cut. Complete sawing no later than 24 hours after concrete placement.
- **Sequence:** If possible, saw every third transverse joint initially, then saw the intermediate joints. Start where concrete placement commenced.
- **Cracking:** If the concrete has already cracked near the location chosen for a joint, do not saw a joint in that location. If a crack develops ahead of the saw cut, discontinue sawing and submit proposals for extra sawn joints.
- **Stand-by machines:** Provide one stand-by sawing machine for each machine planned to be used.
- **Cleaning and protection:** Immediately after each joint is sawn, flush the saw cut and adjacent concrete surface using water, until the waste from sawing is removed from the joint.

Rebated groove joints: Saw straight, parallel-sided grooves for joint seals on top of and centred on the sawn weakened plane joints.

- **Timing:** Commence sawing after the curing period has ended, immediately before joint sealing. Saw during daylight hours.

Preparing joints

Stripping time: At least 12 hours.

Clean: Immediately before installation of the sealer, make sure 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 the manufacturer's recommendations.

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

3.11 SURFACE SEALERS

General

Application: Apply surface sealer after the curing period and if the 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.

3.12 TACTILE GROUND SURFACE INDICATORS

Preparation

Requirement: Conform to the manufacturer's requirements and make sure surfaces are clean and free of dust and contaminants.

Installation

General: Install on a dry and flat surface. Conform to the manufacturer's recommendations.

3.13 COMPLETION

Rectification

Reinstating adjacent surfaces: Reinstall surfaces next to new pavements and associated elements. If an existing road pavement has been disturbed, trim back to a straight, neat and undisturbed edge, parallel to the new concrete for the full depth of the slab.

Traffic control provisions: Make sure completed work is safe for traffic, reinstall linemarkings if necessary.

Concrete pavement: If pavement does not conform to the tolerances, submit rectification proposal.

Unplanned cracking:

- Acceptable limit: Maximum 0.4 mm crack width.
- If cracking is more than 1 mm, provide an assessment of the possible cause and provide a proposal for rectification.

Material removal

Excavated material: Remove from site.

0310 CONCRETE - COMBINED

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide concrete pavement, as documented:

Landscape Architect – Environmental Partnership (NSW),

Civil Engineering – PM Design Group

Hydraulic Engineering – Glenn Haig & Partners

Structural Engineering- PM Design Group.

Performance

Requirements:

- Conforming to the design details and performance criteria.
- Satisfying quality and inspection requirements.
- Compatible with documented applied finishes.

1.2 DESIGN

General

Formwork: The design of formwork, other than permanent composite form systems, 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).

Structural design: To AS 3600 (2018).

Post-tensioned concrete: To AS 3600 (2018).

Concrete structures retaining liquids: To AS 3735 (2001).

Requirements

General: To DESIGN in *0171 General requirements*.

1.3 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements*.

1.4 STANDARDS

General

Formwork design and construction: To AS 3610.1 (2018) and AS 3610.2 (Int) (2023).

Plywood formwork: To AS 6669 (2016).

Composite steel-concrete construction, including profiled steel sheeting and shear connectors: To AS/NZS 2327 (2017).

Reinforced concrete construction: To AS 3600 (2018).

Specification and supply of concrete: To AS 1379 (2007).

Concrete structures for retaining liquids: To AS 3735 (2001).

Residential ground slabs and footings: To AS 2870 (2011).

Post-tensioned concrete: To AS 3600 (2018).

Strand, bar and wire: To AS 4672.1 (2007).

Design, installation and testing of post-installed and cast-in fastenings: To AS 5216 (2021).

Formed surfaces: To AS 3610.1 (2018).

1.5 INTERPRETATION

Definitions

General: For the purposes of this worksection, the definitions given in AS/NZS 1314 (2003), AS 1379 (2007), AS 3600 (2018), AS 3610.1 (2018) and the following apply:

- Ambient temperature: The air temperature at the time of mixing and placing of concrete.
- Anti-burst reinforcement: Reinforcement cage surrounding anchorages to control the tensile bursting stresses.
- Early age strength: A mean compressive strength at 7 days exceeding the values shown in AS 1379 (2007) Table 1.2.
- Green concrete: Concrete that has recently set but has not achieved any design strength.
- Sample: A portion of material taken for assessment, representative of the larger quantity of material from which it was taken.
- Specimen: A portion of a sample that is submitted for testing.
- Weather – cold: Ambient shade temperature less than 10°C.
- Weather – hot: Ambient shade temperature greater than 30°C.

1.6 TOLERANCES

Formwork

Plumb of elements more than 8 m high: 1:1000.

Plumb of elements not more than 8 m high: To AS 3610.1 (2018).

Position: Construct formwork so that finished concrete conforms to AS 3600 (2018) clause 17.5, AS 3610.1 (2018) clause 3.3 and as documented.

Reinforcement

Fabrication: To AS 3600 (2018) clause 17.2.

Reinforcement and tendon position: To AS 3600 (2018) clause 17.5.3.

Formed surfaces

Form face deflections: To AS 3610.1 (2018) Table 3.3.4.1.

Straight elements: To AS 3610.1 (2018) Table 3.3.5.1.

Unformed surfaces

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

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

Certification

Formwork design certification: For all formwork other than permanent composite form systems, 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.

Design documentation

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

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

- Loadings from stacked materials.

Post-tensioned calculations: Submit the following:

- Calculations of tendon jacking forces, theoretical extensions and losses for each stressing stage and at final stressing, before stressing operations begin.
- Expected loss of prestress due to friction in the jack and anchorage, and along the tendon including the friction curvature coefficient and the angular deviation due to wobble effects.
- Expected draw-in during anchorage.

Execution details

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

- Table form and climbing formwork: Proposed method and sequence of moving the formwork to provide concrete of the documented quality and surface finish.
- Continuously climbing formwork (Slipform): The average rate of movement.

Reshoring: Submit details of any proposed reshoring.

Reinforcement: Submit the following:

- General: Details of any proposed changes to documented reinforcement.
- Damaged galvanizing: Details of proposed repair to AS/NZS 4680 (2006) 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 (2018).
- Splicing: Details of any proposed changes to documented requirements.
- Welding: Details of any proposed welding of reinforcement to AS/NZS 1554.3 (2014).

Post-tensioning: Submit the following:

- Details of the proposed post-tensioning system tested and certified to AS/NZS 1314 (2003).
- Safe work method statement (SWMS) including the name and contact details of the subcontractor.
- Details of proposed gauging, stressing and grouting equipment including current calibration certificates.

Concrete: Submit proposals for mixing, placing, finishing and curing concrete including the following:

- Changes to the concrete mix.
- Changes to documented joint locations.
- Curing and protection methods.
- Cutting or displacing reinforcement, or cutting or coring hardened concrete.
- Handling, placement, compaction and finishing methods and equipment, including pumping.
- Placement under water.
- Sequence and times for concrete placement, and construction joint locations. Include any proposed sequential placement of slab segments.
- Site storage, mixing and transport methods and equipment, if applicable.
- Temperature control methods to suit hot or cold atmospheric conditions during concrete placement.
- Sawn joints: Submit details of proposed methods, timing and sequence of sawing joints.

Loading: Submit details of proposed construction systems, loads and procedures, including propping, re-shoring and any proposals for early application of superimposed loads.

Formwork removal: Submit formwork removal procedures.

Emergency construction joints: If emergency construction joints are required, submit a report on the action taken.

Surface repairs: If surface repairs are required, submit proposed methods.

Products and materials

Void formers: Submit a certificate from the manufacturer as evidence of conformity to the requirements of PRODUCTS, **FORMWORK**, **Void formers**.

Post-tensioning: Submit the following:

- Grout: Proposed grout mix (including grading, proportions, compressive strength, shrinkage and additives if any).

- Epoxy grout: If required, proposed formulation.

Concrete product conformity: Submit evidence of conformity, as appropriate, as follows:

- Certification by a JASANZ accredited third party.
- Test report describing tests and giving results that 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.

Pre-mixed supply delivery dockets: For each batch, submit a docket listing the information required by AS 1379 (2007), and the following:

- Special-class performance concrete: Documented performance and type of cement binder.
- Special-class prescription concrete: Details of mix, additives, and type of cement binder.
- Fibre reinforcement type and dosage.
- 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.

Curing compounds: Submit details of any proposed curing compounds, including the following:

- Dosage rates.
- 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.

Type tests: Submit test results for the following:

- Reinforcement strength and ductility: To **REINFORCEMENT, Tests**.
- Post-tensioning:
 - . Anchorage, anchorage assemblies and couplings: To **POST-TENSIONING, Tests**.
 - . Steel strand, wire and bar: To **POST-TENSIONING, Tests**.
- Liquid membrane-forming curing compounds: To **MISCELLANEOUS, Curing compounds**.

Records

Post-tensioning: Submit the following:

- Tendon installation record.
- Post-tensioning stressing schedule.
- Post-tensioning grouting record.

Site extensions: Submit the site extensions to **POST-TENSIONING, Stressing** on the same day as measured for review and approval by a professional engineer.

Samples

Requirement: Submit samples to PRODUCTS, **GENERAL, Samples**.

Shop drawings

Formwork: Submit shop drawings including details of proposed forms, falsework, form liners, bolt positions, release agents and, where applicable, re-use of formwork.

Post-tensioned drawings: Submit shop drawings showing the following:

- Concrete profiles.
- Reinforcement.
- Profiles, sizes and details of tendons, tendon numbers, anchorages, ducts, duct formers, splicing, sheathing, end block reinforcement and other associated components.

- Stressing requirements including sequence of stressing, jacking forces and the basis of assumed loss calculations.
- Number, size and position of grout openings, vents and drain holes in the ducts.

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

Requirement: Submit test results of the following:

- Concrete:
 - . Early age compressive strength.
 - . Other concrete properties, as documented.
- Grout:
 - . Fluidity.
 - . Bleeding.
 - . Early expansion.
 - . Compressive strength.
- Slip resistance test of completed installations.

1.8 INSPECTION

Notice

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

- Used forms, after cleaning and before re-use.
- Base or subgrade before covering.
- Membrane or film underlay installed on the base or subgrade.
- Completed formwork with all dust and debris removed from forms and reinforcement, tendons, cores, fixings and embedded items fixed in place before placing concrete.
- Concealed surfaces or elements before covering.
- Commencement of concrete placement and compaction.
- Finishing and curing of concrete.
- Evaluation of the off-form finishes.
- Evaluation of surface finish.

2 PRODUCTS

2.1 GENERAL

Samples

Requirement: Provide samples, as follows:

- Sample blocks of coloured concrete produced using the proposed mix and casting method before casting final concrete, as follows:
 - . Number: 4.
 - . Size (nominal): 300 x 300 x 50 mm.
- Duct-forming material.

2.2 FORMWORK

General

Form face, linings and release agents: Compatible with documented concrete surface finish and any proposed applied finishes to concrete.

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

Void formers

Requirement: 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 forms

Material: Hot-dipped zinc-coated sheet steel to AS 1397 (2021).

Minimum steel grade: G550.

Accessories: Use materials and corrosion protection compatible with the profiled steel sheeting.

Plywood forms

Material: To AS 6669 (2016).

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 (2018) Section 3.

2.3 REINFORCEMENT**Fibre reinforcement**

Steel fibres: To AS 3600 (2018) clause 16.7.1.

Synthetic fibres: To EN 14889-2 (2006).

Storage: Store in a dry environment. Do not stack.

Steel reinforcement

Standard: To AS/NZS 4671 (2019).

Fabrication tolerances: To AS 3600 (2018) clause 17.2.2.

Surface condition: Provide surfaces conforming to the following:

- Free of loose or flaking mill scale and rust.
- Clean from oil, grease, mud or other material that would reduce the bond between the reinforcement and concrete.

Storage: Store reinforcement above the surface of the ground and protect from damage and deterioration by exposure.

Protective coating

Standard: To AS 3600 (2018) clause 17.2.1.2.

Requirement: 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: High-build, high solids, chemically resistant coating to AS/NZS 3750.14 (1997).

- Thickness: 200 µm minimum.

Galvanizing: To AS/NZS 4680 (2006), and as follows:

- Sequence: If fabricating after galvanizing, repair damaged galvanizing and coat cut ends.
- Zinc-coating (minimum): 600 g/m².

Tie wire

General: Annealed steel 1.25 mm diameter (minimum).

External and corrosive applications: Galvanized.

Supports

Standard: To AS/NZS 2425 (2015).

Tests

Reinforcement strength and ductility: Provide type test reports as evidence of conformity to AS 3600 (2018) Table 3.2.1 for each reinforcement type.

2.4 POST-TENSIONING**Grout properties**

Standard: To AS 3600 (2018) clause 17.1.8.

Fluidity: Efflux times as follows:

- Immediately after mixing: 15 to 20 seconds.

- At the end of grouting or 45 minutes after mixing, whichever occurs first: Within ± 3 seconds of the efflux time recorded immediately after mixing.

Maximum bleed: 0.5% final bleeding.

Maximum early expansion: 0.5% at 3 hours.

Maximum shrinkage: 1% by volume after 24 hours.

Maximum water:cement ratio: 0.4 (by mass).

Compressive strength: 32 MPa at 7 days.

Grout materials

Fine aggregates: Maximum nominal aggregate size of 1 mm. Do not use aggregates for post-tensioning grout when the cross-sectional area of the duct is less than 5 times the cross-sectional area of the tendon.

Cement: To AS 3972 (2010), free from calcium chloride and less than two months old.

Admixtures: To AS 1478.1 (2000). Include an anti-bleed additive.

Fly ash: To AS/NZS 3582.1 (2016), proportioned according to obtain early strength requirements.

Water: To AS 1379 (2007). Clean, free from oil, acid, alkali, organic or vegetable matter and including not more than 500 mg/L of chloride ions.

Epoxy grout type: Commercial epoxy formulation of compressive strength exceeding 40 MPa.

Ducts

Robustness: Provide ducts with sufficient strength to retain their shape, resist damage during construction, and prevent deterioration or electrolytic action due to cement paste or water from the concrete entering the duct.

Wall thickness: To allow for abrasion during stressing of the tendon.

Size: To allow feeding of tendons and grouting.

Tendon material

Prestressing steel: Provide the following:

- Type and grade of strand, wire or bar, to AS 4672.1 (2007).
- Testing to AS/NZS 4672.2 (2007).

Strand type: 7 wire, stress relieved, high tensile steel.

Quality: Make sure tendons are not galvanized, have no nicks, pitting, indents, damage or foreign matter such as mud and dirt. Inspect at delivery and store the prestressing steel on supports clear of the ground.

Straightening of tendons: Not permitted. Supply tendons in coils large enough to self-straighten.

High tensile steel bars: Inspect individually and reject any bars with surface imperfections.

Anchorage, anchorage assemblies and couplings

General: To AS/NZS 1314 (2003).

Anchor plates: Hot-dip galvanized to AS/NZS 4680 (2006).

Tests

Prestressing strand, wire and bar:

- Provide test certificates for every delivery of strand, bar or wire.
- Standard: To AS/NZS 4672.2 (2007).

Anchorage:

- Stressing anchorage efficiency: To AS/NZS 1314 (2003) Appendix C.
- Non-stressing anchorage efficiency: To AS/NZS 1314 (2003) Appendix D.

Anchorage assemblies and couplings:

- Gripping efficiency: To AS/NZS 1314 (2003) Appendix B.
- Non-stressing anchorage efficiency: To AS/NZS 1314 (2003) Appendix D.

2.5 CONCRETE

General

Stockpile: If uniform, consistent colour is documented, stockpile sand, cement and aggregates.

Properties

Concrete mix and supply: Conform to the following:

- Normal-class: To AS 1379 (2007) clause 1.5.3.
 - . Properties: As documented.
- Special-class: To AS 1379 (2007) clause 1.5.4.
 - . Performance properties: As documented.
 - . Prescription properties: As documented.

Aggregates

Standard: To AS 2758.1 (2014).

Storage: Store in silos or on a hardstand located away from surface and ground water runoff. Allow for free drainage of rainwater and prevent contamination and intermixing of aggregates.

Cement

Standard: To AS 3972 (2010).

Age: Less than 6 months old.

Storage: Store cement bags in a dry, under cover and above ground environment.

Supplementary cementitious materials:

- Fly ash: To AS/NZS 3582.1 (2016).
- Slag: To AS 3582.2 (2016).
- Amorphous silica: To AS/NZS 3582.3 (2016).
- Manufactured pozzolans: To AS 3582.4 (2022).

Water

Standard: To AS 1379 (2007) clause 2.4.

Requirement: Clean, free from oil, acid, alkali, organic or vegetable matter and not more than 500 mg/L of chloride ions.

Concrete colour

Standard: To AS 3610.1 (2018).

Chemical admixtures

Standard: To AS 1478.1 (2000), used to manufacturer's recommendations and free from chlorides, and other substances detrimental to concrete or reinforcing steel.

2.6 MISCELLANEOUS**Polymeric film underlay**

Vapour barriers and damp-proofing membranes: To AS 2870 (2011) clause 5.3.3.

Curing compounds

Liquid membrane-forming compounds: To AS 3799 (1998).

Type tests: Provide certified test results for water retention to AS 3799 (1998) Appendix B for liquid membrane-forming compounds.

Joint fillers and sealants

Jointing materials: Provide jointing materials compatible with each other, and non-staining to concrete in visible locations.

Foamed materials (in compressible fillers): Closed cell or impregnated, not water absorbing.

Surface modifiers

Hardeners, sealants and protectors: Proprietary products conforming to the manufacturer's recommendations.

Slip resistance treatment: Proprietary products conforming to the manufacturer's recommendations.

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

Vapour barrier: Under slabs on ground, including integral ground beams and footings.

Damp-proofing membrane: Areas prone to rising damp or salt attack.

Base preparation

Requirement: Conform to base type, as follows:

- Concrete working base: Remove projections above the plane surface, and any 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 (2011) clause 5.3.3.

Requirement: 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 FORMWORK**General**

Requirement: As documented.

Bolt holes

Formwork tie bolts left in the concrete: Position to achieve minimum 50 mm concrete cover to bolt.

Corners

Work above ground: Bevel with a chamfer at re-entrant angles, and a 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.

Joints

Requirement: Provide joints that prevent loss of grout.

Openings

Vertical forms: Provide 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 face and linings. Spread the coating uniformly in a thin film and remove any surplus before placing concrete.

Staining: If oil or grease is used, make sure that surfaces to be exposed will not be stained or discoloured.

Unlined timber forms: Thoroughly wet timber before oiling.

Climbing 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, provide details of proposed fixings.

Steel linings

Rust: Clean off any rust and apply rust inhibiting agent before re-use.

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 REINFORCEMENT

General

Fixing: To AS 3600 (2018) clause 17.2.5 and as documented.

Dowels

Fixing: If a dowel has an unpainted half, embed that half in the concrete placed first.

Tolerances:

- Alignment: 1:100.
- Location: $\pm$ half the diameter of the dowel.

Grade: 250N.

Cover

Generally: As documented, to AS 3600 (2018) clause 4.10.

Structures for retaining liquids: As documented, to AS 3735 (2001) clause 4.4.

Residential ground slabs and footings: As documented, to AS 2870 (2011).

Supports

Concrete, metal or plastic supports: Provide as follows:

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

Spacing:

- Bars: $\leq$ 60 bar diameters.
- Mesh: $\leq$ 600 mm.

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

Projecting reinforcement

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

Bending

Restriction: Use only bars with bends as documented.

Site bending: If required to bend or straighten bars on site, conform to AS 3600 (2018) clause 17.2.3.2. Do not use heat, and only use methods that will not damage the steel and its structural properties.

Protective coatings: Repair coatings damaged by cutting or bending.

Tying

Requirement: Secure the reinforcement against displacement at intersections with wire ties or clips. Bend the ends of wire ties 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: If required, 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 fitments (or helical reinforcement) at every intersection.

Mats: For bar reinforcement in the form of a mat, secure each bar at alternate intersections.

Splices

Requirement: Provide splices, as documented.

Welding: Do not weld reinforcement less than 3 bar diameters in length from any part of a bar that has been bent or re-straightened.

Fibre-reinforced concrete

Steel fibres: To AS 3600 (2018) Section 16.

Synthetic fibres: To EN 14889-2 (2006).

3.4 POST-TENSIONING

General

Protection: Protect post-tensioning tendons, anchorages, ducts, supports and grout from damage or contaminants, including from swarf, loose grease, oil and paint.

Tolerances: To AS 3600 (2018) clause 17.5.3.

Concrete cover: As documented.

Anchorage, ducts and tendons: To AS 3600 (2018) clause 17.3.

Ducts

Placement: Locate and secure to positions, as documented.

Supports: Support and fix at regular intervals. Protect from collapse and other damage.

Sheathing: If ducts are formed with sheaths, provide sheathing material capable of transferring the tendon stresses to the body of the concrete.

Sequence: Assemble tendons on site by installing strand, bar or wire within the duct before concreting.

Damage: If damaged, repair ducts as follows:

- Small holes: Waterproof adhesive tape.
- Larger holes: Metal strips wrapped around the duct, with 100 mm overlap and sealed by a waterproof adhesive tape.

Crossover points: If ducts running in opposite directions clash, consult the professional engineer. Do not relocate ducts without approval.

Anchorage

Anti-burst reinforcement: As documented.

Tendons

Conformance: Provide tendons, as documented.

Care: Do not weld tendons. Do not expose tendons to sparks, ground current or excessive temperatures. Cut to length using mechanical means.

Grout fittings and ducts: Protect from collapse and other damage. Prevent ingress from concrete slurry.

Protection: Make sure tendons are not displaced by heavy and prolonged vibration, the pressure of the concrete being placed, workmen or construction traffic.

Slab marking: If there is possibility for future slab penetrations, mark the tendon locations, either on the slab surface or the soffit.

Tendon installation record: Provide details of the following:

- Date.
- Strand source.
- Coil number.
- Heat or cast number.
- Anchorage, duct and wedge batch numbers.
- Operator and supervisor names.
- Locations products are installed.
- Drawing number and revision.

Grout openings

Provision: Provide grout openings, vents and drain holes as documented, including at each end, and at high points except where the tendon curvature is small and the tendon is relatively level.

Gauges and jacks

General: To AS 1349 (1986).

Accuracy: Use equipment capable of establishing loads within 3% accuracy.

Calibration period: Calibrate gauges and jacks at intervals not exceeding 100 operations or 6 months, whichever is earlier, or if any inaccuracy in the gauges is suspected.

Sets: Calibrate and use jacks and gauges as a set.

Stressing

Requirement: To the approved SWMS.

Tensioning: To AS 3600 (2018) clause 17.3.4.5.

Stressing procedure: Carry out stressing after early age test results indicate concrete has attained the required strength.

Stressing stages: As documented.

Marking: Mark strands after wedges are installed and before initial stress.

Slip: Check markings whilst stressing to make sure there is no slip of strands.

Non-conformance: If the difference between theoretical and measured extensions is greater than 10%, provide an explanation of the cause.

Cutting tendons: Do not cut tendons until the actual extensions are approved.

Re-stress or de-stress: Adjust stress in tendons if necessary, after the theoretical and site extensions have been compared.

Post-tensioning stressing schedule: Provide a stressing schedule, including the following information.

- Date.
- Early age concrete compressive strength results.
- Operator and supervisor names.
- Equipment calibration date, including the identification number of dynamometers, gauges, pumps and jacks.
- Tendon identification.
- Initial and final stressing force (or pressure).
- Theoretical and actual extensions for each stressing stage.
- Non-conformance including tendon breakage.
- Drawing number and revision.

Grouting

Grout mixing and preparation: To AS 3600 (2018) clause 17.1.8.2 or to the manufacturer's recommendations for prebagged grout. Use grout as soon as possible and within 45 minutes of adding cement to mixing water.

Ambient air temperature: Do not grout, if the surrounding air temperature is lower or expected to be lower than 5°C.

Timing: Grout tendons as soon as practicable after stressing and within the time limits applicable to the atmospheric corrosivity category, as documented:

- C1 or C2: Three weeks.
- C3: Two weeks.
- C4: One week.
- C5 or CX: Seek specialist advice.

Exterior and interior corrosivity categories: To **CORROSION RESISTANCE, Atmospheric corrosivity category** in 0171 *General requirements*.

Equipment: Do not use manually powered grouting machines.

Procedure: Prevent damage to grout vents and fittings during grouting. Completely fill the duct during grouting. Inject grout into voids between tendons, ducts and anchorages, until grout flows from vents without air bubbles. Close vents as they fill, progressively in the direction of flow. If there is a blockage or interruption, completely flush grout from the duct using water.

Grout caps: Provide at each anchorage and seal for grouting and venting operations.

Post-tensioning grouting record: For each duct grouted, provide the following:

- Date and time.
- Composition of the grout (water:cement ratio, admixtures) and batch numbers.
- Ambient temperature.
- Operator and supervisor names.
- Duct and tendon identification.
- Grout properties.
- Details of grouting interruptions including pumping or supply interruptions, blockages or loss of grout.

Protection

Grout ducts: Do not subject grouted ducts to shock, vibration, construction traffic or similar loads until 24 hours after completion of grouting.

Permanent protection

Tendons and anchorages: On completion of stressing and grouting, permanently protect anchorage and tendons. Provide at least 40 mm of cover over the cut tendons when the recesses are concreted. Keep anchorages free of foreign matter (rust, grease, oil, paint).

3.5 CONCRETE SUPPLY**Elapsed delivery time**

General: Make sure that the elapsed time between the wetting of the mix and the discharge of the mix at the site is in conformance with the **Elapsed delivery time table**. Do not discharge at ambient temperature below 10°C or above 30°C 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)
5 – 24	120
24 – 27	90
27 – 30	60
30 – 35	45

Pre-mixed supply

Addition of water: To AS 1379 (2007) clause 4.2.3.

Transport method: Select to prevent segregation, loss of material and contamination of the environment, and not to adversely affect placing or compaction.

Site mixed supply

Emergencies: If mixing by hand, provide details.

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

3.6 TESTING**General**

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 (2007).

Method of assessment: Project assessment.

Sampling

Sampling method: To AS 1012.1 (2014).

Sampling locations: To AS 1012.1 (2014) and the following:

- Slump and spread tests: On site, at the point of discharge from the agitator.
- Compressive strength tests: Spread the site sampling evenly throughout the pour.

Sampling frequency: To AS 1379 (2007) Sections 5 and 6 and the following:

- Slump and spread 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 per batch: Columns and load bearing wall elements	Minimum number of samples per day: Other elements
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 (2014), AS 1012.8.2 (2014) and AS 1012.8.4 (2015).

Test methods

General: To the relevant parts of the AS 1012 series.

Compressive strength: To AS 1012.9 (2014).

Flexural strength: To AS 1012.11 (2000).

Acceptance criteria:

- Concrete properties: As documented.
- Early age compressive strength: As documented.

Drying shrinkage at 56 days: To AS 1012.13 (2015).

Other concrete properties: As documented.

Early age concrete compressive strength for post-tensioning

Sampling frequency: For each post-tensioned element, take at least 3 samples for testing at the age of each intended stage of stressing plus at least 3 reserve samples. Take at least one sample every 2 batches.

Sampling locations: Distribute sampling locations randomly, include anchorage areas and the final concrete placement area. Reference the structural element from which the sample is taken.

Making and curing of specimens: To AS 1012.8.1 (2014) and the following:

- Site cure all test cylinders for early age testing.
- For slab samples, maintain exposure to the same weather and temperature by curing the samples on the adjacent deck.
- Retain test cylinders on site until the morning of the test.

Grout properties

Fluidity: To ASTM C939/C939M (2022) for each grout batch.

Bleeding and early expansion: To ASTM C940 (2022), modified to simulate the wicking of strands and tested once every 20 m³.

Compressive strength: To AS 1478.2 (2005) at a frequency of 3 cubes per grouting session.

Liquid retaining structures

Testing for liquid tightness: To AS 3735 (2001) Section 7.

Slip resistance tests

Slip resistance of completed installation: To AS 4663 (2013).

3.7 CORES, FIXINGS AND EMBEDDED ITEMS**General**

Requirement: Install fasteners to manufacturer's recommendations and the assumptions of AS 5216 (2021) Appendix G.

Adjoining elements

Fixings: Provide fixings for adjoining elements. If required, provide temporary support to the adjoining elements during concreting, to prevent movement.

Protection

General: Protect embedded and projecting 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 surface finish.

Corrosion protection: In external or exposed locations, galvanize anchor bolts and embedded fixings as follows:

- All threaded products: To AS/NZS 1214 (2016).
- All non-threaded products: To AS/NZS 4680 (2006).

Grease: Grease threads that will project from the concrete.

Structural integrity

Position: Fix cores and embedded items to prevent movement during concrete placement. In locating cores, fixings and embedded items, displace but do not cut reinforcement, and maintain documented cover to reinforcement.

Isolation: Isolate embedded items to prevent water tracking to concrete that provides minimum cover to reinforcement.

Tolerances

General: Maximum deviation from correct positions:

- Anchor bolt groups for structural steel: To AS/NZS 5131 (2016) Appendix F.
- Cores and embedded items generally: 10 mm.
- Other fixing bolts: 3 mm.

3.8 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 flatness tolerance

Maximum deviation: 6 mm from a 3 m straightedge.

3.9 PLACING AND COMPACTION**Preparation**

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

Placing

Horizontal transport:

- Use suitable conveyors, clean chutes, troughs, hoppers or pipes.
- Minimise jolting and vibration of concrete whilst transporting around site.
- Discharge vertically in a controlled manner into forms or further distribution equipment.

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

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

Vertical elements: Limit the free fall of concrete to maximum of 2 m.

Fibre-reinforced concrete: For pumped concrete, use a 100 to 150 mm mesh screen on the pump hopper to catch fibre balls.

Reinforcement: Maintain the documented concrete cover to reinforcement.

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 embedded in concrete including pipes and conduits. Do not use vibrators to move concrete along the formwork. Avoid causing segregation by over-vibration.

Placing records

Logbook: Keep on site and make available for inspection a logbook 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.

Placing in cold weather

Cement: Do not use high alumina cement.

Temperature limits: Maintain the following:

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

High early strength cement: If deteriorating 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 $\geq 5^{\circ}\text{C}$.

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 forms, materials, and equipment coming in contact with the concrete free of frost and ice.

Freezing: Prevent concrete from freezing.

Placing in hot weather

Requirement: Prevent premature stiffening of the fresh mix and reduce water absorption and evaporation losses.

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

Evaporation rate limit: $\leq 0.50 \text{ kg/m}^2/\text{h}$.

Temperature control: Select one or more of the following methods to make sure the temperature of the concrete mix does not exceed 35°C :

- Cool the concrete using liquid nitrogen injection before placing.
- Cover horizontal transport containers.
- Forms and reinforcement before and during placing: $\leq 35^{\circ}\text{C}$.
- Spray the coarse aggregate using cold water before mixing.
- Use chilled mixing water.

Placing under water

General: Do not place under water unless conditions prevent dewatering.

3.10 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, prepare 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.

Joint preparation: Scabble hardened concrete joint surface to a minimum 3 mm amplitude. Do not damage projecting reinforcing steel. Remove loose or soft material, foreign matter and laitance.

Dampen the surface just before placing the fresh concrete and coat with a neat cement slurry.

Expansion and isolation joints

Expansion joint dowels: Make sure the location and alignment of installed dowels match the documented requirements. Make sure dowels are not displaced during concrete placement.

Bond breaking: Provide back-up materials for sealants, including backing rods, which do not adhere to the sealant.

Preparation: Before filling, dry and clean the joint surfaces, and prime.

Joint filling: Fill with jointing materials as documented. Finish visible jointing material neatly, flush with adjoining surfaces.

Watertightness: Apply the jointing material so that joints subject to ingress of water are made watertight.

Slip joints

General: Provide slip joints, as documented.

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

Slab-on-grade control joints

General: Provide control joints, as documented.

Tooled and sawn joints: Form joints within the concrete surface with either a grooving tool or a mechanical circular saw.

Timing: Form joints as early as possible after placement of concrete. Make sure the concrete has hardened sufficiently to prevent dislodging aggregate.

Joint width: 3 to 5 mm wide.

Joint depth: A minimum of $(0.25 - 0.33) \times$ depth of the concrete.

3.11 SURFACE MODIFIERS**General**

Application: Apply to clean surfaces, to the manufacturer's recommendations.

3.12 FORMED SURFACES**General**

Surface finish: To AS 3610.1 (2018) Table 3.3.3.1 and as documented.

Damage: Do not strip formwork prematurely if damage to the concrete may be caused.

Curing

Requirement: 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, and within an hour of exposure.

Evaluation of formed surfaces

General: If evaluation of a formed surface is required, complete the evaluation before surface treatment.

Finishing methods

Requirement: If soffits of horizontal concrete elements or faces of vertical concrete elements are to have a finish other than an off-form finish, provide finishes as documented.

Form removal: If vertical face formwork needs to be removed for finishing methods while the concrete is green, make sure the concrete has sufficiently set to prevent slump.

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: 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: 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 is produced.
- Grout floated finish: 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 is produced.

Smooth rubbed finish: While the concrete is green, wet the surface and rub using a carborundum or similar abrasive brick until a uniform colour and texture is produced.

3.13 UNFORMED SURFACES**General**

Surface finish: As documented.

Finished levels: Strike off, screed and level slab surfaces to finished levels and to the flatness tolerance class documented.

Finishing methods – primary finish

Machine float finish:

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

Steel trowel finish: After machine floating, finish as follows:

- Use power or 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 scratched 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 pattern finish: Provide a proprietary finishing system.

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

3.14 CURING

General

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

- Curing: Cure continuously from completion of finishing, when the concrete has set sufficiently not to be damaged by the curing process.
- Minimum curing period: 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 AS 3600 (2018) clause 17.1.5 and the following, unless accelerated curing is adopted:
 - . Fully enclosed internal surfaces/Early age strength 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

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

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

Self-levelling toppings: If also used as curing compounds, conform to AS 3799 (1998).

Visually important surfaces: Apply curing compounds to produce uniform colour on adjacent surfaces.

Water curing

Method: Select a method of ponding or continuous sprinkling that does not damage the concrete surface during the required curing period.

Wet hessian curing

Method: Place wet hessian sheets/bags over concrete surface. Keep hessian wet during the required curing period by regularly sprinkling with water. Protect from wind and traffic.

Impermeable sheet curing

Method: Place impermeable sheets, to ASTM C171 (2020), over concrete surface. Anchor down and tape joints in material to retain concrete moisture. Keep the concrete surface covered for the required curing period.

Cold weather curing

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

Hot weather curing

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

3.15 COMPLETION**Early loading**

Prohibition: Prepare proposals for the application of any superimposed load (including backfilling), to any part of what will become a load bearing structure, within 21 days of placing concrete. Do not apply superimposed loads unless it can be demonstrated that 95% of the design strength of the concrete has been achieved.

Formwork removal

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

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

Stripping:

- General: To AS 3600 (2018) where it is more stringent than AS 3610.1 (2018) and AS 3610.2 (Int) (2023).
- Vertical formwork: To AS 3610.1 (2018) Appendix C Table C2.
- Multi-storey work: Remove formwork without disturbing props supporting succeeding floors.
- Post-tensioned concrete: Remove formwork supporting post-tensioned concrete members to AS 3600 (2018) clause 17.6.2.7.

Removable bolts: Remove tie bolts without damaging the concrete.

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.

Curing: 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, within an hour of exposure.

Protection

General: Protect the concrete from damage due to construction loads, physical and thermal shock, and excessive vibration, 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 including:

- Waste Room
- Main Switch Room (MSB)
- Plant
- Store 2 including adjacent Vestibule
- Store 3 – emergency Evac. including adjacent Vestibule
-

Performance

Requirement: Compatible with documented applied finishes.

Company Contacts

Concrete Sealer: <https://files.duspecplus.com.au/public/pdf/specification/0a3fe313-33b0-ec11-983f-002248d3b22c?sv=2020-08-04&se=2025-07-02T04%3A04%3A19Z&sr=b&sp=r&sig=JAItVJ59CsoqUNMtnY0WbONcr%2FtqBH3KKQJthdpRwWo%3D>

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

1.3 STANDARDS

General

Formed surfaces: To AS 3610.1 (2018).

1.4 INTERPRETATION

Definitions

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

- Green concrete: Concrete that has recently set but has not achieved any design strength.

1.5 TOLERANCES

Formed surfaces

Form face deflections: To AS 3610.1 (2018) Table 3.3.4.1.

Straight elements: To AS 3610.1 (2018) Table 3.3.5.1.

Unformed surfaces

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

Flatness tolerance class table

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

1.6 SUBMISSIONS

Execution details

Surface repairs: If surface repairs are required, submit proposed methods.

Tests

Site tests: Submit test results of the following:

- Slip resistance test of completed installations.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties.**

1.7 INSPECTION

Notice

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

- Completed formwork with all dust and debris removed from forms.
- Evaluation of the off-form finishes.
- Evaluation of surface finish.

2 PRODUCTS

2.1 MATERIALS

Surface modifiers

Hardeners, sealants and protectors: Proprietary products conforming to the manufacturer's recommendations.

Slip resistance treatment: Proprietary products conforming to the manufacturer's recommendations.

3 EXECUTION

3.1 SURFACE MODIFIERS

General

Application: Apply to clean surfaces, to the manufacturer's recommendations.

3.2 FORMED SURFACES

General

Surface finish: To AS 3610.1 (2018) Table 3.3.3.1 and as documented.

Damage: Do not strip formwork prematurely if damage to the concrete may be caused.

Curing

Requirement: 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, and within an hour of exposure.

Evaluation of formed surfaces

General: If evaluation of a formed surface is required, complete the evaluation before surface treatment.

Finishing methods

Requirement: If soffits of horizontal concrete elements or faces of vertical concrete elements are to have a finish other than an off-form finish, provide finishes as documented.

Form removal: If vertical face formwork needs to be removed for finishing methods while the concrete is green, make sure the concrete has sufficiently set to prevent slump.

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: 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: 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 is produced.
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Smooth rubbed finish: While the concrete is green, wet the surface and rub using a carborundum or similar abrasive brick until a uniform colour and texture is produced.

3.3 UNFORMED SURFACES

General

Surface finish: As documented.

Finished levels: Strike off, screed and level slab surfaces to finished levels and to the flatness tolerance class documented.

Finishing methods – primary finish

Machine float finish:

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

Steel trowel finish: After machine floating, finish as follows:

- Use power or 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.

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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 scratched 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 pattern finish: Provide a proprietary finishing system.

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

Concrete Sealer: Equal to Dulux Aquatread

3.4 TESTING

Slip resistance tests

Slip resistance of completed installation: To AS 4663 (2013).

3.5 COMPLETION

Warranties

4 SELECTIONS

4.1 SCHEDULES

Test panels schedule

Application	Incorporated features	Panel size

Formed surface finishes schedule

	A	B	C
Surface finish class to AS 3610.1 (2018)		Class 2	
Formwork lining type			
Bolt hole filling			
Evaluation			
Surface finishing method			
Abrasive particle type			

Surface finish class schedule

	Class 1	Class 2	Class 3
Colour control		Off-white	
Critical faces of elements		6-7mm	
Distance between face steps (mm)		5000mm	
Form face span and direction of span			
Repairs	Not permitted		
Liner details, pattern and accuracy			
Surface pattern details and accuracy			
Surface treatment pattern		Cove	
Tie rod pattern			

Unformed surface finishes schedule

	A	B	C
Location	- All new floor slabs on ground, - New concrete hobs under lightweight wall framing		
Flatness tolerance class	Class 2		
Primary finish	Steel Trowel finish to new interior topping floor slabs to have finished surface of carpet, vinyl or		

	A	B	C
	tiles, Timber Sports Floor applied only • Cove Finish with Steel trowelled edge margin to edges and joints to All new floor slabs on ground, carpark		
Supplementary finish			
Slip resistance treatment			
Slip resistance classification	P4		
Slip resistance site test of completed installation	Wet Pendulum Test To AS/NZ4586-2013		

0321 PRECAST CONCRETE

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide concrete pavement, as documented:

Electrical Engineering – Spectrum Engineering Solutions

Hydraulic Engineering – Glenn Haig & Partners

Structural Engineering- PM Design Group.

Performance

Requirement: Conform to the following:

- Designed and certified by a professional engineer.
- Designed to conform to the documented performance requirements.
- Designed for handling, transport and erection.
- Fabricated in conformance with the shop drawings.
- Undamaged by handling and installation.
- Certified by a professional engineer after erection.

1.2 DESIGN

General

In-service structural design: To AS 3600 (2018) and BCA (2022) B1D2.

Erection design: To AS 3850.2 (2024).

Design of post-installed and cast-in fastenings: To AS 5216 (2021).

External wall panels and connections: To BCA (2022) C2D12.

Requirements

General: To DESIGN in *0171 General requirements*.

1.3 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements*.

1.4 STANDARDS

General

Precast elements: Conform to AS 3600 (2018) and NP PCH (2009) (Precast concrete handbook).

Materials, components and equipment for manufacture: To AS 3850.1 (2024).

Planning, design, construction, casting, transportation, erection and installation: To AS 3850.1 (2024).

Precast flooring systems: To AS 3600 (2018).

Installation and testing of post-installed and cast-in fastenings: To AS 5216 (2021).

1.5 INTERPRETATION

Definitions

General: For the purposes of this worksection, the definitions given in AS 3850.1 (2024) and the following apply:

- Precast concrete: Concrete building elements, cast in moulds and cured away from the final structural position, and then transported, lifted and fixed into position.

1.6 TOLERANCES

General

Reinforcement and tendon position: To AS 3600 (2018) clause 17.5.3.

Manufacturing, installation, fixings and embedded items tolerance for precast elements: To AS 3610.1 (2018) Table 3.3.6.2 and AS 3850.2 (2024) clause 2.11.

Formed surfaces finish quality: To AS 3610.1 (2018) Table 3.3.3.1.

1.7 SUBMISSIONS

Certification

Design: Submit independent certification by a professional engineer of conformance of the design to project criteria.

Manufacture: Submit certification from the precast manufacturer of conformance to the documented design.

Design documentation

Calculations: Submit structural performance calculations.

Execution details

Element casting: Submit element casting checklist.

Manufacturer's details: Submit name, contact details and credentials of proposed manufacturer of precast elements.

Safe work method statement (SWMS): Prepare and submit a SWMS for the precast erection specific to the project.

Erection documentation: Submit details of lifting device locations and rigging systems, including marking plans and shop drawings.

Early lifting: If it is proposed to lift the precast elements by their designated lifting points before 28 day strength has been achieved, submit evidence to demonstrate that the element has adequate strength to carry its own weight without damage or residual cracking or deflection on removal of the lifting device.

Lifting and handling equipment: Submit details and specification of proposed equipment along with qualifications and training of the operating personnel in the form of a qualification register.

Products and materials

Protective coating details: Submit proposals for protective coatings to exposed metallic components to AS 2312.1 (2014) or AS/NZS 2312.2 (2014) with regard to site-specific corrosivity zoning.

Colour: Provide details of method of achieving the selected colour including details of the type and colour of the cement, sand and aggregates as well as any colouring oxide pigments or stain.

Proprietary inserts: Submit proprietary documentation for any lifting, bracing or fixing inserts. Include make, type and working load limit.

Non-proprietary inserts: Submit certificate from a professional engineer certifying the working load limit.

Welding of cast-in inserts: Submit written permission from insert manufacturer to proposed welding of cast-in inserts, to AS 3850.1 (2024) clause 2.5.1.

Concrete mix: Submit concrete mix details including the proportions and source of the constituents, admixtures, release agents and curing compounds.

Steel fibre reinforcement: Submit a current Declaration of Performance as evidence of conformity to ISO 13270 (2013) or EN 14889-1 (2006).

Type tests: Submit test results for the following:

- Reinforcement strength and ductility: To **REINFORCEMENT, Tests**.
- Prestressing steel: To **REINFORCEMENT, Tests**.
- Lifting, bracing and fixing inserts: To **CAST-IN ITEMS, Tests**.
- Bearing pads: To **MISCELLANEOUS, Bearing pads**.

Samples

Requirement: Submit samples to PRODUCTS, **GENERAL, Samples**.

Shop drawings

Precast concrete drawings: Submit shop drawings to AS 3850.2 (2024) clause 2.10, of architectural and structural precast concrete elements showing the design, manufacture, assembly, transport and installation details, including the following:

- Project title and manufacturer's name.

- Marking plans and elevations referenced to the building grids and floors to locate each precast element.
- Shape or profile drawings (submit these before fabrication of moulds and tooling).
- Concrete mix and type of cement if special-class concrete is used.
- Locations, sizes, details, materials, ductility and stress grades of tendons and reinforcement.
- Locations, sizes, details, materials, corrosion protection and grades of cast-in ferrules, locating plates and angles, cut outs and openings, bolts, anchors and lifting devices.
- Cast-in services.
- Site fitments.
- Details of all joints, caulking, baffles and waterproofing.
- Surface finish class and surface treatment, if applicable.
- Curing and protection methods.
- Mass and centre of gravity of each precast element.
- Calculated maximum loading on lifting and bracing inserts and attachments.
- Equipment and methods for handling, transport and installation, including lifting inserts and pick-up points.
- Evidence of load capacity of lifting and bracing inserts and attachments in the form of test reports or calculations.
- Specification of plugs for sealing recesses of cast-in fixings.

Structural performance: Submit test results of prior testing for static load tests.

1.8 INSPECTION

Notice

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

- Formwork dimensions and stability.
- Edge details and penetrations before casting of element.
- Connection materials and inserts in place before casting of element.
- Reinforcement and/or prestressing strands in place before casting of element.
- Concreting.
- First precast element of each type at the earliest possible time before and immediately after stripping.
- Stripping and storage.
- Site erection including fixings and any in situ topping.
- Installed temporary bracing.
- Final structure before removal of temporary bracing, including joints visible for inspection.

2 PRODUCTS

2.1 GENERAL

Samples

Requirement: Provide samples of each surface finish, showing the range of variation in texture and colour.

2.2 CONCRETE

General

Standard: To AS 3600 (2018) and AS 1379 (2007).

Stockpile: If uniform, consistent colour is documented, stockpile sand, cement and aggregates.

Aggregates

Standard: To AS 2758.1 (2014).

Storage: Store in silos or on a hardstand located away from surface and ground water runoff. Allow for free drainage of rainwater and prevent contamination and intermixing of aggregates.

Cement

Standard: To AS 3972 (2010).

Age: Less than 6 months old.

Storage: Store cement bags in a dry, under cover and above ground environment.

Supplementary cementitious materials:

- Fly ash: To AS/NZS 3582.1 (2016).
- Slag: To AS 3582.2 (2016).
- Amorphous silica: To AS/NZS 3582.3 (2016).
- Manufactured pozzolans: To AS 3582.4 (2022).

Water

Standard: To AS 1379 (2007) clause 2.4.

Requirement: Clean, free from oil, acid, alkali, organic or vegetable matter and not more than 500 mg/L of chloride ions.

Chemical admixtures

Standard: To AS 1478.1 (2000), used to manufacturer's recommendations and free from chlorides, and other substances detrimental to concrete or reinforcing steel.

Concrete colour

Standard: To AS 3610.1 (2018).

Pigments (oxides): As follows:

- Chemically inert.
- Alkaline resistant.
- Insoluble.
- Light-fast.

2.3 PRECAST CONCRETE PROPERTIES**General**

Concrete: To AS 3600 (2018).

Testing: To the AS 1012 series.

Durability

Concrete cover: To AS 3600 (2018) clause 4.10.

2.4 REINFORCEMENT**Fibre reinforcement**

Steel fibres: To AS 3600 (2018) clause 16.7.1.

Synthetic fibres: To EN 14889-2 (2006).

Storage: Store in a dry environment. Do not stack.

Steel reinforcement

Standard: To AS/NZS 4671 (2019).

Fabrication tolerances: To AS 3600 (2018) clause 17.2.2.

Surface condition: Provide surfaces conforming to the following:

- Free of loose or flaking mill scale and rust.
- Clean from oil, grease, mud or other material that would reduce the bond between the reinforcement and concrete.

Storage: Store reinforcement above the surface of the ground and protect from damage and from deterioration by exposure.

Structural welding: To AS/NZS 1554.3 (2014).

Corrosion protection: To AS 3600 (2018) clause 17.2.1.2.

Prestressing steel

Standard: To AS 4672.1 (2007).

Strand type: 7 wire, stress relieved, high tensile steel.

Quality: Make sure strands are not galvanized, have no nicks, pitting, indents, damage or foreign matter such as mud and dirt. Inspect at delivery and store the prestressing steel on supports clear of the ground.

Construction requirements: To AS 3600 (2018) Section 17.

Welding: Do not weld prestressing strands.

Tie wire

General: Annealed steel 1.25 mm diameter (minimum).

External and corrosive applications: Galvanized.

Supports

Standard: To AS/NZS 2425 (2015).

Tests

Prestressing steel: To AS/NZS 4672.2 (2007).

Reinforcement strength and ductility: Provide type test reports as evidence of conformity to AS 3600 (2018) Table 3.2.1 for each reinforcement type.

2.5 GROUT

General

Grout material requirements: To AS 3600 (2018) clause 17.1.

Grout tube: Corrugated thin walled galvanized tube or similar, sized to provide erection tolerance and clearance for grout flow.

2.6 CAST-IN ITEMS

Lifting, bracing and fixing inserts

Requirement: Conform to the following:

- Fixing inserts: To AS 3850.1 (2024) clause 2.5.
- Lifting and bracing inserts: To AS 3850.1 (2024) clause 2.5 and AS 3850.2 (2024).

Compatibility: Provide cast-in items that are compatible with each other, the reinforcement and the documented concrete finish.

Corrosion protection: In external or exposed locations, provide hot-dipped galvanized anchor bolts and embedded fixings, as follows:

- Minimum coating mass of 600 g/m².
- Threaded products: To AS/NZS 1214 (2016).
- Non-threaded products: To AS/NZS 4680 (2006).

Ferrules: Provide ferrules anchored behind the reinforcing, as documented.

Dowel bars: Provide dowel bars loose, cast in or screwed into a ferrule or coupler and projecting from the precast element. Alternatively, where dowels are cast into and project from in situ concrete, provide a mating sleeve with grout tube.

Grout tube: Provide grout tubes as documented, cast into either in situ concrete or the precast element into which a dowel bar will be grouted.

Cast-in plates and bolts: Provide purpose-made steel brackets with bars, bolts or studs welded to them, as documented. If proprietary inserts are welded, conform to manufacturer's written permission.

Welding of connections: To AS/NZS 1554.1 (2014).

Restraint brackets: Provide all restraint brackets for the precast elements, as documented or as required.

Lifting and bracing inserts: Conform to the following:

- Cast in.
- Provide proprietary lifting devices with published load data designed specifically for lifting concrete elements.
- Provide bracing inserts or strongbacks designed by a professional engineer.
- Do not use deformed bars or stressing tendons as lifting loops.
- Do not place lifting attachments, holes and other temporary fixings for handling purposes on faces visible upon completion.
- Clearly mark all lifting points and the positions for temporary bearing for storage and transport.

Sealing: Recess lifting attachments such as bracing ferrules, or other types of cast-in fixings, and provide plugs for sealing

Tests

Lift, bracing and fixing inserts: To AS 3850.1 (2024) Appendix A.

2.7 MISCELLANEOUS**Curing compounds and release agents**

Liquid membrane-forming compounds: To AS 3799 (1998).

Release agent: Compatible with the curing compound.

Bearing pads

Selections and testing: To AS 5100.4 (2017).

Levelling pads and shims

Requirements: To AS 3850.1 (2024) clause 2.8.

Flashings

Standard: To AS/NZS 2904 (1995).

Sealants

Compression-seals: Polyethylene or polyurethane foam strip.

2.8 PRECAST ELEMENTS**Marking**

Precast element identification: Located so as not to be visible in the completed structure and to remain legible until the element is fixed in place. Include the following:

- Plank thickness (mm).
- Number of strands.
- Strand diameter (mm).
- Concrete cover (mm).
- Date of casting.
- Orientation of the element.
- On precast elements other than those manufactured as a standard product, indicate their location within the structure, in conformance with the marking plan.
- Mass of the element.

Conformance

Tolerances: To AS 3850.2 (2024) clause 2.11.

Assessment: Set aside for inspection any element having damage such as cracking, deformation or spalling, or exhibiting lack of adequate concrete cover.

Rejection: Reject any precast elements not conforming to the documented tolerances and design requirements.

3 EXECUTION

3.1 PREPARATION**Pre-installation**

Requirement: Conform to AS 3850.2 (2024) clause 4.4.2.

Storage

Support points: Support elements at designated support points during storage.

Prevent damage: Protect from warping, twisting, crushing, cracking, staining, discolouration and other damage until precast elements have been installed.

3.2 INSTALLATION**General**

Requirement: To the approved SWMS.

Lifting and handling

Requirement: To AS 3850.2 (2024).

Site cranes: To AS 2550.1 (2011).

Site conditions: Make sure the wind and temperature conditions allow for safe handling and fixing, and are consistent with the structural capability and geometry of the element.

Precautions: Use handling methods that do not overstress, warp or damage the elements.

Lifting: Only lift or support members at specified points. Do not use the fixing devices for lifting or hoisting unless they have also been designed for this purpose and confirmed as such by a professional engineer.

Proprietary systems: Use in conformance with manufacturer's specifications and recommendations.

Temporary bracing and propping: To AS 3850.2 (2024) Section 5.

Fixing

Fixing: Fix the precast elements securely and accurately in their final position.

Welding: Do not site weld lifting, bracing or fixing inserts.

Bed joint: Provide non-shrink grout to the base of the precast elements, as documented.

Ancillaries: Provide components and materials, including fasteners, braces, shims, jointing strips, sealant, flashings, grout and mortar, bearing pads or strips, ties and dowels, clips and fixings necessary for the installation of the elements.

Flooring systems

Shear keys: Grout with mix proportion (sand:cement) 3:1.

Preparation: Immediately before in situ topping, wet surface of plank without pooling.

Topping minimum grade: N32 to AS 1379 (2007).

Surfaces bonded to in situ concrete

Requirement: Prepare all surfaces required to bond with in situ concrete, as documented, to achieve a shear plane surface coefficient in conformance with AS 3600 (2018) Table 8.4.3.

3.3 COMPLETION

General

Removal of temporary bracing or propping: Obtain written instructions from a professional engineer at the completion of installation before removing temporary supports.

Requirement: Remove, seal and rectify temporary attachments after erection.

Conformance

Tolerances: To AS 3850.2 (2024) Table 2.11(D).

0334 BLOCK CONSTRUCTION

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide concrete pavement, as documented:

Electrical Engineering – Spectrum Engineering Solutions

Hydraulic Engineering – Glenn Haig & Partners

Structural & Civil Engineering- PM Design Group.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

1.3 STANDARD

General

Materials and construction: To AS 3700 (2018).

1.4 INTERPRETATION

Definitions

General: For the purposes of this worksection, the definitions in AS 3700 (2018) clause 1.5.2, AS/NZS 4455.1 (2008) clause 1.4 and the following apply:

- Facework: Masonry intended to be exposed in a wall.
- Special mortar: Mortar with compositions not covered in AS 3700 (2018) Table 11.1.

1.5 TOLERANCES

General

Standard: To AS 3700 (2018) clause 12.5 and Table 12.1.

1.6 SUBMISSIONS

Fire performance

Fire-resistance level: Submit evidence of conformity to **FIRE PERFORMANCE, Fire-resistance of building elements**.

Products and materials

Type tests: Submit test results of the following:

- Characteristic unconfined compressive strength of masonry unit: To **MATERIALS, Masonry units**.

Samples

Requirement: Submit samples to **PRODUCTS, GENERAL, Samples**.

Tests

Site tests: Submit results for special mortar and masonry as follows:

- Characteristic compressive strength.
- Characteristic flexural tensile strength.
- Scratch index for mortar joints.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties**.

1.7 INSPECTION

Notice

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

- Set-out.

- Structural steelwork, including bolts and shelf angles, in position.
- Unit type, colour and texture.
- Bottoms of cavities, after cleaning out.
- Bottoms of core holes, before grouting.
- Reinforcement type and diameter.
- Positioning of reinforcement before grouting.
- Control joints, ready for insertion of joint filler.
- Damp-proof courses, in position.
- Flashings, in position.
- Lintels, in position.

2 PRODUCTS

2.1 GENERAL

Samples

Requirement: Provide samples, as follows:

- Each type of face unit, showing the range of variation available, including colour, texture, surface irregularities, defective arrises, and shape.
 - . Number of each type: 6.
- 2 kg sample of each type of sand required to be of a particular colour, grade or source.
- Each type of sealant, showing the finished colour.
 - . Quantity: Minimum two of each colour.

Sample panel: Provide a sample panel for each type of facework, including face or pointing mortar and a finished vertical control joint, in a suitable location.

- Size: Minimum 1200 mm high x 1190 mm or closest unit module long.

2.2 FIRE PERFORMANCE

Fire-resistance of building elements

Fire-resistance level: Tested to AS 1530.4 (2014).

2.3 DURABILITY

General

Exposure locations: To AS 3700 (2018) clause 5.4.

2.4 MATERIALS

Masonry units

Selections: As documented.

Standard: To AS/NZS 4455.1 (2008) and AS/NZS 4455.3 (2008).

Salt attack resistance grade: To AS 3700 (2018) Table 5.1.

Characteristic unconfined compressive strength: To AS/NZS 4456.4 (2003).

Mortar materials

Mortar class: To AS 3700 (2018) Table 5.1.

Cement: To AS 3972 (2010).

White cement: With not more than 1% iron salts content.

Lime: To AS 1672.1 (1997).

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

Water: Clean and free from any deleterious matter.

Admixtures: To AS 3700 (2018) clause 11.4.2.4.

Pigment: To EN 12878 (2014), and as follows:

- Integral pigment mix proportion: Not more than 10% by weight of cement.

Masonry cement mortar mix proportions table (cement:lime:sand), by volume

Mortar class to AS 3700 (2018)	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 (2018)	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 (2018) clause 11.7.

Maximum aggregate size: 12 mm.

Minimum cement content: 300 kg/m³.

Characteristic compressive strength: Minimum 12 MPa.

Nominal slump: 200 mm.

2.5 BUILT-IN COMPONENTS**General**

Durability class of built-in components: To AS 3700 (2018) Table 5.1.

Steel lintels

Angles and flats: To AS/NZS 3679.1 (2016).

Cold-formed proprietary lintels: Designed to AS/NZS 4600 (2018).

Corrosion protection: To AS 2699.3 (2020).

Cutting: Do not cut after galvanizing.

Reinforcement

Standard: To AS/NZS 4671 (2019).

Corrosion protection: To AS 3700 (2018) clause 5.9.

Minimum cover: To AS 3700 (2018) Table 5.1.

Wall ties

Standard: To AS 2699.1 (2020).

Type: A.

Corrosion protection: To AS 2699.1 (2020).

Connectors and accessories

Standard: To AS 2699.2 (2020).

Corrosion protection: To AS 2699.2 (2020).

Flashings and damp-proof courses

Standard: To AS/NZS 2904 (1995).

Weepholes

Weephole formers/guards: As documented.

Slip joints

Standard: To AS 3700 (2018) clause 4.14.

Air vents

Blockwork: Select from the following:

- Concrete framed: Bronze wire mesh in concrete frame, 390 x 190 mm.
- Vent blocks: Purpose-made vent blocks.

3 EXECUTION

3.1 GENERAL

Mortar mixing

General: Measure volumes accurately to the documented proportions. Machine mix for at least six minutes. If the initial set of the cement has taken place, discard the mortar. Do not retemper.

Storage and handling

Masonry units: Store above the surface of the ground and cover to prevent entry of rainwater and contaminants. Locate away from surface and ground water runoff.

Mortar materials: Protect from contamination and as follows:

- Sand: Store away from surface and ground water runoff and allow for free drainage of rainwater.
- Cement and lime: Store bags in a dry, under cover and above ground environment.

Bond

Type: Stretcher bond.

Building in

Embedded items: Build in wall ties and accessories as the construction proceeds. If not practicable to obtain the required embedment within the mortar joint in cored or 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.

Minimum clearance for timber frame shrinkage

General: In timber framed masonry veneer construction, provide clearances to allow for long-term shrinkage of timber including at windows, doors, thresholds, at the underside of eaves where the masonry and soffit meet and as follows:

- Single storey (slab on ground): 10 mm.
- Two storey (slab at ground floor): 32 mm
- Additional clearance: Accommodate additional shrinkage of unseasoned floor timbers.

Monolithic structural action

Construction at different rates or times: 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 to obtain monolithic structural action in the completed work.

Header units: Except in stretcher bond facework, provide masonry header units, to AS 3700 (2018) clause 4.11.2 and as follows:

- 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.

Joining to existing

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

Mortar joints

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

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

Hollow units: Face-shell bedded. Fill perpends solid. Cut mortar flush.

Joint thickness: 10 mm.

Finish: Conform to the following:

- Externally: Tool to give a dense water-shedding finish.

- Internally: If wall is to be plastered, do not rake more than 10 mm to give a key.

Rate of construction

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

Rods

Set-out: Construct masonry to the following rods:

- 190 mm high units: 3 courses to 600 mm.

Temporary support

General: If the final stability of the masonry is dependent on construction of (structural) elements after the masonry is completed, provide proposals for temporary support or bracing.

3.2 FACEWORK

Cleaning

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

Colour mixing

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

Below ground

Facework: Commence facework at least one full course, below the adjacent finished surface level.

Double face walls

Selection: Select face units for uniform width and double-face qualities in single-leaf masonry with facework both sides.

Preferred face: Before starting, obtain approval of the preferred wall face, and favour that face should a compromise be unavoidable.

Perpend

General: If other than vertically aligned perpend in alternate courses are proposed, provide details.

Sills and thresholds

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

Minimum size of cut unit: Three quarters full width.

3.3 SUBFLOOR WORK

Access openings

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

Air vents

Minimum subfloor openings and ground clearance: To BCA (2022) F1D8.

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

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

Underpinning

Requirement: Install underpinning, without causing damage to the building.

Grouting: Pack dry mix M4 mortar between the top of the underpinning and the underside of the existing structure at the completion of each panel of underpinning.

3.4 CAVITY WORK

Cavity clearance

General: Keep cavities clear at all times.

Cavity fill

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

Cavity width

General: Minimum 40 mm for cavity masonry walls and masonry veneer walls, in conformance with AS 3700 (2018) clause 4.7.1.

Openings

Jambs of external openings: Do not close the cavity.

Wall ties, connectors and accessories

Protection: Install to prevent water passing across the cavity.

3.5 DAMP-PROOF COURSES**Location**

General: Locate damp-proof courses, as follows:

- Timber floors: In the first course below the level of the underside of ground floor timbers in internal walls and inner leaves of cavity walls.
- Cavity walls built off slabs on ground: In the bottom course of the outer leaf, continuous horizontally across the cavity and up the inner face bedded in mortar, turned 30 mm into the inner leaf one course above. Project 10 mm beyond the external slab edge and turn down at 45°.
- Internal walls built off slabs on ground: In the first course above floor level.
- Masonry veneer construction built off slabs on ground: 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 areas that slope away from the wall.
- 50 mm above the finished paved or concreted areas that slope away from the wall and are protected from the direct effect of the weather.

Installation

General: Lay in long lengths. Sandwich damp-proof courses between mortar.

Joints: Locate away from weepholes.

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

Laps: Lap full width at angles and intersections and at least 150 mm at joints.

Lap sealing: Seal with a bituminous adhesive and sealing compound.

Steps: Step as necessary, but not exceeding one course each step.

3.6 FLASHINGS**Location**

General: Locate 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 one course above. 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 one course below the sill, extending up across the cavity and under the sill in the inner leaf or the frame for masonry veneer. Extend at least 150 mm beyond the reveals or each side of the opening.
- Over lintels to openings in cavity walls: Full width of outer leaf immediately above the lintel, continuous across cavity, turned 30 mm into the inner leaf one course above or turned up at least 150 mm against the inner frame and fastened to it. Extend at least 150 mm beyond the lintels.
- At abutments with structural frames or supports: Vertically 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.

Lap sealing: Seal with a bituminous adhesive and sealing compound.

Pointing: Point up joints around flashings, filling voids.

Steps: Step as necessary, but not exceeding one course per step.

Weepholes

Requirement: Locate weepholes to external leaves of cavity walls as follows:

- Generally:
 - . Spacing: 1200 mm maximum.
 - . In the course above damp-proof courses, flashing and cavity fill.
 - . At the bottom of unfilled cavities.
- Openings exceeding 1200 mm: Provide weepholes above the opening at maximum 1200 mm centres and at both ends of the opening in the following situations:
 - . If there is no roof overhang directly above the opening.
 - . If the roof overhang does not extend more than three times the distance between the top of the opening and the roof soffit.

Form: Open perpend or proprietary weephole former.

Weephole guards: Provide mesh insect barrier.

3.7 WALL TIES

Location

General: Space wall ties in conformance with AS 3700 (2018) clause 4.10 and at the following locations:

- Not more than 600 mm in each direction.
- Within 300 mm from the line of horizontal or vertical lateral supports, control joints or the perimeter of openings.

Installation

Embedment: At least 50 mm into mortar. Provide at least 15 mm of mortar cover to any exposed surface.

Fixing of masonry veneer ties:

- To timber frames: Screw fix to outer or side face of timber frames with fasteners to AS 3566.1 (2002).
- To concrete: Masonry anchors.
- To steel frames: Screw fix to outer or side face of steel members with fasteners to AS 3566.1 (2002).

3.8 CONTROL JOINTS

General

Location and spacing: Provide control joints to AS 3700 (2018) clause 4.8.

Control joint filling

Filler material: Provide compatible sealant and bond breaking backing materials that are non-staining to masonry. 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 filling with a gun-applied flexible sealant.

Sealant joint depth to width ratio (depth:width): 1:2.

Minimum sealant depth: 6 mm.

Fire-resisting control joints

General: If a control joint is located in an element of construction required to have a fire-resistance level (FRL), construct the control joint with fire-stopping materials that maintain the FRL of the element.

Fire-stopping: To AS 4072.1 (2005).

3.9 BLOCKWORK DUCT RISERS

General

Location: Build a one-piece corrosion-resistant metal tray to the masonry duct risers at roof level to shed water from the duct above roof flashing 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 two weepholes through the masonry duct riser walls on opposite sides immediately above the tray.

3.10 BED JOINT REINFORCEMENT

Location

Stack bonded masonry: Conform to AS 3700 (2018) clause 4.12 and the following:

- Spaced vertically at centres not exceeding six times the thickness of the stack bonded leaf.
- In the first bed joint above or below an unrestrained horizontal edge of the masonry.
- One bed joint minimum, within 300 mm above or below a horizontal line of lateral support.

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.

3.11 REINFORCED AND GROUTED BLOCKWORK

Reinforcement

Cover: Maintain cover to vertical and horizontal steel reinforcement using plastic clips or wheels, as appropriate.

Vertical reinforcement: Tie vertical steel reinforcement to the starter bars through cleanout holes in each reinforced hollow masonry unit and fix in position at the top of the wall with plastic clips.

Horizontal: Lay horizontal steel reinforcement in contact with rebated webs. Hold in position using plastic clips if vertical steel is subsequently positioned to wall construction.

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 that 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 cleanout 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 minutes and within 30 minutes, and vibrate or rod to mix with the previous pour.

3.12 LINTELS

Location

General: Install one lintel to each wall leaf, as documented.

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 vertically.

Minimum bearing each end:

- Span not more than 1000 mm: 100 mm.
- Span more than 1000 mm and not more than 3000 mm: 150 mm.
- Span more than 3000 mm: To structural drawings.

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

- Minimum propping period: 7 days.

3.13 CONNECTORS AND ACCESSORIES

Slip joints

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

Locations and details: As documented.

3.14 ARCHES

Arch voussoirs

General: Cut units using a masonry saw.

Shapes and dimensions

General: Form arches using solid or cored masonry units.

3.15 BAGGING

Preparation

General: Cut joints flush before bagging.

Dry bagging

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

Textured bagging

Application: Apply laying mortar to the surface using a sponge float. Flush up irregularities, but leave approximately 2 mm of mortar on the surface. When initial set is reached, texture using a hand bristle brush.

3.16 TESTING

Special mortar

Durability: Scratch index test to AS 3700 (2018) Appendix E.

Compressive strength: To AS 3700 (2018) Appendix C.

Flexural strength: To AS 3700 (2018) Appendix D.

Special masonry

Sampling and testing: To AS 3700 (2018) clause 12.7.

Performance: As documented.

0341 STRUCTURAL STEELWORK

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide concrete pavement, as documented:

Structural & Civil Engineering- PM Design Group.

Electrical Engineering – Spectrum Engineering Solutions

Adjoining elements: 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:

- 0171 General requirements.
- 0344 Steel - hot-dip galvanized coatings.
- 0345 Steel - protective paint coatings.
- 0346 Structural fire protection systems.

1.3 STANDARDS

General

Materials and design: To AS 4100 (2020).

Materials and design of cold-formed decking, purlins and girts: To AS/NZS 4600 (2018).

Composite steel-concrete construction including profiled steel sheeting and shear connectors: To AS/NZS 2327 (2017).

Fabrication and erection: To AS/NZS 5131 (2016).

1.4 INTERPRETATION

Abbreviations

General: For the purposes of this worksection, the following abbreviations apply:

- AESS: Architecturally Exposed Structural Steelwork.
- CC: Construction Category.
- NDE: Non-Destructive Examination.

Definitions

General: For the purposes of this worksection, the definitions given in AS/NZS 5131 (2016) apply.

1.5 TOLERANCES

General

Requirement: To AS/NZS 5131 (2016) Section 12 and Appendix F.

Tolerance class: 1.

AESS: As documented.

1.6 SUBMISSIONS

Execution details

Anchor bolts: If anchor bolts do not meet documented location tolerances, submit proposals for rectification before proceeding.

Bolting connections: For connections not documented, submit proposals.

Bolt tensioning procedure: Submit details of procedure, equipment to be used and calibration of the process.

Site base plate holing: If hand cutting of bolt holes in column base plates are required, submit details.

Purlins and girts: If purlins and girts support components other than roofing or cladding, submit details.

Site modifications: Submit details of proposed on-site modifications or rectifications to any steel member, connection component, mechanical fastener, weld or corrosion protection.

Splices: If variations to documented splice locations or additional splices are proposed, submit details.

Temporary connections or attachments: If not documented, submit details.

Undocumented weld types: Submit proposals for weld type and electrodes.

Welding plan: Submit a welding plan to AS/NZS 5131 (2016) clause 7.2.

Work method statement: Before any erection work commences, submit a work method statement to AS/NZS 5131 (2016) clause 11.2.3.

Fabrication details

Distortions: Submit proposals for the following:

- Preventing or minimising distortion of galvanized components, welded components or welded and galvanized components.
- Restoration to the designed shape.

Identification marks: If members and/or connections will be exposed to view, submit details of proposed marking.

Program: Submit a fabrication program showing the proposed sequence of operations and time required.

Products and materials

Steel members and sections: Submit test reports or test certificates conforming to AS 4100 (2020) clause 2.2.2.

Bolts, nuts and washers: Submit test reports or test certificates conforming to AS/NZS 1252.1 (2016) Section 6.

Verification testing of bolt assemblies: Submit test reports or certificates conforming to AS/NZS 1252.2 (2016) Section 2, together with the Supplier Declaration of Conformity (SDoC).

Anchor bolts: If anchors, other than those documented, are required or proposed for supporting or fixing structural steel, submit evidence of the anchor capacity to carry the load.

Substitution: If alternative sections or connections are proposed, submit details.

Records

Survey: Submit survey of erected structural steel to verify components have been installed as documented.

Drawings: Submit as-built structural drawings, upon completion.

Samples

Requirement: Submit samples to PRODUCTS, **GENERAL**, **Samples**.

Shop detail documentation

General: Submit shop detail documentation to a scale that best describes the detail, conforming to AS/NZS 5131 (2016) clause 4.4.

Drawing format: pdf, dwg and IFC

Review of shop detail documentation: Eclipse Consulting Engineers

Subcontractors

General: Submit names and contact details of proposed fabricator, detailer and installer.

Responsibilities: Submit names and contact details corresponding to the person/organisation assigned responsibility to the items listed in AS/NZS 5131 (2016) Table B3.

Tests

Requirement: Submit test results, as follows:

- Bars and sections: Non-destructive tests.
- Plates: Ultrasonic tests.
- Welds: Non-destructive examinations.

Warranties

Requirement: Submit warranties to **COMPLETION**, **Warranties**.

1.7 INSPECTION

Notice – off-site

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

- Materials including welding consumables before fabrication.
- Testing of welding procedures and welder qualification tests.
- Commencement of shop fabrication.
- Commencement of welding.
- Complete penetration butt welds before the placement of root runs.
- High-strength bolt tensioning (when completed off-site).
- Completion of fabrication before surface preparation.
- Surface preparation before protective coating.
- 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 protective coating or cladding.
- Tensioning of bolts in categories 8.8/TB, 8.8/TF, 10.9/TB and 10.9/TF.
- Reinforcement and formwork in place before any encasement.
- Completed grouting, encasement, fire protection or site applied protective coating.

2 PRODUCTS

2.1 GENERAL

Samples

Requirement: Provide samples, as follows:

- AESS, as documented.
- Special finishes for finished steel, as documented.

Sample size: Minimum 0.1 m².

Materials

Requirement: To AS/NZS 5131 (2016) Section 5.

Storage and handling

Requirement: Pack, support, transport and handle members and components without overstressing, deforming or damaging them or their protective coating.

Damaged items: Rectify or replace. Do not assemble into the structure without approval.

Protection: Wrap or otherwise protect members or components to prevent damage to surface finishes during handling and erection.

Storage: Store off the ground.

Lifting points: Do not allow steel slings to come into direct contact with coated steelwork.

Purchasing and traceability

Purchasing documentation and procedure: To AS/NZS 5131 (2016) clause 4.6.

Level of traceability: To AS/NZS 5131 (2016) clause 5.2.3 and the types defined in AS/NZS 5131 (2016) clause 4.7.

2.2 STRUCTURAL STEEL

Steel members and sections steel grade table

Type of steel	Minimum grade
Hot-rolled sections to AS/NZS 3679.1 (2016) and SA TS 102 (2016)	300
Welded sections to AS/NZS 3679.2 (2016)	300

Type of steel	Minimum grade
Hot-rolled plates, floor plates and slabs to AS/NZS 3678 (2016) and SA TS 102 (2016)	250
Hot-rolled flat products to AS/NZS 1594 (2002)	HA250
Hollow sections to AS/NZS 1163 (2016) and SA TS 102 (2016): Circular sections less than 166 mm nominal outside diameter	C250
Hollow sections to AS/NZS 1163 (2016) and SA TS 102 (2016): Sections other than circular sections less than 166 mm nominal outside diameter	C350
Cold-formed purlins and girts to AS 1397 (2021)	G450 or Z350

Certification

Steel: Minimum requirements for test and inspection certificates, to the following:

- Hot-rolled bars and sections: To AS/NZS 3679.1 (2016) clause 11.2.4.
- Welded I sections: To AS/NZS 3679.2 (2016) clause 11.2.4.
- Hot-rolled plates: To AS/NZS 3678 (2016) clause 11.2.4.
- Cold-formed hollow sections: To AS/NZS 1163 (2016) clause 11.2.4.

Testing

Requirement: As documented.

2.3 MECHANICAL FASTENERS

Standards

Bolts: To AS 1110.1 (2015), AS 1111.1 (2015) and AS/NZS 1252.1 (2016).

Nuts: To AS 1112.1 (2015), AS 1112.2 (2015), AS 1112.3 (2015), AS 1112.4 (2015) and AS/NZS 1252.1 (2016).

Bolting category

Requirement: To the **Bolting category schedule**.

Certification

High-strength bolt assemblies: Minimum requirements for test reports, to AS/NZS 1252.1 (2016) clause 6.4.2.

Finish

Bolts, nuts and washers: Hot-dip galvanized to AS/NZS 1214 (2016), corrosion-free, and in serviceable condition.

Anchor bolts

Hexagonal bolts: To AS 1111.1 (2015).

Hexagonal nuts: To AS 1112.3 (2015).

Plain washers: To AS 1237.1 (2002).

Requirement: Provide each anchor bolt with 2 nuts and 2 oversize washers with sufficient thread for the levelling nut and washer to sit below the base plate.

Mechanical and chemical anchors: To AS 5216 (2021), installed to manufacturer's recommendations.

2.4 OTHER MATERIALS

Welding consumables

Requirement: To the relevant part of the AS/NZS 1554 series.

Studs and shear connectors

Requirement: To AS/NZS 5131 (2016) clause 5.6.

Grout

Requirement: To AS/NZS 5131 (2016) clause 5.8.

3 EXECUTION

3.1 PREPARATION, ASSEMBLY AND FABRICATION

Identification

Traceability: To AS/NZS 5131 (2016) clause 5.2.3.

Marking: Provide marks or other means of identifying each member compatible with the finish, for setting out, locating, erecting and connecting the steelwork to 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 (2024) clause 5.12.6.

Natural beam camber

General: If steel beams have a natural camber, within the straightness tolerance, fabricate the steelwork element with the camber up.

Cutting

Shearing: Do not shear edges of a connection or parts of a member that have been designated as areas of plastic deformation.

Punching: Do not punch fastener holes in locations designated as areas of plastic deformation.

Shaping

Requirement: Where forming, shaping or correcting distorted members, avoid damage and conform to AS/NZS 5131 (2016) clause 6.6.

Holing

Slotted holes: Do not use slotted holes for connections, other than those documented.

Tolerances

Measurement: Check tolerances by measurement after fabrication and application of corrosion protection.

3.2 WELDING

General

Requirements: To AS/NZS 5131 (2016) Section 7.

Standard: To AS/NZS 1554.1 (2014).

Weld category

Weld categories not documented: Category GP.

Weld type

Weld type not documented: Prepare proposals for weld type and electrodes.

Non-destructive weld examination (NDE)

Requirement: To AS/NZS 5131 (2016) clause 13.6.2.

Extent and type of NDE: To AS/NZS 5131 (2016) Table 13.6.2.2(A).

Non-visual NDE: By a third party testing authority.

Repairs: Repair welds revealed as faulty by NDE and repeat the examination.

Site welds

Completion: Weld only when correct alignment and preset or camber have been achieved.

3.3 MECHANICAL FASTENING

Connection contact surfaces

General: To AS/NZS 5131 (2016) clause 8.4.1.

Bolting categories 8.8/TF and 10.9/TF: Clean, as rolled and free from applied finishes.

Washers

Requirement: Place one washer under the part rotated during tightening process (nut or bolt head).

Method of tensioning TB and TF bolting categories

8.8/TB and 8.8/TF: Use part-turn method or a direct tension indicator device.

10.9/TB and 10.9/TF: Use a direct tension indicator device.

Permanent bolting

Completion: Bolt only when correct alignment and preset or camber has been achieved.

3.4 SURFACE PREPARATION AND TREATMENT**General**

Requirement: Conform to *0344 Steel - hot-dip galvanized coatings* and/or *0345 Steel - protective paint coatings*, as appropriate.

3.5 SPECIAL FINISHES**General**

Requirement: Apply special finishes, as documented.

3.6 METAL SPRAYING**General**

Standard: To ISO 2063-2 (2017).

Requirement: Apply sprayed metal, as documented.

Process: Electric arc.

Application: Apply the coating as soon as possible after blasting.

3.7 FIRE PROTECTION COATINGS**General**

Requirement: Apply fire protection to structural steelwork to *0346 Structural fire protection systems*.

3.8 ARCHITECTURALLY EXPOSED STRUCTURAL STEELWORK**General**

Requirement: Provide AESS to AS/NZS 5131 (2016) Section 10 and as documented.

Fabrication

Requirements: To AS/NZS 5131 (2016) clause 10.4.

Corners and edges: Grind smooth sharp, marred, or roughened corners and edges.

Rough surfaces: Deburr and grind smooth.

Erection

Additional requirements: To AS/NZS 5131 (2016) clause 10.5.

3.9 ERECTION**General**

Execution: Make sure every part of the structure has sufficient design capacity and is stable under construction loads produced by the construction procedure.

Temporary work

General: Provide all necessary temporary bracing or propping.

Temporary connections: Detail required cleats, if not shown on shop detail documentation.

Temporary members: If temporary members are required, fix so as not to weaken or deface permanent steelwork.

Anchor bolts

General: For each group of anchor bolts, provide a template with set-out lines clearly marked for positioning the bolts when casting in.

Beam camber

Requirement: If beam elements have a camber (natural or induced), erect them with the camber up.

Site work

General: Other than work shown on the shop detail documentation as site work, do not fabricate, modify or weld structural steel on-site.

Purlins

Trimming members: Provide to support edges of roof sheeting along hips, valleys and roof penetrations.

Movements

General: Allow for thermal movements during erection.

Grouting at supports

Preparation: Before grouting steelwork 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 constructing supported floors, walls and roofing.

Temperature: Do not grout if the temperature of the base plate or the footing surface exceeds 35°C.

Drifting

Limitation: Use drifting only to bring members into position, without enlarging holes or distorting components.

3.10 REPAIRS

General

Requirement: Repair finishes to restore the full integrity of any coating.

3.11 COMPLETION

Tolerances

Conformance: After completing erection, verify conformance with AS/NZS 5131 (2016) Section 12 and Appendix F.

Temporary connections

General: Remove temporary cleats on completion and restore the surface.

0341P LYSAGHT PURLINS AND GIRTS IN STRUCTURAL STEELWORK

1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide LYSAGHT purlins and girts and structural steelwork, as documented.

To be read in conjunction with Eclipse Consulting Engineers Structural Engineering documents.

Performance

Construction category to AS 4100 (2020) and AS/NZS 5131 (2016):

Adjoining elements: Provide for the fixing of adjoining building elements that are to be connected to or supported on the structural steel.

1.2 COMPANY CONTACTS**Lysaght technical contacts**

Enquiries: www.lysaght.com/contact-us.

1.3 CROSS REFERENCES**General**

Requirement: Conform to the following:

- 0171 General requirements.
- 0344 Steel - hot-dip galvanized coatings.
- 0345 Steel - protective paint coatings.
- 0346 Structural fire protection systems.

1.4 STANDARDS**General**

Materials and design: To AS 4100 (2020).

Materials and design of cold-formed decking, purlins and girts: To AS/NZS 4600 (2018).

Composite steel-concrete construction including profiled steel sheeting and shear connectors: To AS/NZS 2327 (2017).

Fabrication and erection: To AS/NZS 5131 (2016).

1.5 MANUFACTURER'S DOCUMENTS**Technical manuals**

Lysaght Zeds, Cees, SupaZeds® and SupaCees®: professionals.lysaght.com

Permalite Aluminium Zeds and Cees: permalite.com.au

1.6 INTERPRETATION**Abbreviations**

General: For the purposes of this worksection, the following abbreviations apply:

- AESS: Architecturally Exposed Structural Steelwork.
- CC: Construction Category.
- NDE: Non-Destructive Examination.

Definitions

General: For the purposes of this worksection, the definitions given in AS/NZS 5131 (2016) and the following apply:

- Cee: A single web C shaped roll-formed purlin/girt with equal sized lipped flanges.
- Permalite: Roll-formed marine grade aluminium alloy 5052 H36.
- SupaCee®: A C shaped purlin/girt with a longitudinally stiffened web and equal sized stiffened lipped flanges.

- SupaZed®: A Z shaped purlin/girt with a longitudinally stiffened web and unequal opposite facing stiffened lipped flanges, which allow for lapping.
- Zed: A single web Z shaped purlin/girt with unequal opposite facing lipped flanges, which allow for lapping.

1.7 TOLERANCES

General

Requirement: To AS/NZS 5131 (2016) Section 12 and Appendix F.

Tolerance class: 1.

AESS: As documented.

1.8 SUBMISSIONS

Execution details

Anchor bolts: If anchor bolts do not meet documented location tolerances, submit proposals for rectification before proceeding.

Bolting connections: For connections not documented, submit proposals.

Bolt tensioning procedure: Submit details of procedure, equipment to be used and calibration of the process.

Site base plate holing: If hand cutting of bolt holes in column base plates are required, submit details.

Purlins and girts: If purlins and girts support components other than roofing or cladding, submit details.

Site modifications: Submit details of proposed on-site modifications or rectifications to any steel member, connection component, mechanical fastener, weld or corrosion protection.

Splices: If variations to documented splice locations or additional splices are proposed, submit details.

Temporary connections or attachments: If not documented, submit details.

Undocumented weld types: Submit proposals for weld type and electrodes.

Welding plan: Submit a welding plan to AS/NZS 5131 (2016) clause 7.2.

Work method statement: Before any erection work commences, submit a work method statement to AS/NZS 5131 (2016) clause 11.2.3.

Fabrication details

Distortions: Submit proposals for the following:

- Preventing or minimising distortion of galvanized components, welded components or welded and galvanized components.
- Restoration to the designed shape.

Identification marks: If members and/or connections will be exposed to view, submit details of proposed marking.

Program: Submit a fabrication program showing the proposed sequence of operations and time required.

Products and materials

Steel members and sections: Submit test reports or test certificates conforming to AS 4100 (2020) clause 2.2.2.

Bolts, nuts and washers: Submit test reports or test certificates conforming to AS/NZS 1252.1 (2016) Section 6.

Verification testing of bolt assemblies: Submit test reports or certificates conforming to AS/NZS 1252.2 (2016) Section 2, together with the Supplier Declaration of Conformity (SDoC).

Anchor bolts: If anchors, other than those documented, are required or proposed for supporting or fixing structural steel, submit evidence of the anchor capacity to carry the load.

Substitution: If alternative sections or connections are proposed, submit details.

Records

Survey: Submit survey of erected structural steel to verify components have been installed as documented.

Drawings: Submit as-built structural drawings, upon completion.

Samples

Requirement: Submit samples to PRODUCTS, **GENERAL**, **Samples**.

Shop detail documentation

General: Submit shop detail documentation to a scale that best describes the detail, conforming to AS/NZS 5131 (2016) clause 4.4.

Drawing format: pdf, dwg and IFC

Review of shop detail documentation: Eclipse Consulting Engineers

Subcontractors

General: Submit names and contact details of proposed fabricator, detailer and installer.

Responsibilities: Submit names and contact details corresponding to the person/organisation assigned responsibility to the items listed in AS/NZS 5131 (2016) Table B3.

Tests

Requirement: Submit test results, as follows:

- Bars and sections: Non-destructive tests.
- Plates: Ultrasonic tests.
- Welds: Non-destructive examinations.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties.**

1.9 INSPECTION**Notice – off-site**

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

- Materials including welding consumables before fabrication.
- Testing of welding procedures and welder qualification tests.
- Commencement of shop fabrication.
- Commencement of welding.
- Complete penetration butt welds before the placement of root runs.
- High-strength bolt tensioning (when completed off-site).
- Completion of fabrication before surface preparation.
- Surface preparation before protective coating.
- 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 protective coating or cladding.
- Tensioning of bolts in categories 8.8/TB, 8.8/TF, 10.9/TB and 10.9/TF.
- Reinforcement and formwork in place before any encasement.
- Completed grouting, encasement, fire protection or site applied protective coating.

2 PRODUCTS**2.1 GENERAL****Product substitution**

Other products: Conform to **SUBSTITUTIONS** in 0171 *General requirements.*

Samples

Requirement: Provide samples, as follows:

- AESS, as documented.
- Special finishes for finished steel, as documented.

Sample size: Minimum 0.1 m².

Materials

Requirement: To AS/NZS 5131 (2016) Section 5.

Storage and handling

Purlins and girts: If not required for immediate use, stack and cover bundled sections, raised off the ground and on a slight slope so that water can drain away. Do not leave bundled sections of Permalite purlins and girts or accessories exposed for any period as water staining may occur between any aluminium surfaces in contact with each other.

Requirement: Pack, support, transport and handle members and components without overstressing, deforming or damaging them or their protective coating.

Damaged items: Rectify or replace. Do not assemble into the structure without approval.

Protection: Wrap or otherwise protect members or components to prevent damage to surface finishes during handling and erection.

Storage: Store off the ground.

Lifting points: Do not allow steel slings to come into direct contact with coated steelwork.

Purchasing and traceability

Purchasing documentation and procedure: To AS/NZS 5131 (2016) clause 4.6.

Level of traceability: To AS/NZS 5131 (2016) clause 5.2.3 and the types defined in AS/NZS 5131 (2016) clause 4.7.

2.2 STRUCTURAL STEEL**Steel members and sections steel grade table**

Type of steel	Minimum grade
Hot-rolled sections to AS/NZS 3679.1 (2016) and SA TS 102 (2016)	300
Welded sections to AS/NZS 3679.2 (2016)	300
Hot-rolled plates, floor plates and slabs to AS/NZS 3678 (2016) and SA TS 102 (2016)	250
Hot-rolled flat products to AS/NZS 1594 (2002)	HA250
Hollow sections to AS/NZS 1163 (2016) and SA TS 102 (2016): Circular sections less than 166 mm nominal outside diameter	C250
Hollow sections to AS/NZS 1163 (2016) and SA TS 102 (2016): Sections other than circular sections less than 166 mm nominal outside diameter	C350
Lysaght purlins and girts to AS 1397 (2021)	G450, Z350
Permalite purlins and girts to AS/NZS 1664.1 (1997) (MPa)	179

Certification

Steel: Minimum requirements for test and inspection certificates, to the following:

- Hot-rolled bars and sections: To AS/NZS 3679.1 (2016) clause 11.2.4.
- Welded I sections: To AS/NZS 3679.2 (2016) clause 11.2.4.
- Hot-rolled plates: To AS/NZS 3678 (2016) clause 11.2.4.
- Cold-formed hollow sections: To AS/NZS 1163 (2016) clause 11.2.4.

Testing

Requirement: As documented.

2.3 PURLINS AND GIRTS**General**

Material selection and design: To Lysaght's recommendations with material selection aligned to environmental exposure conditions.

Lysaght steel

Material: GALVSPAN® high tensile steel.

Permalite aluminium

Material: Lightweight corrosion-resistant marine grade aluminium alloy 5052 H36.

2.4 PURLIN BRIDGING AND ACCESSORIES**General**

Material: Use materials and corrosion protection compatible with the documented purlins and girts.

Bridging: Required as documented, to control lateral deflection and twist of the purlins and girts.

HOOK-LOK® II bridging

Suitability: For use with Lysaght Zeds®, Cees, SupaZeds® and SupaCees® ranging from 100 mm to 250 mm in depth.

Series 300 and 350 bridging

Suitability: For use with Lysaght Zeds, Cees, SupaZeds® and SupaCees® 300 mm and 350 mm in depth.

EZY-LOK™ bridging

Suitability: For use with Lysaght SZ175 and SZ225 and Permalite aluminium Zeds and Cees ranging from 100 mm to 250 mm in depth. For depths over 250 mm a C15025 aluminium channel with bolted ends is used.

2.5 MECHANICAL FASTENERS**Standards**

Bolts: To AS 1110.1 (2015), AS 1111.1 (2015) and AS/NZS 1252.1 (2016).

Nuts: To AS 1112.1 (2015), AS 1112.2 (2015), AS 1112.3 (2015), AS 1112.4 (2015) and AS/NZS 1252.1 (2016).

Bolting category

Requirement: To the **Error! Reference source not found.**

Certification

High-strength bolt assemblies: Minimum requirements for test reports, to AS/NZS 1252.1 (2016) clause 6.4.2.

Finish

Bolts, nuts and washers: Hot-dip galvanized to AS/NZS 1214 (2016), corrosion-free, and in serviceable condition.

Lysaght purlin bolts

Description: Coated steel bolts with integral washers on both the head and nut for use with Lysaght purlins and girts. M12 x 30 mm available in grade 4.6 and 8.8. M16 x 45 mm available in grade 4.6 and 8.8.

Permalite purlin bolts

Description: Grade A4-70 316 stainless steel bolts for use with Permalite aluminium purlins and girts. M12 x 40 mm and M16 x 40 mm available, both coated with a 15 to 25 µm fluoro-polymer coating.

Anchor bolts

Hexagonal bolts: To AS 1111.1 (2015).

Hexagonal nuts: To AS 1112.3 (2015).

Plain washers: To AS 1237.1 (2002).

Requirement: Provide each anchor bolt with 2 nuts and 2 oversize washers with sufficient thread for the levelling nut and washer to sit below the base plate.

Mechanical and chemical anchors: To AS 5216 (2021), installed to manufacturer's recommendations.

2.6 OTHER MATERIALS**Welding consumables**

Requirement: To the relevant part of the AS/NZS 1554 series.

Studs and shear connectors

Requirement: To AS/NZS 5131 (2016) clause 5.6.

Grout

Requirement: To AS/NZS 5131 (2016) clause 5.8.

3 EXECUTION

3.1 PREPARATION, ASSEMBLY AND FABRICATION

Identification

Traceability: To AS/NZS 5131 (2016) clause 5.2.3.

Marking: Provide marks or other means of identifying each member compatible with the finish, for setting out, locating, erecting and connecting the steelwork to the marking plans.

Hard stamping to AS/NZS 5131 (2016):

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 (2001) clause 5.12.6.

Natural beam camber

General: If steel beams have a natural camber, within the straightness tolerance, fabricate the steelwork element with the camber up.

Cutting

Shearing: Do not shear edges of a connection or parts of a member that have been designated as areas of plastic deformation.

Punching: Do not punch fastener holes in locations designated as areas of plastic deformation.

Shaping

Requirement: Where forming, shaping or correcting distorted members, avoid damage and conform to AS/NZS 5131 (2016) clause 6.6.

Holing

Slotted holes: Do not use slotted holes for connections, other than those documented.

Tolerances

Measurement: Check tolerances by measurement after fabrication and application of corrosion protection.

3.2 WELDING

General

Requirements: To AS/NZS 5131 (2016) Section 7.

Standard: To AS/NZS 1554.1 (2014).

Weld category

Weld categories not documented: Category GP.

Weld type

Weld type not documented: Prepare proposals for weld type and electrodes.

Butt weld run-on/run-off tabs: [complete/delete]

Stress relief treatment

Type: [complete/delete]

Non-destructive weld examination (NDE)

Requirement: To AS/NZS 5131 (2016) clause 13.6.2.

Extent and type of NDE: To AS/NZS 5131 (2016) Table 13.6.2.2(A).

Non-visual NDE: By a third party testing authority.

Repairs: Repair welds revealed as faulty by NDE and repeat the examination.

Site welds

Completion: Weld only when correct alignment and preset or camber have been achieved.

3.3 MECHANICAL FASTENING

Connection contact surfaces

General: To AS/NZS 5131 (2016) clause 8.4.1.

Bolting categories 8.8/TF and 10.9/TF: Clean, as rolled and free from applied finishes.

Washers

Requirement: Place one washer under the part rotated during tightening process (nut or bolt head).

Method of tensioning TB and TF bolting categories

8.8/TB and 8.8/TF: Use part-turn method or a direct tension indicator device.

10.9/TB and 10.9/TF: Use a direct tension indicator device.

Permanent bolting

Completion: Bolt only when correct alignment and preset or camber has been achieved.

Purlin bolts

Requirement: Tighten all purlin bolts snug-tight to AS/NZS 5131 (2016) clause 8.3.

3.4 SURFACE PREPARATION AND TREATMENT

General

Requirement: Conform to *0344 Steel - hot-dip galvanized coatings* and/or *0345 Steel - protective paint coatings*, as appropriate.

3.5 SPECIAL FINISHES

General

Requirement: Apply special finishes, as documented.

3.6 METAL SPRAYING

General

Standard: To ISO 2063-2 (2017).

Requirement: Apply sprayed metal, as documented.

Process: Electric arc.

Application: Apply the coating as soon as possible after blasting.

3.7 FIRE PROTECTION COATINGS

General

Requirement: Apply fire protection to structural steelwork to *0346 Structural fire protection systems*.

3.8 ARCHITECTURALLY EXPOSED STRUCTURAL STEELWORK

General

Requirement: Provide AECS to AS/NZS 5131 (2016) Section 10 and as documented.

AECS category

AECS category to AS/NZS 5131 (2016) clause 10.2:

Fabrication

Additional requirements: To AS/NZS 5131 (2016) clause 10.4.

Corners and edges: Grind smooth sharp, marred, or roughened corners and edges.

Rough surfaces: Deburr and grind smooth.

Erection

Additional requirements: To AS/NZS 5131 (2016) clause 10.5.

3.9 ERECTION

General

Execution: Make sure every part of the structure has sufficient design capacity and is stable under construction loads produced by the construction procedure.

Temporary work

General: Provide all necessary temporary bracing or propping.

Temporary connections: Detail required cleats, if not shown on shop detail documentation.

Temporary members: If temporary members are required, fix so as not to weaken or deface permanent steelwork.

Anchor bolts

General: For each group of anchor bolts, provide a template with set-out lines clearly marked for positioning the bolts when casting in.

Beam camber

Requirement: If beam elements have a camber (natural or induced), erect them with the camber up.

Site work

General: Other than work shown on the shop detail documentation as site work, do not fabricate, modify or weld structural steel on-site.

Purlins

Trimming members: Provide to support edges of roof sheeting along hips, valleys and roof penetrations.

Movements

General: Allow for thermal movements during erection.

Grouting at supports

Preparation: Before grouting steelwork 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 constructing supported floors, walls and roofing.

Temperature: Do not grout if the temperature of the base plate or the footing surface exceeds 35°C.

Drifting

Limitation: Use drifting only to bring members into position, without enlarging holes or distorting components.

3.10 REPAIRS**General**

Requirement: Repair finishes to restore the full integrity of any coating.

3.11 COMPLETION**Tolerances**

Conformance: After completing erection, verify conformance with AS/NZS 5131 (2016) Section 12 and Appendix F.

Temporary connections

General: Remove temporary cleats on completion and restore the surface.

Warranties

Purlins and girts: Provide the Lysaght published product warranties.

0342 LIGHT STEEL FRAMING

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide prefabricated and light steel wall, roof and truss framing, as documented and designated:

Structural & Civil Engineering- PM Design Group.

Performance

Requirements:

Construction category to AS 4100 (2020) and AS/NZS 5131 (2016):

- Suitable for having flooring, linings, cladding and roofing fixed to it.
- Conforming to the documented performance criteria.
- Conforming to the requirements of NASH-1 (2005) or NASH-2 (2014).

1.2 DESIGN

Requirements

General: To DESIGN in 0171 General requirements.

1.3 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

1.4 STANDARDS

General

Design, materials and protection: To AS/NZS 4600 (2018).

Residential and low-rise steel framing: To NASH-1 (2005) (National Association of Steel Housing) and NASH-2 (2014).

1.5 INTERPRETATION

Definitions

General: For the purposes of this worksection, the definitions given in the NASH-1 (2005) and NASH-2 (2014) apply.

1.6 TOLERANCES

General

Manufacturing, assembly and installation tolerances: To NASH-1 (2005) Appendix D and NASH-2 (2014) Appendix A.

1.7 SUBMISSIONS

Certification

Erected frame: Submit certification that the erected frame conforms to the documented project requirements.

Design documentation

General: If the structural documentation defines performance criteria, submit as follows:

- Design to AS/NZS 4600 (2018) or NASH-1 (2005): Independent design, documentation and certification from a professional engineer.
- To NASH-2 (2014): Certification of conformance to the requirements of NASH-2 (2014) from a professional engineer.

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 (2018) or NASH-2 (2014) requirements for span, spacings and loadings.

Shop drawings

General: Submit shop drawings, to a scale that best describes the detail, requirements for the documented configurations and loadings.

Prefabricated roof trusses: Include the following:

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

Prefabricated wall frames: Include the following:

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

Prefabricated floor frames/cassettes: Include the following:

- Plan: Level of installation, arrangement of members, and size and section type of each member, including prefabricated floor joists.
- Method of assembly, connection, holding down and bracing.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties.**

1.8 INSPECTION**Notice**

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

- Damp-proof course installed before installation of steel framing.
- Steel framing erected on site before lining or cladding.

2 PRODUCTS**2.1 GENERAL****Storage and handling**

Requirement: Transport all components to site and store, if required, so that components and their coating are not damaged or distorted.

Frames and trusses: If required, store on a flat even surface and do not load with other items.

Exposure: Minimise exposure of components to the weather, both during storage, handling and after erection.

2.2 COMPONENTS**Damp-proof course**

Membrane: To the membrane requirements of AS 2870 (2011) or AS/NZS 2904 (1995).

Cold-formed steel framing

General: Cold-formed sections from steel, metallic-coated to AS 1397 (2021).

Corrosion protection: To NASH-2 (2014) Section 8.

Framing members

Cold-formed steel framing for proprietary systems: To NASH-1 (2005) or NASH-2 (2014).

3 EXECUTION**3.1 GENERAL****Frame fabrication**

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

Service holes: If not pre-punched, form holes by drilling or punching, without compromising the structural integrity of the frame, located centrally in the web of the section, conforming to the requirements of NASH-2 (2014).

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

Fastening

Prefabricated framing: Fasten framing elements using fasteners, as documented, to the fabricator's requirements.

Framing built in situ: Use fasteners, as documented, from the following types:

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

Compatibility: Compatible with steel frame to prevent galvanic corrosion of dissimilar metals.

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.

Unseasoned or CCA treated timber

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

Earthing

Requirement: To AS/NZS 3000 (2018). Provide temporary earthing during erection until the permanent earthing is installed.

Protection

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

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

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

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

3.2 FLOOR FRAMING

General

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

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

3.3 WALL FRAMING

Wall studs

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

Maximum stud spacing: 600 mm.

Heads to openings

Requirement: Provide lintels appropriate to load and span.

Additional support

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

Vermin barriers

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

Damp-proof course

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

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

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

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

Flashings

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

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

3.4 ROOF AND CEILING FRAMING**Beam framing**

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

Additional support

Requirement: Provide additional frame members at the following locations:

- Hanging light fittings.
- Ceiling fans.
- Access panels.
- Any other hanging services or fixtures and fittings.

Water tank or heater in roof space: Provide a support platform to AS/NZS 3500.4 (2021) clause 5.5.1.

Battens

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

Anti-ponding boards

Standard: To AS 4200.2 (2017).

3.5 TRUSSES**Fabrication**

Assembly: Factory assemble trusses.

Supports for in roof services

General: If walkways, mechanical plant or other services are to be supported within the roof space, provide support and make sure trusses have been designed to carry the loads.

Water tank and heater: If a water tank or heater is located in the roof space, provide a support platform to AS/NZS 3500.4 (2021) clause 5.5.1 and make sure trusses have been designed to carry the loads.

Marking

General: Permanently mark each truss to show:

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

Installation

Support: Support and fix trusses to the truss fabricator's recommendations.

Vertical movement: Over internal walls not providing support to trusses, provide at least 10 mm vertical clearance and use wall bracing methods that allow for vertical movements, to the truss fabricator's recommendations.

3.6 ROOF TRIM

Fascia, valley and barge boards

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

3.7 COMPLETION

Cleaning

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

0344 STEEL - HOT-DIP GALVANIZED COATINGS

1 GENERAL

1.1 RESPONSIBILITIES**General**

Requirement: Provide hot-dip galvanized coatings, as documented.

Performance

Requirement: Control atmospheric corrosion to structural steelwork and steel products until the first scheduled maintenance.

1.2 CROSS REFERENCES**General**

Requirement: Conform to the following:

- 0171 General requirements.

1.3 STANDARDS**General**

Coating: To AS/NZS 4680 (2006).

Coating on fasteners: To AS/NZS 1214 (2016).

Durability: To AS/NZS 2312.2 (2014).

Metal finishing

Coating mass/thickness minimum: To AS/NZS 4680 (2006).

Threaded fasteners coating mass/thickness minimum: To AS/NZS 1214 (2016).

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 may lead to dimensional change, distortion or difficulties during galvanizing, identify these and submit details for improvement.

1.5 INSPECTION**Notice**

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

- Coating appearance and thickness, at the galvanizing plant.

2 EXECUTION

2.1 GENERAL**Care**

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 (2003).

Acid pickling: To AS 1627.5 (2003).

- Inhibitor: Required.

Coating process

General: To AS/NZS 4680 (2006) Section 6.

Threaded fasteners: To AS/NZS 1214 (2016) Section 5.

Post treatment

General: Passivate.

Drilling after completion of hot-dip galvanizing

Repair: Prime drill hole surfaces to AS/NZS 4680 (2006) Section 8 before the surfaces begin to corrode.

Surface finish

Standard: To AS/NZS 4680 (2006) Section 7.

Coating quality: Continuous and as smooth and evenly distributed as possible. Free of blisters, roughness, sharp points, flux residues and any defects that may affect the end use of the article.

Silicon killed steels: Dull grey is acceptable provided a sound and continuous coating is achieved.

Surplus zinc on fastener threads: Remove.

Friction-type bolted connections: Treat coated contact surfaces to achieve the required design slip factor, without removing excessive coating thickness as follows:

- Contact surface preparation: To
GAA Best practice guide for hot dip galvanized bolts and bolted joints (2020).
- Slip factor test: To AS 4100 (2020) Appendix J.

Coating repair

Rejection: If uncoated surfaces or areas damaged by handling at the galvanizing plant exceed the limits specified for repair in AS/NZS 4680 (2006) Section 8, reject the galvanizing.

Extent and methods: To AS/NZS 4680 (2006) Section 8.

Preparation of galvanized surfaces 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 to 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 to 400 mm.
- Nozzle type: 10 to 13 mm orifice diameter venturi type.

2.2 TESTING**Galvanizing tests**

Coating thickness tests: To AS/NZS 4680 (2006) clause 9.2 and Appendix G.

2.3 SITE WORK**Site welding**

Grinding of edges: Permitted.

Weld areas: Reinstate coating to AS/NZS 4680 (2006) Section 8.

Site coating reinstatement

Rejection: If any item has damaged areas exceeding the limits specified for repair in AS/NZS 4680 (2006) clause 8.1, reject the item.

Extent: Areas damaged by transport, site welding, site flame cutting, site handling, or erection.

Method: To AS/NZS 4680 (2006) Section 8.

0411P FOSROC WATERPROOFING - EXTERNAL AND TANKING
--

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide FOSROC waterproofing membrane systems for:

- Perimeter Retaining walls,
- OSD Tank
- Landscape and planter boxes, and tanking, as documented.
- All Male and Female wet areas including accessible Male and Female Amenities,
- Café and Dry Store

Performance

Requirements:

- 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.
- Able to resist water under hydrostatic pressure.

1.2 COMPANY CONTACTS

FOSROC technical contact

Website: www.fosroc.com.au/specification-services

1.3 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

1.4 STANDARDS

External waterproofing

Membrane materials: To AS 4654.1 (2012).

Membrane design and installation: To AS 4654.2 (2012).

Stormwater drainage

Standard: To AS/NZS 3500.3 (2021).

1.5 MANUFACTURER'S DOCUMENTS

Technical manuals

Website: www.fosroc.com.au

1.6 INTERPRETATION

Abbreviations

General: For the purposes of this worksection, the following abbreviations apply:

- APP: Atactic polypropylene.
- SBS: Styrene butadiene styrene.

Definitions

General: For the purposes of this worksection, the definitions given in AS 4654.1 (2012) and AS 4654.2 (2012) and the following apply:

- Bitumen: A viscous material from the distillation of crude oil comprising complex hydrocarbons, which is soluble in carbon disulfide, softens when it is heated, is waterproof and has good powers of adhesion. It is produced as a refined by-product of oil.

- . 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).
- . 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).
- Bond breaker: 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 before laying the membrane.
- Liquid applied: A water-based formulation that cures to form an elastomeric membrane.
- Polyurea: Two component, rapid curing liquid elastomeric membrane applied with specialised equipment.
- Polyurethane: Water or solvent-based formulations that moisture cure to form an elastic rubber membrane.
- PVC membrane: Flexible plastic sheet membrane (vinyl).
- 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.
- Waterproofing system: Combinations of membranes, flashings, drainage and accessories that form waterproof barriers and that may be:
 - . Loose-laid.
 - . Bonded to substrates.

1.7 SUBMISSIONS

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION, Operation and maintenance manuals**.

Products and materials

Manufacturer's data: Submit product data sheets.

Type tests: Submit test results for the following:

- Membranes: To PRODUCTS, **GENERAL, Tests**.

Records

General: Submit photographic records of application to EXECUTION, **GENERAL, Reporting**.

Flood tests: Submit photographic records to **TESTING, Flood tests**.

Samples

Requirement: Submit samples to PRODUCTS, **GENERAL, Samples**.

Shop drawings

Requirement: Submit shop drawings showing the following:

- Junctions with vertical surfaces and upstands.
- Junctions at perimeters.
- Drainage details, including outlets and overflows.
- Control joints.
- Flashings.
- Penetrations.
- Corners.
- Terminations and connections.
- Membrane layers.
- Insulation and protection.

Subcontractors

General: Submit names and contact details of proposed suppliers and installers as recommended by FOSROC.

Substrate acceptance

Requirement: Submit evidence of installer's acceptance of the flooring substrate before starting installation.

Tests

Site tests: Submit results, as follows:

- Substrate moisture content to **TESTING, Substrate moisture tests**.
- Flood test, including results of retesting after rectification, to **TESTING, Flood tests**.
- Slip resistance of completed installation to **TESTING, Slip resistance tests**.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties**.

1.8 INSPECTION

Notice

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

- Substrates prepared and ready for installation of the waterproofing and tanking systems.
- Secondary layers prepared and ready for subsequent layers.
- Membranes after installation and before concealment.
- Underflashings after installation and before installation of overflashings.
- After flood testing, if applicable.

2 PRODUCTS

2.1 GENERAL

Product substitution

Other products: Conform to **SUBSTITUTIONS** in *0171 General requirements*.

Product identification

General: 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.

Samples

Requirement: Provide 300 x 300 mm samples of each type of membrane including the finish of the visible surface.

Tests

Standard: To AS 4654.1 (2012) Section 2 and Tables 2.1 to 2.3.

2.2 LIQUID MEMBRANE SYSTEMS

Fosroc Nitoproof 210

Description: High performance, water-based, rubberised bitumen, liquid waterproofing membrane with plant root inhibitors.

Fosroc Nitoproof 310

Description: Water-based latex, fibre enhanced, single component, waterproofing membrane.

Fosroc Nitoproof 410

Description: Fast drying, flexible, polymer/cementitious, two part liquid waterproofing membrane.

Fosroc Nitoproof 610

Description: Flexible, polyurethane liquid waterproofing membrane.

Fosroc Nitoproof 750

Description: Highly flexible, polyurethane liquid waterproofing membrane.

Fosroc Nitoproof 810

Description: Highly flexible, water-based polyurethane liquid waterproofing membrane.

Fosroc Nitoband

Description: Flexible bond breaking tape of acrylonitrile butadiene rubber, and detailing accessories for sealing critical movement zones, including the following:

- Nitoband Elastic Joint Band Tape for floor to wall and wall to wall applications.
- Nitoband Elastic Joint Band Corners: 270° external, 90° internal and adjustable internal corners.
- Nitoband Elastic Joint Band Pipe Penetration Detailing Squares: For pipes up to 50 mm, 110 and 150 mm.
- Nitoband Butyl Square Floor Waste Detailing Collars of various sizes.

Typical application: Internal, external, underground and fully immersed applications used with liquid applied membranes.

Fosroc Nitoproof Top Coat UV

Description: Water-based, acrylic hybrid membrane top coat for UV exposed applications.

Fosroc Nitoproof Top Coat EW

Description: Solvent free, aliphatic polyurethane clear sealer.

Fosroc Nitoprime 120

Description: Water-based, single component, fast drying primer.

Fosroc Nitoprime 115

Description: Water-based, solvent-free primer for non-porous substrates.

Fosroc Polyurea WHE110

Description: Fast setting, hybrid polyurea-polyurethane elastomeric waterproof membrane.

2.3 SELF-ADHESIVE MEMBRANE SYSTEMS

Fosroc Proofex 6100

Description: Woven polypropylene surfaced, bituminous self-adhesive membrane, to waterproof bridge decks, ramps, car parks and road pavements where the membrane will be overlaid with hot asphalt.

Fosroc Proofex 3100

Description: Self-adhesive bituminous membrane incorporating a cross laminated HDPE film that provides excellent physical and application properties.

Fosroc Primer 24

Description: Bituminous primer for Proofex 6100 and Proofex 3100.

2.4 SHEET MEMBRANE SYSTEMS

Proofex Engage

Description: Membrane system comprising a cell mesh bonded to a blended polyethylene/polypropylene membrane, which allows poured concrete to interlock, forming a tenacious mechanical bond.

Proofex PGP

Description: Flexible PVC synthetic membrane for the waterproofing of tunnels and below ground structures.

2.5 CEMENTITIOUS MEMBRANE SYSTEMS

Vandex BB75E-Z

Description: High performance, crack accommodating, cement-based render, waterproofing barrier for positive and negative water pressure applications.

Vandex Cemelast

Description: Flexible, surface applied, cement-based render, waterproofing barrier, for positive and negative water pressure applications.

Vandex Concrete Grey

Description: Concrete capillary penetrating, crystal growth sealing, cement-based, waterproofing system, for positive and negative water pressure applications.

Vandex Plug

Description: Fast setting, cement-based mortar to plug running water leaks.

2.6 ACCESSORIES**Pressure seal flashing**

Description: Aluminium strips for sealing and flashing the edge of bituminous sheet membranes.

Flashing

Description: Aluminium strips for sealing and flashing the edge of bituminous sheet membranes.

Sealants

Requirement: Waterproof, flexible, mould-resistant and compatible with the waterproofing system.

Internal Bituminous Corner

Description: Prefabricated corners made of polymeric bituminous membrane.

External Bituminous Corner

Description: Prefabricated corners made of polymeric bituminous membrane.

Torch on Bituminous Fillet

Description: Prefabricated bond breaker made of polymeric bituminous membrane.

Roof Drain

Description: Prefabricated dropper made of thermoplastic elastomer with a 170 mm spigot.

Parapet Drain Outlet – Boy Type

Description: Prefabricated angular drain spitter made of thermoplastic elastomer.

2.7 PROTECTION**Fosroc Proofex Protection Board PP**

Description: Lightweight polypropylene, impact protection sheet for membranes.

2.8 SLIP SHEETS**Sheet material****Description:**

1 layer of 300 µm thick polyethylene sheet or 1 layer of 130 g/m² geotextile sheet.

Function: Isolates the movement of overlaying finishes such as screeds from the membrane.

2.9 DRAINAGE CELL SHEETS**Fosroc Sheet drain 81**

Description: Dimpled protection and drainage membrane in high-density, extruded polyethylene with continuous filament yarn.

Walls

Cell panel protection: [complete/delete]

If required, the product recommended by the cell panel supplier.

Filter: [complete/delete]

Geotextile product of the recommended grade to suit the fill material. Delete if filter is integral with the drainage cell panels specified.

Location:[complete/delete]

Refer to **SUBSOIL DRAINS** in *0802 Hydraulic design and install* for groundwater disposal.

Planter bases

Protection: [complete/delete]

The product recommended by the membrane supplier.

Geotextile product of the recommended grade to suit the soil.

3 EXECUTION

3.1 GENERAL

Reporting

General: Make progressive photographic records of the waterproofing installation. Label photographs with the date, location and weather.

Timing: Record at the following stages:

- After substrate preparation.
- After primer application.
- After membrane installation.
- After protection from traffic provided.

Liquid applied membranes:

- Record wet film thickness once every 10 m² and compare to the manufacturer's requirements.
- On completion of every 100 m² of each coat, compare the amount of membrane used with the manufacturer's application rate and record the result.

3.2 PREPARATION

Substrates

General: Prepare substrates as follows:

- Clean and remove any deposit or finish that may impair adhesion of membranes.
- Remove excessive projections.
- Fill voids and hollows in concrete substrates with a concrete mix not stronger than the substrate.
- Fill cracks in substrates wider than 1.5 mm with a filler compatible with the membrane system.
- Remove all traces of a concrete curing compound if used.

Delete the reference to the curing compound if it is demonstrated to be compatible with the membrane.

Concrete substrates: Cure for more than 28 days.

Refer to the manufacturer's substrate curing time requirements for the membrane system being used.

Moisture content

Requirement: Verify that the moisture content of the substrate is compatible with the water vapour transmission rate of the membrane system by testing to **TESTING, Substrate moisture tests**.

Falls

Requirement: Verify that falls in substrates are greater than 1:100.

Consult the membrane supplier to determine a fall that minimises ponding at lapped seams.

Joints and fillets

Internal corners:

- Liquid applied membranes: Provide 15 x 15 mm 45° fillets.
- Sheet membranes: Provide 40 x 40 mm 45° fillets.

Fillet material: Cement or plastic.

External corners: Round or arris edges.

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

Priming

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

3.3 INSTALLATION

Ambient conditions

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

Protection

Damage: Protect membrane from damage during installation and for the period after installation until the membrane achieves its service characteristics that resist damage to FOSROC's recommendation.

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 – Self-adhesive membranes

Longitudinal laps: 50 to 60 mm.

Transverse laps: 70 to 80 mm.

Sheet joints – Pre-applied sheet membranes

Selvage: 75 mm.

Over-seal: 75 mm.

Sheet joints – Bituminous sheet membranes

Side laps: 80 to 100 mm.

End laps: 120 to 150 mm.

Movement and control joints

General: Install membranes to accommodate control joints in the substructure.

Bond breakers: Size to allow the membrane to accommodate movement.

Joint backing gutter: Fix a formed metal gutter to one side of the soffit directly below the joint and fall to a suitable disposal or drainage point.

Control joint covers: Install after fixing hobs and membranes.

Membrane terminations

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

- Height: To AS 4654.2 (2012) Table A1.
- Anchoring: Secure sheet membranes along the top edge.
- Edge protection: Protect edges of the membrane.

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

Vertical upward terminations:

- Liquid applied membranes: Terminate under an overflashing, or provide an overflashing of liquid applied membrane.
- Sheet membranes: Terminate under an overflashing, or provide a pressure seal overflashing or an overflashing fixed into a cast-in reglet.

Membrane downturns: Provide downturns for sheet membrane systems as follows:

- Roofs or similar structures: Extend minimum 100 mm from the junction of the structure.
- Balconies with a fully bonded membrane: Terminate at the drip groove.

Vertical downward terminations:

- Liquid applied membranes: Extend membrane to the underside of a horizontal return.
- Sheet membranes: Provide a pressure seal overflashing.

Horizontal terminations: Do not provide. Use vertical terminations.

Membrane penetrations

Vertical penetrations: Provide separate sleeves fixed to the substrate using Fosroc Nitoband Elastic Joint Band System Pipe Penetration Detailing Squares for vertical penetrations including pipes, ducts and vents.

Horizontal penetrations: Install Fosroc Nitoband Elastic Joint Band System Pipe Penetration Detailing Squares for all vertical penetrations to FOSROC's recommendation.

Membrane at balcony doors and windows

Requirement: Install membrane before fixing door or window frames.

Upturn height above external finished floor level: To AS 4654.2 (2012) Table A1.

Hobless and flush thresholds: Install membrane before fixing door or window frames. Provide 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.

Upturn height above roof surface: To AS 4654.2 (2012) Table A1.

Membrane at parapets

Requirement: Terminate membrane upturns under parapet flashing or capping with at least 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 at post supports

Post supports fixed before membrane:

- Fix post support to substrate with countersunk fasteners and seal the perimeter of the base plate to the substrate.
- Lay out membrane sheets to minimise cuts around the post support vertical member.
- Dress the membrane closely around the post support and seal the edge of the penetration to the vertical member.
- Fix an overflashing so that any joint is staggered as much as possible relative to joints in the base membrane, and overlap at least 150 mm beyond the perimeter of the base plate.

Post supports fixed after membrane:

- Fix post support to substrate with countersunk fasteners over a waterproof resilient gasket cut to match the shape of the base plate, and seal the perimeter of the base plate to the membrane.
- Dress the overflashing closely around the post support and seal the edge of the penetration to the vertical member.
- Fix an overflashing and overlap at least 150 mm beyond the perimeter of the base plate.

Membrane to planter boxes

Membrane: Extend root-resistant membrane at least 100 mm vertically above the soil or 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.

Membrane to below ground structures

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

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

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

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

Curing of liquid membrane systems

General: To the manufacturer's recommendations.

Overlaying finishes on membranes

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

Bonded or partially bonded membranes: 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 to not 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 that is compatible with the membrane.

3.4 TESTING**Substrate moisture tests**

Moisture content of concrete substrate: Test substrate in-slab relative humidity to ASTM F2170 (2019). Perform three tests for the first 100 m² of subfloor area and an additional test for each additional 100 m².

Moisture content of timber, plywood and particleboard substrate: Test substrate to AS/NZS 2098.1 (2006) for plywood substrates or to AS/NZS 1080.1 (2012) for timber and particleboard substrates.

Flood tests

Requirement: Perform a flood test before the installation of surface finishes.

Moisture content measurement method: To **Substrate moisture tests**.

Set-up:

- Measure the wall/floor junction of adjacent spaces and of the slab soffit below for dryness.
- Record the result for each area.
- Dam the access openings and seal drainage outlets.
- Provide temporary overflows of the same capacity as the outlets.
- Fill space with clean water as follows:
 - . Minimum water level: 25 mm.
 - . Maximum water level: 100 mm.
 - . Minimum dimension below perimeter flashings: 25 mm.
- Test duration: Minimum 24 hours and maximum 72 hours.

Records:

- Make photographic records of the flooded areas and adjacent areas.
- Label photographs with the date and location.

Evaluation:

- Visual test: Drain the water. After 2 hours, visually inspect the wall/floor junction of adjacent spaces and of the slab soffit below for water or moisture.
- Moisture meter test: If there is no visual evidence of water, 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.
- Test results indicating an increase in moisture after flooding: Failure.
- Failure: If required, remedy defects and retest.

Slip resistance tests

Slip resistance of completed installation: To AS 4663 (2013).

3.5 COMPLETION**Reinstatement**

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

Operation and maintenance manuals

Requirement: Prepare a manual that includes the manufacturer's maintenance recommendations, including the following:

- Preventive maintenance procedures.
- Instructions and procedures for the repair of the membrane.

Warranties

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

- Form: Against failure of materials and execution under normal environment and use conditions.

4 SELECTIONS**4.1 ROOF/PODIUM/DECK WATERPROOFING - NEW CONSTRUCTION****Maintenance traffic areas schedule (UV exposed membrane)**

	1A	1B	1C	1D	1E
Proprietary system	FOSROC	FOSROC	FOSROC	FOSROC	FOSROC
Material type	Two-layer, torch on mineral finish sheet membrane system	Two-layer, torch on mineral finish sheet membrane system	Water-based Polyurethane liquid applied membrane	Water-based, Polymer/Cementitious, liquid applied membrane	Fast setting, hybrid polyurea-polyurethane elastomeric waterproof membrane
Primer: Porous substrates	Fosroc Primer 24	Fosroc Primer 24	Nitoprime 120	Nitoprime 120	Fosroc Nitoprime 320PU
Primer: Non-porous substrates	Fosroc Primer 24	Fosroc Primer 24	Nitoprime 115	Nitoprime 115	Fosroc Nitomortar 903
Joint bond breaker	Sand/cement fillet	Sand/cement fillet	Nitoband Elastic Joint Band System	Nitoband Elastic Joint Band System	Sand/cement fillet
Base membrane	Fosroc Proofex Torchseal A800	Fosroc Proofex Torchseal A600	-	-	-
Top membrane	Fosroc Proofex Torchseal A825	Fosroc Proofex Torchseal A625	Fosroc Nitoproof 810	Fosroc Nitoproof 810	Fosroc Poyurea WHE110
UV wear coat	-	-	Fosroc Nitoproof Top Coat UV	Fosroc Nitoproof Top Coat UV	Fosroc Nitoflor PA
Optional*	-	-	Fosroc Nitoproof Top Coat EW*	Fosroc Nitoproof Top Coat EW*	-

Pedestrian traffic areas – tiled /paved schedule (UV protected)

	2A	2B	2C	2D	2E
Proprietary system	FOSROC	FOSROC	FOSROC	FOSROC.	FOSROC
Material type	Two-layer, torch on sheet membrane with	Two-layer, torch on sheet membrane with	Water-based Polyurethane, liquid applied	Water-based, Polymer/Cementitious, liquid applied	Fast setting, hybrid polyurea-

	2A	2B	2C	2D	2E
	screed, tile/paver over	screed, tile/paver over	membrane with screed, tile/paver over	membrane with screed, tile/paver over	polyurethane elastomeric waterproof membrane with screed, tile/paver over
Screed	Concrete screed over	Concrete screed over	Concrete screed over	Concrete screed over	Concrete screed over
Primer: Porous substrates	Fosroc Primer 24	Fosroc Primer 24	Fosroc Nitoprime 115	Fosroc Nitoprime 115	Fosroc Nitoprime 320PU
Primer: Non-porous substrates	Fosroc Primer 24	Fosroc Primer 24	Fosroc Nitoprime 120	Fosroc Nitoprime 120	Fosroc Nitomortar 903
Joint bond breaker	Sand/cement fillet	Sand/cement fillet	Nitoband Elastic Joint Band system	Nitoband Elastic Joint Band system	Sand/cement fillet
Base membrane	Fosroc Proofex Torchseal A600	Fosroc Proofex Torchseal A600	-	-	-
Top membrane	Fosroc Proofex Torchseal A825	Fosroc Proofex Torchseal A625	Fosroc Nitoproof 810	Fosroc Nitoproof 410	Fosroc Polyurea WHE110

Car park/vehicle traffic areas schedule (UV protected membrane)

	3C	3D
Proprietary system	FOSROC	FOSROC
Material type	Single layer, self-adhesive, sheet membrane	Water-based Polyurethane, liquid applied membrane
Overlay	Concrete topping slab or asphalt	Concrete topping slab
Primer: Porous substrates	Fosroc Primer 24	Fosroc Nitoprime 120
Primer: Non-porous substrates	Fosroc Primer 24	Fosroc Nitoprime 115
Joint bond breaker	Sand/cement fillet	Fosroc Nitoband Elastic Joint Band System
Base membrane	-	-
Top membrane	Fosroc Proofex 3100 (concrete topping) or Fosroc Proofex 6100 (asphalt topping)	Fosroc Nitoproof 810

4.2 BALCONY AREAS – NEW CONSTRUCTION

Balcony/terrace areas – tiled/paved schedule (UV protected membrane)

	5C	5D
Proprietary system	FOSROC	FOSROC
Material type	Water-based polyurethane liquid applied membrane with screed, tile/paver over	Water-based, polymer/ cementitious, two part, liquid applied membrane with screed, tile/paver over
Screed	Screed layer over	Screed layer over
Primer: Porous substrates	Fosroc Nitoprime 120	Fosroc Nitoprime 120
Primer: Non-porous	Fosroc Nitoprime 115	Fosroc Nitoprime 115

	5C	5D
substrates		
Joint bond breaker	Fosroc Nitoband Elastic Joint Band System	Fosroc Nitoband Elastic Joint Band System
Base membrane	-	-
Top membrane	Fosroc Nitoprime 810	Fosroc Nitoprime 410

4.3 LANDSCAPED GARDEN – NEW CONSTRUCTION

Landscaped garden areas schedule (UV protected membrane)

	6
Proprietary system	FOSROC
Material type	Two layer torch-on, root resistant, sheet membrane system with drainage sheet
Primer	Fosroc Primer 24
Base membrane	Fosroc Proofex Torchseal A600
Top membrane	Fosroc Proofex Torchseal A700
Drainage sheet layer	Fosroc Proofex Sheetdrain 81

Planter box gardens schedule (UV protected membrane)

	7A	7B
Proprietary system	FOSROC	FOSROC
Material type	Two layer torch-on, root resistant, sheet membrane system with drainage sheet	Polymer modified bituminous, liquid applied membrane, containing root inhibitors, with drainage sheet
Primer: Porous substrates	Fosroc Primer 24	Diluted Fosroc Nitoproof 210
Primer: Non-porous substrates	Fosroc Primer 24	Fosroc Nitoprime 115
Joint bond breaker	Sand/cement fillet	Fosroc Nitoband Elastic Joint Band System
Base membrane	Fosroc Proofex Torchseal A600	-
Top membrane	Fosroc Proofex Torchseal A700	Fosroc Nitoproof 210 with Fosroc Nitoband Elastic Joint Band System
Drainage sheet	Fosroc Proofex Sheetdrain 81	Fosroc Proofex Sheetdrain 81
Protection board	Fosroc Proofex Protection Board PP	Fosroc Proofex Protection Board PP

4.4 BELOW GROUND BASEMENT WATERPROOFING/TANKING – NEW CONSTRUCTION

Below ground basement waterproofing and drainage/tanking schedule (UV protected membrane)

	8A	8B	8C	8D
Proprietary system	FOSROC	FOSROC	FOSROC	FOSROC
Material type	Single layer, pre-applied, sheet waterproofing & tanking membrane system	Two layer torch-on, sheet membrane system with drainage sheet	Single layer, self-adhesive, sheet membrane with drainage sheet	Water-based, rubberised bitumen, liquid applied membrane with drainage sheet
Primer: Porous substrates	-	Fosroc Primer 24	Fosroc Primer 24	Diluted Fosroc Nitoproof 210
Primer: Non-porous	-	Fosroc Primer 24	-	Fosroc Nitoprime

	8A	8B	8C	8D
substrates				115
Joint bond breaker	Sand/cement fillet	Sand/cement fillet	Sand/cement fillet	Fosroc Nitoband Elastic Joint Band System
Base membrane	-	Fosroc Proofex Torchseal A600	-	-
Top membrane	-	Fosroc Proofex Torchseal A800	Fosroc Proofex 3100	Fosroc Nitoproof 210
Waterproofing	Fosroc Proofex Engage	-	-	-
Drainage	Fosroc Proofex Sheetdrain 81	Fosroc Proofex Sheetdrain 81	Fosroc Proofex Sheetdrain 81	Fosroc Proofex Sheetdrain 81

Retaining wall waterproofing and drainage schedule (UV protected membrane)

	9A	9B	9C	9D
Proprietary system	FOSROC	FOSROC	FOSROC	FOSROC
Material type	Two layer torch-on, sheet membrane system with drainage sheet	Single layer torch-on, sheet membrane with drainage sheet	Single layer, self-adhesive, sheet membrane with drainage sheet	Polymer modified bituminous, liquid applied membrane, incorporating plant root inhibitors, with drainage sheet
Primer: Porous substrates	Fosroc Primer 24	Fosroc Primer 24	Fosroc Primer 24	Diluted Fosroc Nitoproof 210
Primer: Non-porous substrates	Fosroc Primer 24	Fosroc Primer 24	Fosroc Primer 24	Fosroc Nitoprime 115
Joint bond breaker	Sand/cement fillet	Sand/cement fillet	Sand/cement fillet	Fosroc Nitoband
Base membrane	Fosroc Proofex Torchseal A600	-	-	-
Top membrane	Fosroc Proofex Torchseal A600	Fosroc Proofex Torchseal A600	Fosroc Proofex 3100	Fosroc Nitoproof 210
Drainage	Fosroc Proofex Sheetdrain 81	Fosroc Proofex Sheetdrain 81	Fosroc Proofex Sheetdrain 81	Fosroc Proofex Sheetdrain 81

4.5 OTHER WATERPROOFING APPLICATIONS – NEW CONSTRUCTION

Water storage retaining tanks/vessels schedule (UV protected/UV exposed membranes)

	10A	10B
Proprietary system	Parchem	Parchem
Material type	Flexible, dynamic crack accommodating, cement-based render waterproofing barrier for new or old concrete/masonry structures, drinking water approved to AS/NZS 4020 (2018)	In-depth concrete capillary penetrating, crystal growth sealing, cement-based waterproofing barrier for high positive/negative water pressures
Primer: Porous substrates	-	-
Primer: Non-porous substrates	-	-
Joint bond breaker	-	-
Membrane (UV Protected or Exposed)	Vandex Cemelast	Vandex Concrete Grey

Drainage/tanking schedule (UV protected membrane)

	11A	11B	11C	11D	11E
Proprietary system	FOSROC	FOSROC	FOSROC	FOSROC	FOSROC
Material type	Two layer torch-on, sheet membrane system with drainage sheet	Single layer torch-on, sheet membrane with drainage sheet	Single layer, pre-applied, sheet waterproofing & tanking membrane	Single layer, self-adhesive, sheet membrane with drainage sheet	Single layer flexible PVC synthetic membrane
Primer	Fosroc Primer 24	Fosroc Primer 24	-	Fosroc Primer 24	-
Base membrane	Fosroc Proofex Torchseal A600	-	-	-	-
Top membrane	Fosroc Proofex Torchseal A800	Fosroc Proofex Torchseal A600	Fosroc Proofex Engage	Fosroc Proofex 3100	Fosroc Proofex PGP
Drainage	Fosroc Proofex Sheetdrain 81	Fosroc Proofex Sheetdrain 81	Fosroc Proofex Sheetdrain 81	Fosroc Proofex Sheetdrain 81	Fosroc Proofex Sheetdrain 81

0423 ROOFING - PROFILED SHEET METAL
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1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide a profiled sheet metal roofing system and associated work, as documented.

Corrosion resistance

Material: To the manufacturer's recommendations for distance from marine influence.

Roof access

Requirement: To 0193 *Building access safety systems*.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 *General requirements*.

1.3 STANDARDS

General

Standard: To AS 1562.1 (2018).

1.4 INTERPRETATION

Definitions

General: For the purposes of this worksection, the definitions given in AS 1562.1 (2018) apply.

1.5 TOLERANCES

Sheet metal roofing

Supporting members: To AS 1562.1 (2018) clause 4.2.3.

1.6 SUBMISSIONS

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION**, **Operation and maintenance manuals**.

Products and materials

Type tests: Submit test results for the following:

- Profiled sheet metal roofing: To PRODUCTS, **PROFILED SHEET METAL ROOFING, Tests**.

Samples

Requirement: Submit samples to PRODUCTS, **GENERAL**, **Samples**.

Warranties

Requirement: Submit warranties to **COMPLETION**, **Warranties**.

1.7 INSPECTION

Notice

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

- Roof supports before covering up or concealing.
- Glazing products before they are installed.
- The parts of the roofing, sarking, vapour barrier, insulation and roof plumbing installation before covering up or concealing.

2 PRODUCTS

2.1 GENERAL

Samples

Requirement: Provide samples of the following, showing the range of variation available:

- Trim and accessories with a colour finish.
- Custom profiled flashings and cappings.
- Sheet metal finishes.
- Sealants.

Storage and handling

Storage: To the manufacturer's recommendations and as follows:

- Keep clean, dry and unexposed to weather.
- Store away from uncured concrete and masonry, on a level base and not in contact with other materials that cause staining, denting or other surface damage.
- Stack flat and off the ground on at least 3 evenly placed bearers.

Handling: Handle metal 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.

Storage area conditions: Allocate a safe and trade free area.

Welded safety mesh

Standard: To AS/NZS 4389 (2015).

2.2 PROFILED SHEET METAL ROOFING**Standards**

Design and materials: To AS 1562.1 (2018).

Fasteners

Requirement: Starter clips, fixing clips and fastenings to the roofing system supplier's recommendations.

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

Fastenings to timber battens: Fastenings 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.

Insulation spacers

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

Components

Sealant: 100% neutral cure non-acid based silicone rubber to match roofing.

Tests

Resistance to concentrated loads: To AS 1562.1 (2018) clause 5.4.

Resistance to wind pressures:

- Non-cyclonic wind regions: To AS 1562.1 (2018) clause 5.5.
- Cyclonic wind regions: To AS 1562.1 (2018) clause 5.6.

2.3 ROOF PLUMBING**General**

Description: Flashings, cappings, gutters, rainheads, outlets, external downpipes and accessories necessary to complete the roofing system.

Flashing and capping: Notched to match profile of roofing.

Matching fascia/barge capping: If the selected eaves gutter is a proprietary high front pattern forming part of a combined system of gutter, fascia and barge, provide matching proprietary fascias and barge cappings to roof verges and edges.

Standards

Roof drainage: To AS/NZS 3500.3 (2021).

Metal rainwater goods: To AS/NZS 2179.1 (2014).

Flashings and cappings: To AS/NZS 2904 (1995).

2.4 SKYLIGHTS**General**

Standard: To AS 4285 (2019).

Description: A proprietary skylight system for installation in roofs pitched less than 15°, including framing, fixing, trim, seals, accessories and flashings.

2.5 ROOF HATCHES**General**

Description: A proprietary roof hatch system, including framing, fixing, trim, seals, accessories and flashings.

2.6 ROOF WINDOWS**General**

Standard: To AS 4285 (2019).

Description: A proprietary window system designed for non-vertical installation in roofs pitched greater than 15° and less than 90°, consisting of the following:

- Timber frame and sash, shop clear primed or prefinished.
- External anodised aluminium protective profiles.
- Sealed double glazing.
- Horizontally pivoted sash, 180° reversible, on patent friction hinges.
- Opening and locking by patent control bar.
- Ventilation flap.

2.7 ROOF VENTILATORS**General**

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

3 EXECUTION

3.1 GENERAL**Preparation**

Substrates or framing: Before fixing roofing, check the alignment of substrates or framing and adjust if required.

Flexible underlay: Check that the underlay or insulation is restrained.

Roofing: Make sure the roofing is clean and free of dust and loose particles.

3.2 SHEET METAL ROOFING

Certification for span, cantilever, thermal performance, trafficability, and serviceability must be provided in accordance with the above. Product/manufacture must be cited on all test certification.

Product Type:	Lysaght Trimdek sheet metal roof
Product Finish External:	Colorbond 0.42 BMT
External Profile:	TRIMDEK
Colour:	Dover White®
Product Finish internal:	Colorbond 0.42 BMT

3.3 INSTALLATION

Protection

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

Protection: Protect surfaces and finishes, including the retention of protective coatings during installation.

Thermal movement

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

Metal separation

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

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

3.4 PROFILED SHEET METAL ROOFING

Roof sheet installation

Standard: To AS 1562.1 (2018).

Fastener type, size, corrosion resistance class, and spacing: To the sheet metal roofing manufacturer's recommendations.

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

Accessories: Provide accessories with the same finish as roofing sheets to complete the roofing installation.

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.

Ridges and eaves

Sheet ends: Treat as follows:

- Project sheets 50 mm into gutters.
- Close off ribs at bottom of sheets using mechanical means or with purpose-made fillers or end caps.
- Turn pans of sheets up at tops and down into gutters by mechanical means.
- Pre-cut notched eaves flashing and birdproofing if required.
- 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 for every two lengths of flashing, at a maximum of 12 m centres.

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 flashing over the roofing to the ridge to prevent ponding behind the penetrating element.

Wall abutments: If a roof abuts a wall, provide overflashing 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 and 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 cure silicone rubber and secure with either of the following:

- Clamping ring.
- Proprietary flexible clamping shoe with attached metal surround flashing.

Gutters

Gutter and sump support: Provide framing and lining to support valley gutters, box gutters and sumps. Line the whole area under the gutters and sumps.

Box gutter: Prefabricate box gutters to the required section and shape as follows:

- Form stop ends, downpipe nozzles, bends and returns.
- Dress downpipe nozzles into outlets.
- Hail guards: Install grating over the whole of the box gutter, over all box gutter sumps and over the edges of roofing sheeting entering box gutters.
- Overflows: Provide overflows to prevent back-flooding. Size to pass 100% of the design rainfall. Discharge overflows in visible locations and so water does not enter the building or cause damage to the building.
- Sumps: Minimum 150 mm deep and the full width of the box gutter.

Valley gutters: Profile to suit the valley boarding. Turn back both edges 180 x 6 mm radius. Nail or screw to the valley boarding at the top end to prevent the gutter creeping downwards.

Gratings: Install removable gratings over rainheads and sumps.

Leaf guard location: All gutter outlets.

External downpipes

General: Prefabricate downpipes to the required section and shape. 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.

- Size: Not less than the diameter of the downpipe.

Downpipe support: Provide supports and fixings for downpipes.

3.6 COMPLETION**Reinstatement**

Extent: Repair or replace damage to the roofing and rainwater system. If the work cannot be repaired satisfactorily, replace the whole area affected.

Damage to prepainted finish: Replace panels with scratches in the prepainted finish greater than 2 mm in width visible from the ground.

Fasteners: Make sure weathertight and external panel facings are not distorted.

Cleaning

Roofing and rainwater drainage system: Remove debris, metal swarf, solder, sealants and unused materials.

Exposed metal surfaces: Clean surfaces of substances that interfere with uniform weathering or oxidation.

Roof plumbing: Clean out spoutings, gutters and rainwater pipes after completion of roof installation.

Protection: After completion, remove protective coatings using methods to the manufacturer's recommendations.

Operation and maintenance manuals

Requirement: Prepare a manual that includes 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.

0428 ROOFING - INSULATED PANEL SYSTEMS

1 GENERAL**1.1 RESPONSIBILITIES****General**

General: Provide Arcpanel Ecotek Panel roofing system and associated work as documented and which satisfies the product performance requirements and is independently manufactured and documented. The Arcpanel Ecotek Panel roofing system is certified for structural performance by independent professional engineers.

1.2 PERFORMANCE CRITERIA**Ambient climatic conditions**

Exposure severity category: Benign (external - generally)

Roof access

Type: *Arcpanel roofing panels are designed to allow a maximum live load of 0.25kPa.*

1.3 COMPANY CONTACTS**Arcpanel Contact:**

*Brad Collyer
NSW Account Manager
0428 033 211
brad.collyer@arcpanel.com.au*

1.4 CROSS REFERENCES**General**

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

- *General requirements.*
 - *AS1170 – Parts 1,2,3 & 4 Loading Code*
 - *AS1562.1 – Design and Installation of Metal Roofing*
 - *AS4040 – Methods of testing sheet roof and wall cladding*
 - *NCC VOL1: BP1.1*
 - *NCC VOL2: P2.1.1*
 - *SAA HB39 – Installation code for metal roofing and wall cladding*

1.5 MANUFACTURER'S DOCUMENTS**Technical manuals**

Arcpanel Ecotek Panel Design, Detailing and Installation Guide Version 2021

Arcpanel Roof Panel Maintenance Brochure

1.6 INSPECTION**Notice**

Inspection: Give sufficient notice so that inspection may be made of:

*Refer to: Arcpanel Ecotek Panel Design, Detailing and Installation Guide Version 2021
Arcpanel Roof Panel Maintenance Brochure*

1.7 SUBMISSIONS

Installation

Installation to be carried out in accordance with the Arcpanel Ecotek Design, Detailing and Installation Guide Version 2021

2 PRODUCTS

2.1 COMPONENTS

Fasteners

Refer to: Arcpanel Ecotek Panel Design, Detailing and Installation Guide Version 2021
page 12-13

2.2 SHEET METAL ROOFING

Standards

Product **must be tested and certified** by NATA accredited testing authorities to comply with the BCA in accordance with the following standards.

AS 1530.3 - Methods for fire tests on building materials, components and structures - Simultaneous determination of ignitability, flame propagation, heat release and smoke release

AS ISO 9705 – Full scale room fire testing

AS 1170 - Structural design and the effects of external loads on structures and their element

AS 1562.1 - Design and installation of sheet roof and wall cladding – Metal

Certification for span, cantilever, thermal performance, trafficability, and serviceability must be provided in accordance with the above. Product/manufacture must be cited on all test certifications.

Roofing Product

Product Type:	ARCPANEL ECOTEK PANEL
Product Finish External:	XRW COLORBOND 0.42BMT
Product Finish internal:	XRW COLORBOND 0.42BMT
Internal Core Material:	EXPANDED POLYSTYRENE
Product Thickness:	200mm
Profile:	TRIMDEK EXTERNAL & CUSTOM ORB INTERNAL
Insulation Value:	R4.7
NCC Specification C1.10	AS 5637.1 GROUP 1
AS 1530.3	SMOKE DEVELOPED INDEX 4
Colour:	DOVER WHITE

Roofing Product

Product Type:	ARCPANEL ECOTEK PANEL
Product Finish External:	XRW COLORBOND 0.42BMT
Product Finish internal:	XRW COLORBOND 0.42BMT
Internal Core Material:	EXPANDED POLYSTYRENE
Product Thickness:	130mm
Profile:	TRIMDEK EXTERNAL & CUSTOM ORB INTERNAL
Insulation Value:	R2.8
NCC Specification C1.10	AS 5637.1 GROUP 1
AS 1530.3	SMOKE DEVELOPED INDEX 4
Colour:	DOVER WHITE

3 EXECUTION

3.1 INSTALLATION

Protection

General: *Arcpanel Ecotek Panel Design, Detailing and Installation Guide Version 2021*

Touch up: *Contact Bluescope Steel*

Thermal movement

Requirement: Provide for thermal movement in the roof installation and the structure, including movement in joints and fastenings. *Arcpanel Ecotek Panel steel manufacturer information states that the maximum sheet length should be 24m without an expansion joint. Arcpanel Ecotek Panel system can accommodate the predicted thermal expansion and the panel performance will not be affected in any way.*

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

Requirement: *Arcpanel Panel: Cover Width 762mm +/- 2mm*
Overall Length +/- 10mm

3.2 COMPOSITE PANEL ROOFING

Roofing installation

Laying start location: *Arcpanel Ecotek Panel Design, Detailing and Installation Guide Version 2021. and the SAA HB39 – Installation code for metal roofing and wall cladding.*

Eaves: Treat ends of sheets as follows:

- Generally: Close off ribs at tops and bottoms of sheets by mechanical means or with purpose-made fillers or end caps.
- At gutters: Project sheets *1/3 gutter width* into gutters.

Swarf: Remove swarf and other debris as soon as it is deposited. *Refer to Bluescope Technical Bulletin.*

Accessories: Provide material with the same finish as roofing sheets.

Expansion joints: *Required every 24m*

3.3 BUILDING ELEMENTS

Ridges and eaves. *Refer to the SAA HB39 – Installation code for metal roofing and wall cladding.*

Treat ends of sheets as follows:

- Project top sheets *1/3 gutter width* 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: *Refer to Arcpanel Ecotek Panel Design, Detailing and Installation Guide Version 2021 and the SAA HB39 – Installation code for metal roofing and wall cladding.*

0431B CLADDING – COMBINED

1 GENERAL

1.3 RESPONSIBILITIES

General

Provide lightweight external wall cladding and associated work, as documented

Scope of Work

- *To the perimeter of the exterior of the new pavilions in Cemintel Barestone Cladding with ExpressPanel Façade..*

1.4 COMPANY CONTACTS

Cemintel ExpressPanel Façade System technical contacts

Website: <http://www.cemintel.com.au/products/commercial-expresspanel/>

The contractor shall furnish all materials, labour and equipment for the installation of the Cemintel ExpressPanel™ System where indicated on the drawings and/or as specified. The ExpressWall™ system shall be installed in accordance with CSR guide N°FC126 Cemintel ExpressWall™.

Cemintel Barestone External System technical contacts

Website: <https://www.cemintel.com.au/wp-content/uploads/2024/09/BARESTONE-External-Design-Installation-Guide-Sep2024.pdf>

1.5 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements.*

1.6 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.

2 PRODUCTS

2.3 COMPRESSED FIBROUS CEMENT SHEET CLADDING - CEMINTEL

Standards

Design and installation: To AS/NZS 2908.2:2000.

Cladding product

Product brand: CSR – Cladding material shall be Cemintel Barestone™ Panel as manufactured by CSR.

Barestone™ shall be 9mm compressed cellulose reinforced sheet manufactured in accordance with AS/ NZS 2908.2. Back face is sealed with VC-9, a UV cured high build clear sealer applied to a thickness of 35-40µm. Front face of panels is undercoated with VC-7, a UV cured high build white sealer applied to a thickness of 35- 40µm. Final coat is VP-200 white Intercoat primer with a thickness of 5-10µm to front face and edges.

Colour: External – to finishes schedule

Cladding product

Product brand: CSR – Cladding material shall be Cemintel Territory™ Panel as manufactured by CSR.

Cemintel Territory™ panels shall be 16mm cement bonded fibrous wood particle cladding products that are pressed with surface texture and prefinished using a durable multi-layer paint process. The long horizontal edge of the panel is machined with a tongue and groove profile and a compressible

sealing strip is bonded onto the tongue which enables the panels to fit neatly together to form a weather resistant joint.

Cemintel Territory panels are manufactured in Japan to the Japanese Industrial Standard JIS A 5422 (fibre reinforced cement sidings) and are classified as a Type A, Grade 2 (fibre cement) sheet in accordance with ASTM C1186. Colour: External – to finishes schedule

3 EXECUTION

3.3 TOLERANCES

Permitted deviations

Metal sheet cladding: To AS 1562.1 clause 4.2.

Pre-assembled cladding systems: To manufacturer's recommendations.

3.4 CONSTRUCTION GENERALLY

Cladding sheet installation

- Fixing start location: at the start of any structural column or wall junction. Fit either cover strip where butting into next panel or corner capping.

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

Accessories: Provide material with the same finish as cladding sheets.

EXPRESSWALL™ Steel Framing

Cemintel ExpressWall™ steel framing system shall be Cemintel ExpressWall™ Top Hat of BMT as supplied by CSR, and Intermediate Top Hat as manufactured by Rondo Building Services Pty Ltd. Framing shall be installed in accordance with CSR installation guide N°FC126 Cemintel ExpressWall™.

Provide additional Top Hat frame to perimeter of windows to west wall for fixing of framed sunshade screens.

Wall Wrap/Sarking/Insulation

Wall wrap/sarking material shall be *Bradford Enviroseal Proctor Wrap in accordance with CSR installation guide N°FC126 Cemintel ExpressWall™, CSRTerritory™ External Horizontal Installation Guide.

Flashings, Corner, Window/Door Reveal Lashing

Requirement: Finish off at corners, window and door reveals with purpose-made folded flashing strips. Provide Purpose made folded flashing to the top of the wall system at the junction of the roof fascia.

Control joints: At all external corners, adjacent to all openings and at maximum 6 m centres.

Flashings not supplied by CSR shall be designed and installed in accordance with SAA-HB39, 1997, Installation Code for Metal Roofing and Wall Cladding. Flashing to be colour matched to the panels.

Fixing

Screws for fixing Barestone™ to top hats shall be ExpressWall Countersunk Head Screws, Class 3 finish as supplied by CSR. All counter sunk head screws in the Barestone™, shall be covered with Megapoxy p1epoxy, and sanded flush with the panel surface.

Accessories and trim

Tapes, gaskets, sealants, backing strips and the like shall be as detailed in CSR guide N°FC126 Cemintel Barestone™.

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.

3.5 COMPLETION

Warranties

Cladding materials: Submit the manufacturer's published product warranties.

0436 COLORBOND® IN CLADDING – PROFILED SHEET METAL

1 GENERAL**1.1 RESPONSIBILITIES****General**

General: Provide and install COLORBOND® and ZINCALUME® steel cladding and associated work, as documented, which satisfies the product performance requirements.

Scope of Work

- New traditionally framed roof over exterior awnings
- Ensure continuous alignment of cladding at junction of differing substrates

Cladding Product

- Wall cladding: Trimdek®
- Material: COLORBOND® steel conforming to AS 1397-G550-AZ150 and AS 2728.
- Colour: Dover White®, Monument®
- Orientation: Vertical and Horizontal

1.2 COMPANY CONTACTS**BlueScope Steel technical contacts**

Website: www.bluescopesteel.com.au/our-company/contact-us

1.3 CROSS REFERENCES**General**

Requirement: Conform to the following worksection(s):

- 0171b General requirements.
- 0431b Roofing – Combined
- 0451b Windows, Glazed Doors and Automatic Sliding doors
- 0471 Insulation and Pliable Membranes
-

1.4 MANUFACTURER'S DOCUMENTS**Technical manuals**

Website: steelproducts.bluescopesteel.com.au/home/technical-library

1.5 INSPECTION**Notice**

Inspection: Give notice so that the framing, sarking, vapour barrier and insulation may be inspected before they are covered up or concealed.

1.6 SUBMISSIONS**Products and materials**

Type tests: As appropriate for the project, submit results of facade testing as follows:

- Water penetration to AS/NZS 4284 (2008).
- Structural testing to AS/NZS 4284 (2008).
- Resistance to wind pressure:
 - . For non-cyclone regions to AS 4040.2 (1992).
 - . For cyclone regions to AS 4040.3 (2018).

Samples

Finish: Submit samples of the cladding materials.

Subcontractors

General: Submit names and contact details of proposed suppliers and installers.

Evidence of experience: [complete/delete]

Seamed sheet metal cladding: Submit evidence of experience with non-ferrous cladding installation.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties**.

Cladding materials: Submit the manufacturer's product warranties.

2 PRODUCTS

2.1 GENERAL**Product substitution**

Other cladding: Conform to **PRODUCTS, GENERAL, Substitutions** in the *General requirements* worksection.

2.2 MARKING**Identification**

General: Deliver materials to the site in BlueScope Steel 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 COLORBOND® COMPONENTS**Fasteners**

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

Fastenings to timber battens: Provide fastenings just long enough to penetrate the thickness of the batten without piercing the underside.

2.4 COLORBOND® CLADDING**Standards**

Design and installation: To AS 1562.1.

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

Wall sheet installation

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

Accessories: Provide material with the same finish as cladding sheets

2.5 WEATHERPROOFING**Flashings, Corner, Window/door Reveal Flashings and Cappings**

Standard: To AS/NZS 2904.

Material: The selected cladding product material.

Requirement: Finish off at corners, window and door reveals with purpose-made folded flashing strips. Provide Purpose made folded flashing to the top of the wall system at the junction of the roof fascia.

Control joints: At all external corners, adjacent to all openings and at maximum 6 m centres.

Installation Code for Metal Roofing and Wall Cladding.

Flashings Cappings and the like to be colour matched to the panels.

3 EXECUTION

3.1 TOLERANCES

Permitted deviations

Requirement: To AS 1562.1 clause 4.2.

3.2 CONSTRUCTION GENERALLY

Substrates or framing

Preparation: Before fixing cladding check and, if necessary, adjust the alignment of substrates or framing.

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.

3.3 COMPLETION

Warranties

Cladding materials: Submit the manufacturer's published product warranties. Use only where warranties extending beyond the defects liability period are available for the particular system. Insert the required warranty period and terms, which should be negotiated beforehand. If the warranty is in the form of separate material and installation warranties, require the signatures of both manufacturer and installer. BlueScope Steel has an internet based system Warranty Estimator and Management System that allows access to warranty advice for BlueScope Steel building products and pre-approved warranties at www.bluescopesteel.com.au/warranties.

0451B WINDOWS, DOORS, GLAZED DOORS AND AUTOMATIC SLIDING DOORS

4 GENERAL

4.1 RESPONSIBILITIES

General

General: Provide windows, glazed doors and automatic sliding doors, as documented and in accordance with attached data sheets.

To be read in conjunction with the Section J Approvals

Performance

Product design: Provide windows with sashes capable of being opened to satisfy the documented maintenance requirements.

- Main Entry – Dorma 200 automated bi-parting sliding doors
- See attached specification sheets

4.2 COMPANY CONTACTS

Dorma Automatic Doors or similar

Website: <https://www.dormakaba.com/au-en>

4.3 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements.*
- *Door Hardware*

4.4 STANDARDS

General

Selection and installation: To AS 2047.

- Building classification: Class 9b

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.

Fire Escape Requirements for automatic sliding doors

Automatic Sliding Doors: To AS5007

4.5 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).
- Commencement of window installation.

4.6 SUBMISSIONS

Certification

Sealant compatibility: Submit statements from, all parties to the installation, that certify the compatibility of sealants and glazing systems to all substrates.

Shop drawings

Submit shop drawings to a scale that best describes the detail, showing the following information:

- Full size sections of members.
- Hardware, fittings and accessories including fixing details.
- Junctions and trim to adjoining surfaces.

- Layout (sectional plan and elevation) of the window assembly.
- Lubrication requirements.
- Methods of assembly.
- Methods of installation, including fixing, caulking and flashing.
- Provision for vertical and horizontal expansion.
- Method of glazing, including the following:
 - . Rebate depth.
 - . Edge restraint.
 - . Clearances and tolerances.
 - . Glazing gaskets and sealant beads.

Certification: Submit an engineers' certificate confirming compliance with AS 2047.

Subcontractors

General: Submit names and contact details of proposed manufacturers and installers. Have windows and glazed doors installed by their manufacturer or by a subcontractor recommended by the manufacturer.

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: To AS/NZS ISO 717.1.

5 PRODUCTS

5.1 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.

5.2 GENERAL

Standards

Flashings: To AS/NZS 2904.

Aluminium extrusions: To AS/NZS 1866.

5.3 GLASS

Glass types and quality

Standard: To AS/NZS 4667.

Glazing plastics

General: Free from surface abrasions, and warranted by the manufacturer for 10 years against yellowing or other colour change, loss of strength and impact resistance, and general deterioration.

Safety glasses

Standard: To AS/NZS 2208.

Certification: Required.

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

Type: Grade A when used in curtain walls.

5.4 GLAZING MATERIALS

If windows and glazed doors are selected as complete proprietary items, delete this clause.

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.

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.

5.5 GLASS IDENTIFICATION

Safety glazing materials

Identification: To AS 1288.

Noise reducing glazed assemblies

Labelling: Label each panel with a legible non-permanent mark, self-destroying when removed, stating and certifying the R_w rating, and identifying the testing authority. Remove when directed.

5.6 ALUMINIUM FRAME FINISHES

Powder coatings

Standard: To AS 3715.

Grade: Architectural coating.

Colour: White

5.7 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.

Locks and latches

Standard: To AS 4145.3.

Sash balances

Requirement: Match the spring strength of the balances to the sash weight they support.

6 EXECUTION

6.1 INSTALLATION

Glazing

General: Install the glass so that:

- Each piece is permanently fixed in place to withstand the normal loadings and ambient conditions at its location without distortion or damage to glass and glazing materials.
- Building movements are not transferred to the glass.
- External glazing is watertight and airtight.

Temporary marking: Use a method which does not harm the glass. Remove marking on completion.

Toughened glass: Do not cut, work, or permanently mark after toughening. Use installation methods which prevent the glass making direct contact with metals or other non-resilient materials.

Preglazing

Window assemblies and glazed doors: Supply inclusive of glazing, shop preglazed.

Windows and glazed doors

General: Install windows and glazed doors frames as follows:

- Plumb, level, straight and true within acceptable building tolerances.
- Fixed or anchored to the building structure in conformance with the wind action loading requirements.
- Isolated from any building loads, including loads caused by structural deflection or shortening.
- Allow for thermal movement.

Weatherproofing

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.

In situ touch up

Polyester or fluoropolymer coatings: Contact supplier for approval to apply touch up products, otherwise replace damaged material.

Trim

General: Provide mouldings, architraves, reveal linings, and other internal trim using materials and finishes matching the window frames. Install to make neat and clean junctions between frames and the adjoining building surfaces. Return Building internal building linings to meet the window frames with casing beads.

6.2 COMPLETION

Trade clean

Method: Clean with soft clean cloths and clean water, finishing with a clean squeegee. Do not use abrasive or alkaline materials.

Extent: All frames and glass surfaces inside and out.

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.

Warranties

Window and door assemblies: Submit the manufacturer's published product warranties.

Hardware: Submit the manufacturer's published product warranties.

0451P ALSPEC ALUMINIUM WINDOWS AND DOORS

1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide ALSPEC aluminium systems, as documented.

To be read in conjunction with the Section J report by Partners Energy Pty.Ltd.

1.2 COMPANY CONTACTS**ALSPEC Aluminium Systems technical contacts**

Website: www.alspec.com.au/contact/.

1.3 CROSS REFERENCES**General**

Requirement: Conform to the following:

- 0171 General requirements.

1.4 STANDARDS**General**

Selection and installation: To AS 2047 (2014).

Building classification:

Ground Floor Class 9b assembly building

Glazing

Glass type and thickness: To AS 1288 (2021), if no glass type or thickness is nominated.

Materials and installation: To AS 1288 (2021).

Quality requirements for cut-to-size and processed glass: To AS/NZS 4667 (2000).

1.5 MANUFACTURER'S DOCUMENTS**Technical manuals**

Commercial Systems - ALSPEC Hunter Evo 150 Aluminium Systems: www.alspec.com.au.

Security Systems - Invisi-Gard Stainless Steel Security: www.invisi-gard.com.au.

Specifiers' guides and CAD drawings: www.alspec.com.au.

1.6 INTERPRETATION**Abbreviations**

General: For the purposes of this worksection, the following abbreviations apply:

- AGWA: Australian Glass and Window Association.
- WERS: Window Energy Rating Scheme.

Definitions

General: For the purposes of this worksection, the definitions given in AS/NZS 4668 (2000) and the following apply:

- Aluminium joinery: The collective term used for aluminium framed and glazed windows and doors.
- Hardware: To AS 4145.1 (2008) Section 2.
- Louvres - continuous: Louvres that run continuously past, and are supported by, concealed framing or brackets.
- Louvres - horizontal: Louvres that span horizontally between frame stiles, mullions or vertical supports.
- Louvres - vertical: Louvres that span vertically between frame heads and sills, or horizontal supports.
- Total system SHGC: Solar heat gain coefficient as defined by the NCC and tested in conformance with NFRC 200 (2023).

- Total system U-Value: Thermal transmittance as defined by the NCC and tested in conformance with NFRC 100 (2023).
- Weathering: Inclined upper external surface, such as of a coping, sill, or top of a buttress or chimney, designed to shed rainwater quickly and throw it clear of the facing material below.

1.7 SUBMISSIONS

Certification

Windows and glazed doors: Submit evidence of conformity to AS 2047 (2014).

Sealant compatibility: Submit statements from all parties to the installation certifying the compatibility of sealants and glazing systems to all substrates.

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.

Toughened glass: For each batch of glass, submit certification from the manufacturer of heat soaking.

Fire performance

Fire-resistance level: Submit evidence of conformity to PRODUCTS, **Error! Reference source not found., Error! Reference source not found..**

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION, Operation and maintenance manuals.**

Products and materials

Safety glazing materials: Submit evidence of conformity to AS/NZS 2208 (1996) Appendix A.

Type tests: Submit results, as follows:

- Acoustic performance of windows and doors.
- Protection of openable windows.

Samples in prototypes: Install required samples in prototypes.

Samples

General: Submit samples labelled with the series code reference and date of manufacture.

Aluminium joinery: Submit samples of the following:

- Prefinished production materials showing the limits of the range of variation in the documented colour.
- Joints made by proposed techniques.
- Sections for frames, sashes, louvres and slats.

Glazing: Submit samples of glazing materials, each at least 200 x 200 mm, showing the visual properties and range of variation, if any, for each of the following:

- Tinted or coloured glass or plastics glazing.
- Surface modified or surface coated glass.
- Patterned or obscured glass or plastics glazing.
- Ceramic-coated glass.
- Wired glass.
- Mirror glass.

Hardware and accessories: Submit samples of the following:

- Window manufacturer's standard hardware and accessories including locks, latches, handles, catches, sash operators, anchor brackets and attachments, masonry anchors and weatherseals (pile or extruded).
- Generic hardware: Submit samples of generic hardware not documented as proprietary items.

Shop drawings

General: 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.
- 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.

Subcontractors

General: Submit names and contact details of proposed subcontractors endorsed by ALSPEC.

Warranties

Requirement: Submit ALSPEC warranty to **Error! Reference source not found., Error! Reference source not found..**

1.8 INSPECTION**Notice**

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

- Prototypes constructed and ready for inspection.
- Openings prepared to receive windows.
- 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.

2 PRODUCTS**2.1 GENERAL****Product substitution**

Other products: Conform to **SUBSTITUTIONS** in *0171 General requirements*.

Storage and handling

Storage: Store in a clean, dry area unaffected by weather, to the manufacturer's recommendations. Protect from building materials and loose debris such as wet plaster, mortar, paint and welding splatter.

Handling: Handle frames to the manufacturer's recommendations and as follows:

- Stack upright, off the ground and against a flat, vertical surface.
- Carry in the vertical position with sashes locked.
- Do not rack frames out of square.
- Do not remove any bands and corner bracing until after installation.

Acoustic performance

Windows and doors: Rating to AS/NZS ISO 717.1 (2004), as documented.

Protection of openable windows

Fall prevention: To BCA (2022) D3D29 and BCA (2022) H5D3.

Product identification

General: Marked to show the following:

- Manufacturer's identification.
- Product brand name.
- Product type.
- Quantity.
- Product reference code and batch number.
- Date of manufacture.

Marking

Window assemblies: To AS 2047 (2014) Section 8.

2.2 FIRE PERFORMANCE

Fire-resistance of building elements

Fire-resistance level: Tested to AS 1530.4 (2014).

2.3 ALSPEC COMMERCIAL FRAMING

Hunter Evo Flush Glazed Framing

Description: Single or double flush glazed framing system.

Framing section: 150 mm x 50 mm.

- Single glazing: 4 mm to 14 mm thick.
- Double glazing: 15 mm to 40 mm thick.
- Maximum panel height: 4500 mm.
- Maximum panel width: 2400 mm.

2.4 GLAZING

Performance

Glass: Free from defects that detract from appearance or interfere with performance under normal conditions of use.

Plastics glazing: 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.

Heat soaking

Requirement: Heat soak glass to AS 1288 (2021) clause 3.8.

Standard: To EN 14179-1 (2016).

Marking: To EN 14179-1 (2016) or certified by the manufacturer to AS 1288 (2021) clause 3.8.2.

Safety glazing materials

Standard: To AS/NZS 2208 (1996).

Type: Grade A to AS 1288 (2021).

Certification: Required.

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

Marking: To AS/NZS 2208 (1996) clause 1.7.

Heat-strengthened glass

Requirement: Heat-strengthened annealed glass that requires extra strength and thermal resistance.

Standard: To ASTM C1048 (2018).

Ceramic-coated glass

Requirement: Heat-strengthened or toughened glass with a coloured ceramic coating fused to and made an integral part of the surface to ASTM C1048 (2018), Condition B.

Opacified glass

Requirement: Glass with an opacifier permanently bonded to the inner face.

Insulating glass units (IGUs)

Requirement: Provide insulating glass units, as documented.

Manufacture, testing and installation: To AS 4666 (2012).

2.5 GLAZING MATERIALS

General

Requirement: Putty, glazing compounds, sealants, gaskets, glazing tapes, spacing strips, spacing tapes, spacers, setting blocks and compression wedges appropriate for the conditions of application and required performance.

Jointing materials

Requirement: Jointing and pointing materials that are compatible with each other and the contact surfaces, and non-staining to finished surfaces to manufacturer's recommendations. Do not provide bituminous materials on absorbent surfaces.

Elastomeric sealants

Sealing compounds (polyurethane, polysulfide, acrylic): To ASTM C920 (2018) or ISO 11600 (2002).

Sealing compounds (silicone): To ASTM C920 (2018) or ISO 11600 (2002).

Sealing compounds (butyl): To ASTM C1311 (2022).

Primer

Compatibility: Apply the manufacturer's 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 that do not absorb water.

Bond breaking: Provide backing rods, and other back-up materials for sealants, that do not adhere to the sealant.

2.6 SCREENS

General

Requirement: Provide screens, as documented.

Fixed screens

General: Fixed screens fitted to the window frames with a clipping device that allows for removal for cleaning.

Hinged screens

General: Screens hinged at the top to give access to opening sash.

Retractable screens

General: Proprietary retractable screens, comprising aluminium frames and fibreglass mesh, fitted between the guide channels incorporated in the frames, and a retraction system including tension spring, bearings, positive self-locking device and elastomeric sealing strip at sill.

Sliding screens

General: Screens that are not part of the window frame, with matching aluminium head guide, sill runner, and frame stile sections.

Hardware: Nylon slide runners and finger pull handle. Provide pile strip closers against sash where necessary to close gaps.

Aluminium framed screens

General: Aluminium extruded or folded box frame sections with mesh fixing channel, mitred, staked and screwed at corners. If necessary to adapt to window opening gear, provide an extended frame section.

Mesh: Bead the mesh into the frame channel with a continuous resilient gasket, so that the mesh is taut and free of distortion.

2.7 ALUMINIUM FRAME FINISHES

Powder coatings

Standard: To AS 3715 (2002).

Product: [complete/delete]

Anodised

Standard: To AS 1231 (2000).

Thickness:

- Internal: 15 microns.
- External: 20 microns.

2.8 ANCILLARY COMPONENTS AND FITTINGS

Trim

General: Provide trim, shadow angles and architraves, as documented.

Extruded gaskets and seals

General: Provide seals, as documented.

Materials: Non-cellular (solid) elastomeric seals as follows:

- Rubber products: Neoprene, ethylene propylene diene monomer (EPDM) or silicone rubber.
- Flexible polyvinyl chloride (PVC): E type compounds, colourfastness grade B.

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 (1995).

Nylon brush seals

General: Dense nylon bristles locked into holding strips and fixed in a groove in the edge of the door or in purpose-made anodised aluminium holders fixed to the door or frame to the manufacturer's recommendations.

Pile weatherstrips

General: Provide weatherstrips, as documented.

Standard: To AAMA 701/702 (2023).

Material: Pile and backing or equivalent polypropylene, low friction silicone treated, ultraviolet stabilised, fixed to the frame to the manufacturer's recommendations.

Finned type: A pile weatherseal with a central polypropylene fin bonded into the centre of the backing rod and raised above the pile level.

Weather bars

General: A weather bar for hinged external doors, located under the centres of closed doors.

2.9 HARDWARE**General**

Requirement: To ALSPEC's recommendations.

Window locks and latches

Standard: To AS 4145.2 (2008).

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: Provide sash operators, as documented.

2.10 KEYING**Contractor's keys**

Master key systems: Do not use any key under a master key system.

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

Pin tumbler locks: Nickel alloy, not brass.

Lever locks: Malleable cast iron or mild steel.

Keying system

Requirement: Keying system, as documented.

Coding of locks: If window locks are included in building key code groups, provide cylinder or pin tumbler locks coded to match.

Number of keys table

Code	Key type	Minimum number of keys
KD	Locks keyed to differ	2 for each lock
KA#	Locks keyed alike:	
	2 locks in code group	4
	3 to 10 locks in code group	6
	11 to 40 locks in code group	10
	41 and over locks in code group	1 for every 4 locks or part thereof

3 EXECUTION

3.1 GLAZING PROCESSING

General

Processing: Perform required processes on glazing, 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 arised.

3.2 INSTALLATION

General

Requirement: Install windows and glazed doors as follows:

- Plumb, level, straight and true within 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.

Glazing

Requirement: 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 glazing materials.
- No transfer of building movements to the glazing.
- Watertight and airtight for external glazing.

Temporary marking: Use a method that does not damage the glazing. Remove marking only after certification and acceptance of the installation.

Toughened glass: Do not cut, drill, edgework or permanently mark after toughening. Use installation methods that prevent the glass making direct contact with metals or other non-resilient materials.

Frameless installations: Join the vertical edges of adjacent glass panels with silicone jointing compound.

Heat-absorbing glass: In locations exposed to direct sunlight, provide wheel cut edges free from damage or blemishes, with minimum feather.

Weatherproofing

Flashing and weatherings: Install flashings, weather bars, threshold plates, drips, storm moulds, joint sealant and pointing to prevent water penetrating the building between the window frame and the building structure under the prevailing service conditions, including normal structural movement of the building.

Fixing

Packing: Pack behind fixing points with durable full width packing.

Fasteners: Conceal fasteners.

Fasteners and fastener spacing: To the recommendations of the AGWA (Australian Glass and Window Association) *An industry guide to the correct fixing of windows and doors (2021)*.

Joints

General: Make accurately fitted tight joints so that fasteners or fixing devices such as pins, screws, adhesives and pressure indentations are not 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 before completion of the works.

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 SECURITY WINDOW GRILLES**General**

Installation: To AS 5040 (2003).

3.4 HARDWARE**Fasteners**

Materials: Use materials compatible with the item being fixed and of sufficient strength, size and quality to perform their function.

- Concealed fasteners: Provide a corrosion-resistant finish.
- Exposed fasteners: Match exposed fasteners to the material being fixed.

Support: Provide appropriate back support (for example lock stiles, blocking, wall noggings and backing plates) for hardware fasteners.

- 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, if required by and conforming to 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.

3.5 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 that 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.

Repair of finish

Polyester or fluoropolymer coatings: Contact supplier for approval to apply touch up products, otherwise replace damaged material.

Cleaning

Method: Clean with soft clean cloths and clean water, finishing with a clean squeegee. Do not use abrasive, acidic or alkaline materials.

Extent: All frames and glass surfaces internally and externally.

Operation and maintenance manuals

Requirement: Prepare a manual that includes the manufacturer's published recommendations for operation, care and maintenance.

Warranties

Aluminium joinery excluding hardware:

- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: 7 years, conditional on compliance with the AGWA Code of Conduct.

Powder coating:

- Dulux Duralloy:
 - . Film integrity: 10 years.
 - . Colour integrity: 10 years.
- AkzoNobel Interpon D 610:
 - . Film integrity: 7 years.
 - . Colour integrity: 10 years.

Hardware supplied

Hardware supplied separately: by Dormakaba

0453B DOORS AND ACCESS PANELS

1 GENERAL**1.1 RESPONSIBILITIES****General**

General: Provide doors, frames, doorsets, security screen doors and fire doorsets, as documented.

Scope of Work

- *Solid core timber doors with Louvered Grilles and stainless steel kick plates, Door closers, Viewing Panels*
- *All Doors panels to be a minimum standard with of 920mm excluding frame depth.*
- *All timber doors are to be pre-primed for an enamel semi-gloss finish*
- *2hr fire rate doors to the main switchboard room*
- *EDB doors with non-combustible sheathing smoke seals and the like.*

1.2 CROSS REFERENCES**General**

Requirement: Conform to the following worksection(s):

- *General requirements.*
- *Door hardware- see Annexed schedule by DormaKaba*
- Windows – Architectural Window Schedule.

1.1 COMPANY CONTACTS

Alspec Website : <https://www.alspec.com.au/ecoframeplus-101mm-centre-pocket>

Louvre Grille Inserts: <http://airadditions.com.au/rayflow-grilles-and-diffusers/door-grille/>

Aluminium Door Frames: <https://www.alspec.com.au/swan-evo-45mm-commercial-door>
[cc https://www.rondo.com.au/products/access-panels#close](https://www.rondo.com.au/products/access-panels#close)

Steel Doors: www.lathamsteeldoors.com.au

1.3 INTERPRETATION**Definitions**

General: For the purposes of this worksection 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.
 - . **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 Door Frames

Type: Assemble frames from coated steel sections, including necessary accessories such as buffers, strike plates, spreaders, mortar guards, switch boxes, fixing ties or brackets, and cavity flashing with suitable provision for fixing hardware; prefinished with protective coatings, built in or fixed to prepared openings.

Sections

Rebates: Incorporate rebates or double rebates where required for side hung doors or glazed transoms.

Metallic-coated steel sheet: To AS 1397.

Minimum steel Assembly methods

Mechanical: Site assemble from “knocked down” components by mechanical methods, e.g. slot and lug joints.

Welded: Shop assemble fire rated and heavy duty frames by continuous welding. Grind the welds smooth and cold galvanize the welded joints before shop priming.

Finish

Prefinish: Zinc-iron.

Shop priming: Shop prime the sections for the painting system.

Hardware and accessories

General: Provide for fixing hardware including hinges and closers, using 4 mm backplates and lugs. Screw fix the hinges into tapped holes in the back plates.

Spreader: Removable spreader bar for frames to be built into masonry construction.

Hardware accessories: Mortar guards and reinforcing plates for the hardware.

Buffers: Two resilient grommet type buffers.

Cavity flashing: For external frames in cavity masonry.

Switch boxes (for light switches on door frame): Form from steel sheet of the same type as the frame, with clearance hole top and bottom, and weld into position.

Glazing beads (for glazed transom lights): Fabricate from material of the same type as the frame. Mitre corners. Screw to frames with matching countersunk head screws at 300 mm maximum centres.

Installation

Building in to masonry: Attach galvanized rod ties to stiles at 600 mm maximum centres. Build in and grout up solid.

Installing in existing masonry: To AS/NZS 1905.1, Appendix D. Fix with bonded hairpin anchors.

Fixing to stud frames: Clip galvanized brackets to frame jambs at 600 mm maximum centres and fasten to the stud frame.

2.2 DOORS

General

Doors: Proprietary products manufactured for interior or exterior applications and for the finish required.

Materials

Standards: Conform to the following:

- Decorative laminated sheets: To AS/NZS 2924.1.
- 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.

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.

Flush doors

General: Provide flush doors of balanced construction.

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.
- Allow and install for aluminium framed/louvred door grilles equal to Rayflow DG6030 to all doors indicated on the door schedule.

Smoke doors: Solid core $\geq$ 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 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.

2hr Fire Rated Door

Adhesives:

- Internal: To AS/NZS 2270.
- External: To AS/NZS 2271.

Door thickness:

- General: 45 mm.
- External doors and doors over 900 mm wide: 40 mm.

Core: Vermiculite sheet

Cut outs: If openings are required in flush doors (e.g. for 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.

2.3 DOORSETS

Fire-resistant doorsets

Standard: To AS 1905.1 and BCA Spec C3.4.

2.4 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, ultra-violet stabilised.
- Rubber products (neoprene, ethylene propylene diene monomer (EPDM) or silicone rubber): To BS 4255-1.

Flashings

General: Corrosion resistant, compatible with the other materials in the installation, and coated with a non-staining compound where necessary.

Standard: To AS/NZS 2904.

Jointing materials

General: Compatible with each other and with the contact surfaces and non-staining to finished surfaces. Do not provide bituminous materials on absorbent surfaces.

Nylon brush seals

General: Dense nylon bristles locked into galvanized steel strips and fixed in a groove in the edge of the door or in purpose-made anodised aluminium holders fixed to the door with double sided PVC foam tape.

Pile weather strips

General: Polypropylene or equivalent pile and backing, low friction silicone treated, ultra-violet stabilised.

Standard: To AAMA 701/702.

Weather bars

General: Provide a weather bar under hinged external doors, locate under the centres of closed doors.

2.5 CEILING ACCESS PANELS

Fit new Ceiling access panels equal to Rondo SRAP FE 530x530mm with slimline polymer frame to allow access for servicing plant located above the ceiling generally in the viewing area, changing places room and the hallway outside the training room entry. Install in accordance with the manufacturers recommendations and specification. Confirm locations with the relevant trades.

3 EXECUTION

3.1 FRAMES

General

Frames: Install the frames are 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: ≥ 25 mm.
- Thickness: ≥ 1.5 mm.

Depth of fixing for building into masonry:

- Brackets: ≥ 200 mm.
- Expansion anchors: ≥ 50 mm.
- Plugs: ≥ 50 mm.
- Rods: ≥ 60 mm.

Jamb fixing centres: ≤ 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 in to masonry: Screw galvanized steel brackets twice to jambs and build in.

Fixing to masonry openings: Build in seasoned timber plugs to masonry joints or use proprietary expansion anchors and screw twice through jambs at each fixing.

Fixing to stud frame openings: Screw once to studs at each fixing.

Steel frames

Building in to masonry: Attach galvanized steel rods to jambs, build in and grout up.

Fixing to masonry openings: Build in hairpin anchors and install locking bars, or use proprietary expansion anchors and screw twice through jambs at each fixing.

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. Return Building internal building linings to meet the window/door frames with casing beads.

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 and sides before installation – 3 coats.

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.

0454P B&D GROUP IN OVERHEAD DOORS
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1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide B&D overhead doors, as documented.

Level 00 - To Court Hall and adjacent to Store 2

1.2 COMPANY CONTACTS

B&D Group technical contacts

Website: www.bnd.com.au/contact-us

1.3 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 *General requirements.*
- 0331 *Brickwork and Blockwork*
- 0451b *Windows, Glazed Doors and Automatic Sliding doors*
- 0471 *Insulation and Pliable Membranes*
- 0456p *Safety Jalousie Louvre Windows*
- 0453b *Doors and Access Panels*
- 0455 *Door Hardware*

1.4 STANDARDS

General

Garage doors and other large access doors: To AS/NZS 4505.

Design wind pressure: To AS/NZS 1170.2.

Fire shutters: To AS 1905.2.

1.5 INTERPRETATION

Definitions

General: For the purposes of this worksection the definitions in AS/NZS 4505 and AS 1905.2, and the following apply:

- Wicket: Door side-hung on the vertical guide and interlocking with the closed curtain.

1.6 MANUFACTURER'S DOCUMENTS

Technical manuals

Website: www.bnd.com.au/architects-specifiers-landing

1.7 SUBMISSIONS

Certification

Fire shutters: Submit evidence of compliance of installation to AS 1905.2.

Operation and maintenance manual

General: Submit the manufacturer's published instructions for operation, care and maintenance.

Products and materials

Type tests: Submit results, as follows:

- Fire-resistance: Verification from an accredited test laboratory of fire-resistance level.
- Acoustic performance: Verification from an accredited test laboratory of weighted sound reduction index (R_w).
- Wind-borne debris impact: Verification from an accredited testing laboratory of wind-borne debris impact rating.

Samples

General: Submit 2 samples of each of the following where applicable:

- Sections proposed for frames, louvres and slats.
- Joints made, using proposed techniques.
- Finishes to prepared surfaces.
- Colour samples from prefinished production material (e.g. anodised or organic coated extrusions and sheet) showing the limits of the range of variation, if any, for each component documented.
- Door manufacturer's standard hardware items.

Shop drawings

General: Submit shop drawings showing details of each assembly, component and connection, and information relevant to fabrication, surface treatment and installation.

Motorised overhead doors: Submit shop drawings showing location of motor, wiring, power requirements, location and type of safety devices, location of manual operation switch, and other electronic components.

Subcontractors

General: Submit names and contact details for proposed B&D Group approved suppliers and installers.

1.8 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.

2 PRODUCTS

2.1 GENERAL**Product substitution**

Other products: Conform to PRODUCTS, **GENERAL**, **Substitutions** in *0171 General requirements*.

Door assembly

Requirement: Provide complete with B&D door assembly standard operating system, hardware, and accessories.

Marking and labelling

General: To AS/NZS 4505 Section 8.

2.2 B&D ROLLING SHUTTER DOORS**B&D industrial rolling shutter door range**

B&D Series 90 Industrial Aluminium Shutter: Interlocking 1.4 mm x 90 mm extruded aluminium slat curtain fitted with moulded nylon clips running in extruded aluminium guides.

Perforation Size: 6.5mm holes **Note: Perforated slats to occur to bottom third of overall height of the shutter door**

Colour: Woodland Grey

Curtain

Rolling shutter: Individual horizontal interlocking slats with interlocking hinges.

Rolling grille: Articulated curtain formed of horizontal members spaced apart and connected by vertical links.

Fire shutter: Roll formed galvanized interlocking steel slats, each slat fitted with steel end caps.

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.

Springless: Direct drive.

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:
 - . Chain: Chain operated shutter fitted with a spur gear attached to one end of the drum and meshing with reduction gears.
- Motorised: Direct drive or chain drive. 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.

2.3 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.

3 EXECUTION

3.1 INSTALLATION**General**

Requirement: Install overhead door assembly in conformance with B&D Group's recommendations and as documented.

Preparation

Substrate: Before start of installation, check the alignment of substrates or framing and adjust if required.

Frames, guides and tracks

Requirement: Install frames, guides and tracks 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.

Warranties

General: Submit B&D Group's published product warranties.

0455 DOOR HARDWARE

1 GENERAL**1.1 RESPONSIBILITIES****General**

Door hardware schedule by DormaKaba **NAT25137: Multipurpose + Evacuation Centre**
Specification found in the Appendix at the end of this document.

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.

Key Schedule; Final key system to be determined with Superintendent during the project. It is envisaged that the key system will have a three tier requirements.

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**.

1.2 COMPANY CONTACTS**1.3 CROSS REFERENCES****General**

Requirement: Conform to the following worksection(s):

- *General requirements.*
- *0453b Doors and access panels*
- *0451p AWS Aluminium Windows and Doors*

1.4 INTERPRETATION**Abbreviations**

General: For the purposes of this worksection the abbreviations given in AS 4145.1 Appendix D apply.

Definitions

General: For the purposes of this worksection the general definitions given in AS 4145.1 Section 2 apply.

Lock function: For the purposes of this worksection the general definitions given in AS 4145.1 Appendix E apply.

1.5 SUBMISSIONS**Door-by-door schedule**

General: Submit a door-by-door hardware schedule.

Information sources: This worksection and the contract drawings.

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.

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.

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.

Refurbishment and alteration work

Reuse of recovered hardware: Submit a proposal describing the standard of cleaning, repair and testing of recovered items and the location where each is to be reused.

Samples

Generic items: Submit samples of hardware items offered as meeting the description of items not specified as proprietary items.

Refurbished items: Submit samples of hardware items offered as meeting the standard of cleaning, repair and testing of recovered 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

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 LOCKS AND LATCHES**Standard**

General: To AS 4145.2.

Padlocks

Standard: To AS 4145.4.

Lock and latch classification

Rating systems: To AS 4145.1 Section 3.

Performance requirements: To AS 4145.2 Section 3.

2.2 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

Timber doors in aluminium frames:

- **Material: Powdercoated aluminium**

Aluminium framed doors in aluminium frames:

- **Material: Powdercoated aluminium**

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.

2.3 HINGE TABLES

Solid core doors

Application: Provide hinges to solid core doors to **Hinges table A**. The table can be used to determine the quantity of hinges required for the nominated door leaf sizes and weights only. For door leaf sizes not specified or with applied finishes use the weight of the door to determine the quantity of hinges required. For door leafs over 80 kg, nominate pivot hinges.

The size of the hinge is determined by the door leaf thickness:

- 35 - 43 mm thick door: 100 x 75 mm # butt hinges with a minimum thickness of 2.5 mm.
- 44 - 55 mm thick door: 100 x 100 mm # butt hinges with a minimum thickness of 2.5 mm.
- > 55 mm thick door: Refer to the door by door hardware schedule.

Hinge pin: The symbol # refers to the pin type. Supply fixed pins to doors opening out or designated as a security doors.

Wide throw: If necessary, provide wide throw hinges to achieve the required door swings in the presence of obstacles such as nibs, deep reveals and architraves.

Hinge table A

Nominal door leaf size (H x W x T) (mm)	Door leaf weight (kg - approx)	Number of hinges
2040 x 920 x 40	≤ 48	3
2040 x 1020 x 40	≤ 52	4
2400 x 720 x 40	≤ 50	4
2400 x 820 x 40	≤ 52	4
2400 x 920 x 40	≤ 55	4

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)	Knuckles (minimum)	Screws/hinge leaf (minimum)
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

2.4 DOOR HANGING SYSTEMS

General

General: Provide sliding door tracks as documented in the **Sliding track schedule**.

2.5 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.

2.6 KEYING**Temporary construction keys and cylinders**

Requirement: Provide one of the following:

- Loan cylinder: Install for construction locks and replace at practical completion.
- Construction keyed master key cylinder: 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: To the **Number of keys table**.

Group keying

Keying system: Provide a group keying system as documented in the **Key codes schedule**.

Existing system: Obtain the details of existing group or master key systems to which a new system is required to be an extension.

Future extensions: Provide master and grandmaster group keying systems which are capable of accommodating future extensions.

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.

Number of keys table

Code	Key type	Minimum number of keys
GGMK	Great grandmaster keys	2
GMK	Grandmaster keys	2
MK	Master keys	2 per code group
KD	Locks keyed to differ	2 per lock
KA	Locks keyed alike:	
	-2 locks in code group	4
	-3 to 10 locks in code group	6
	-11 to 40 locks in code group	10
	-41 and over locks in code group	1 per 4 locks or part thereof

3 EXECUTION**3.1 INSTALLATION****Mounting height**

Locks and latches: Centreline of the door knob or lever spindle above finished floor: Not less than 1000mm

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.

4 SELECTIONS**4.1 PADLOCK SCHEDULE****Location:**

To the fire hydrant enclosure

Padlock schedule

Property	Room or space group 1	Room or space group 2	Room or space group 3
Room or space type	TBC		
Security	Master Key		

4.2 KEYING SCHEDULE

Allow to provide **master keying** system to match levels of existing buildings as approved by the Superintendent.

0194P RAVEN DOOR SEALS AND WINDOW SEALS
--

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide RAVEN door seals and window seals, as documented.

Performance

Handling: Before supply, verify on site, the correct handling of hardware items.

Operation: Make sure working parts are accurately fitted to smooth close bearings, without binding or sticking, free from rattle or excessive play, lubricated if appropriate.

1.2 PERFORMANCE

Bushfire-prone areas

Bushfire Attack Level (BAL): To AS 3959 (2018).

1.3 COMPANY CONTACTS

RAVEN technical contacts

Website: www.raven.com.au.

1.4 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

1.5 STANDARDS

Seals general

Quality management for manufacture: To ISO 9001 (2015).

Acoustic applications: Tested to AS 1191 (2002) or EN ISO 10140-2 (2021) and rated to the NCC cited AS/NZS ISO 717.1 (2004).

Fire door assemblies: To AS 1530.4 (2014) and AS 1905.1 (2015).

Smoke door assemblies: To BCA (2022) Spec 12, tested to AS 1530.7 (2007) and rated to AS 6905 (2007), and tested to EN 1634-3 (2004).

Combined fire and smoke door assemblies: To BCA (2022) Spec 12, AS 1530.4 (2014), AS 1905.1 (2015), AS 1530.7 (2007) and AS 3959 (2018) for weather seals providing BAL-FZ.

Buildings in bushfire-prone areas: To AS 3959 (2018):

- BAL-40: Flame retardant silicon, PVC and TPE weather seals with a Flammability Index not more than 5 when tested to AS 1530.2 (1993).
- BAL-FZ: Approved door seals for use with fire doorsets tested to AS 1530.4 (2014).

Weather and energy saving seals for proprietary windows and door assemblies: To AS 4420.1 (2016) clause 5 and clause 6, and AS 2047 (2014).

Door bottom and perimeter seals for glazed external doors: To AS 2047 (2014).

Threshold plates: To the NCC cited AS 1428.1 (2009).

1.6 MANUFACTURER'S DOCUMENTS

Technical manuals

Website: www.raven.com.au.

1.7 INTERPRETATION

Abbreviations and definitions

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

Ordering abbreviations:

- Al: Aluminium.

- B/A: Bronze anodised (15 µm for door bottom seals and perimeter seals, 25 µm for threshold plates).
- B/K: Black anodised (15 µm for door bottom seals and perimeter seals, 25 µm for threshold plates).
- C/A: Clear anodised (15 µm for door bottom seals and perimeter seals, 25 µm for threshold plates).
- EPDM: Ethylene Propylene Diene Monomer.
- PE: Painted Polyester Enamel finish (special order and extra cost).
- PVC: Polyvinyl Chloride.
- Si: Silicone Rubber.
- TPE: Thermoplastic Elastomer.

1.8 SUBMISSIONS

Samples

Requirement: Submit samples to PRODUCTS, **GENERAL**, **Samples**.

2 PRODUCTS

2.1 GENERAL

Product substitution

Other products: Conform to **SUBSTITUTIONS** in 0171 *General requirements*.

Product identification

General: Marked to show the following:

- Manufacturer's identification.
- Product brand name.
- Product type.
- Quantity.
- Product reference code and batch number.
- Date of manufacture.

2.2 MATERIALS

Aluminium

Material: Commercial grade alloy 6060, 6061 or 6063 with T5 or T6 temper.

Finish to visible extrusions:

- Satin clear, bright gold, bronze or black anodised.
- Anodising thickness:
 - . Perimeter seal extrusions: Minimum 15 µm.
 - . Threshold plates and threshold plate seals: Minimum 25 µm.

PVC

RAVEN proprietary grade PVC extrusions:

- Highest quality available.
- Added UV inhibitors if exposed to sunlight.
- Self-extinguishing grade.
- Antimicrobial additive.
- Service temperature -5°C to +70°C.

Si

RAVEN proprietary grade silicon rubber extrusions:

- Are unique and if designated (SE) are self-extinguishing.
- Added UV inhibitors.
- Antimicrobial additive.
- Service temperature of -60°C to +230°C.

TPE

RAVEN proprietary grade TPE extrusions:

- Highest quality available.
- Added UV inhibitors.
- Flammability Index less than 5 to AS 1530.2 (1993) if indicated for bushfire-prone areas.
- Service temperature -40°C to +100°C.

EPDM

RAVEN proprietary grade closed cell EPDM rubber extrusions:

- Highest quality available as developed by the automotive industry.
- Added UV inhibitors.
- Classified SE/B self-extinguishing burn rate to SAE J 369 (2019), and ISO 3795 (1989).
- Service temperature -40°C to +70°C.

3 EXECUTION

3.1 INSTALLATION

Handing

Requirement: Match door seals to the handing of doors.

Supply

Factory fit and retrofit: Deliver door seals for door perimeter seals and door bottom seals in complete sets for each door, ready for installation.

Identification: Mark packaging with relevant floor level and door location number.

Packaging: For rigid length seals, provide recyclable cartons and recyclable polyethylene with fixings and fitting instructions.

Off-site installation to proprietary window and door assemblies: Supply RAVEN TPE and silicon rubber weather stripping on bulk reels.

Door assemblies

Modification: Rebate and groove door assemblies to suit the dimensions recommended by RAVEN.

Fitting instructions: Conform to RAVEN's fitting instructions, supplied with each product.

Fixing

Fasteners:

- Unexposed applications: Zinc-plated self-tapping fasteners supplied by RAVEN with each product.
- External coastal exposure applications: Substitute the standard fasteners supplied with equivalent stainless steel fasteners.

Backset: Allow backset clearances as required for hinging, latching and automatic closers.

Proprietary aluminium door/window frames: Select the fixing options to suit the documented RAVEN perimeter/frame seals.

3.2 COMPLETION

Warranties

Type: Manufacturer's warranty to cover manufacturing defects and defects with products and materials delivered to site.

Period: 2 years.

0457 EXTERNAL SCREENS

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide external screens, as documented.

Performance

Requirement: Conform to the following:

- Plumb, level, straight and true within the building tolerances of the structural system.
- Undamaged and free of surface defects or distortions.
- Fixed or fastened to the building structure.
- Able to resist wind and other actions without vibration or permanent distortion.

Scope of Work

- External façade Louvres North and South and Louvre screens to Rm.18 Plant are HD Luxalon 84R Louvres as detailed
- Sports Hall – Louvreclad Axis Series operable ventilation louvres

1.2 COMPANY CONTACTS

Hunter Douglas Luxalon Facade Louvres technical contacts or similar

Website: <https://ap.hunterdouglas.asia/product/open-structure/open-structure-84r>

Louvreclad Axis Louvres

Website: <https://www.louvreclad.com/solution/axis-series-operable-louvre-system/>

Metal Mesh

Website: <https://www.metalmesh.com.au/perforated-metal-sheet/perforated-metal-aluminium/file:///C:/Users/Z4/Downloads/PR15T20Q.pdf>

1.3 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

1.4 STANDARDS

General

Aluminium framed sunscreens, awnings and shutters:

- Stress analysis of members: To AS/NZS 1664.1 (1997) or AS/NZS 1664.2 (1997).

Horizontal and vertical screen loadings: To AS/NZS 1170.1 (2002).

Electrically operated external louvres and blinds:

- Drive motors: To AS/NZS 60335.2.97 (2017).

Access for maintenance: To AS 1657 (2018).

Bushfire protection: To AS 3959 (2018).

1.5 INTERPRETATION

Abbreviations

General: For the purposes of this worksection, the following abbreviations apply:

- BMS: Building Management System.

Definitions

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

- Louvres - continuous: Louvres that run continuously past, and are supported by, concealed framing or brackets.

- Louvres - horizontal: Louvres that span horizontally between frame stiles, mullions or vertical supports.
- Louvres - vertical: Louvres that span vertically between frame heads and sills, or horizontal supports.
- Supply and fix powder coat aluminium perforated screen to entry portico on the engineered support frame as a backing to the Facility Signage.
- Membrane: A thin and flexible sheet of fabric material.
- Screen: Includes sunscreens, trafficable sunscreens, external louvres and blinds, shutters, screens forming barriers, awnings and pergolas fixed to building facades or openings; to control sunlight and/or provide privacy, to screen plant and equipment, or to provide an architectural feature. It applies to fixed, adjustable, operable and automatically controlled types.
- Shade fabric: A fabric designed to prevent a proportion of sunlight or other light from reaching the area beyond the shade fabric.
- Tensioned membrane: A fabric or sheet material that is held in a predetermined 2- or 3-dimensional shape under permanent tension. The shape and the tension are interrelated and designed to safely carry the permanent and imposed loads (such as those resulting from wind actions) in a predictable manner.

1.6 SUBMISSIONS

Certification

Screens forming barriers design: Submit a professional engineer's certificate confirming conformance with AS/NZS 1170.1 (2002) clause 3.6 and AS/NZS 1170.2 (2021).

Sealant compatibility: Submit statements from all parties to the installation that certify the compatibility of sealants with screen components, finishes and all substrates.

Execution detail

Embedded fixings: Submit details of any proposed alternative methods of fixing.

Fire performance

Combustibility: Submit evidence of conformity to PRODUCTS, **Error! Reference source not found., Error! Reference source not found..**

Fire hazard properties: Submit evidence of conformity to PRODUCTS, **Error! Reference source not found., Error! Reference source not found..**

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION, Operation and maintenance manuals.**

Samples

Requirement: Submit samples to PRODUCTS, **GENERAL, Samples.**

Shop drawings

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

- Layout of the screen assembly (sectional plans, vertical sections and elevations of each building face where screens are to be installed).
- Full size sections of typical members including mullions, transoms, subheads, sills, subsills, louvres, infill panel material or fabric, beads, bearings, linkages, exposed fixings, sealant beads, glazing gaskets, splice plates, trays and cover strips, with notes specifying the proposed materials.
- Method of assembly, including isometric or axonometric and exploded views of typical framing junctions, showing panel to panel joints (for modular systems).
- Method of installation, including the following:
 - . Location and magnitude of reactions to be accommodated by the support structure.
 - . Type and location of fasteners and other attachments to be cast or otherwise built into the building structure.
 - . Erection tolerances.
 - . Accurate locations and full size details of machined slots, keyholes and other penetrations in frame extrusions for lifting and installing the units.
 - . Junctions and trim to adjoining surfaces.
 - . Caulking and flashing.
- Provision for differential vertical or horizontal movements, including the following:

- . Thermal expansion and contraction.
- . Frame deflections.
- . Seismic and wind loads.
- Details of motor and operating mechanism enclosures.
- Method of draining the assembly, including details showing the following:
 - . Pressure equalised drained joints.
 - . Location, number and size of weepholes.
 - . Connection points to rainwater or stormwater systems.
- Hardware, fittings and accessories including window cleaning restraints and visible heads of fasteners.
- Sliding panel locking system to prevent screens moving under wind conditions.
- Infill panel stiffening.
- Location and power requirements of motors, sensors and controls.
- Wiring diagrams of control systems BMS interface details.

Subcontractors

General: Submit names and contact details of the proposed manufacturers and, if the manufacturer is not the installer, the installers recommended by the manufacturers.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties.**

1.7 INSPECTION**Notice**

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

- Fabricated screen assemblies at the factory ready for delivery to the site.
- Fabricated screen assemblies delivered to the site, before installation.
- Completion of prototypes.
- Commencement of installation of screen assemblies.
- Completion of installation.

2 PRODUCTS**2.1 GENERAL****Samples**

Requirement: Provide samples of the following:

- Sections proposed for frame members, louvres, accessories, cover panels and trim.
- Joints made, using proposed techniques.
- Colour samples of prefinished production material (e.g. anodised or thermoset powder coated extrusions or sheet, glazing, infill panel material or fabric), each at least 200 x 200 mm, showing the limits of the range of variation in the selected colour, if any, for each component of the screens specified.
- Accessory and hardware items documented descriptively or by performance (i.e. not proprietary items). Include handles, operators, controls, switches, sensors, motors, fixing clips, anchor brackets and attachments, fixings, gaskets and weatherseals.

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

Storage and handling

General: Deliver, unload and store external screens, components and accessories in unbroken manufacturer's packaging.

Marking

Requirement: Before the separate parts of the screens are delivered to the site, provide suitable and sufficient marks or other means for identifying each part, and for showing its correct location and orientation, when installed.

2.2 FIXED ALUMINIUM LOUVRES

Product

HD Luxalon 84R façade system general

Introduction

Supply and fix Luxalon® 84R Façade System as manufactured by Hunter Douglas Architectural Products.

Description of the system

The system will consist of linear rollformed aluminium panels with round edges, which can simply be clicked on the prongs of a stringer. The stringers are fixed on a non-Luxalon® sub-construction. To prevent contact corrosion by applying dissimilar metals, each fixing of the stringers to the sub-construction must be made through the Luxalon® washer set.

Panels

84R: size 84 x 16 mm manufactured from 0.6 mm aluminium. Panels to be manufactured from pre-painted, stove enamelled aluminium, corrosion resistant alloy EN-AW-3005 or equivalent (according to EN 1396 and EN13523).

Panels have a manufacturer availability 800-6000 mm, other lengths on request). Panels to be coupled in longitudinal direction by means of panel splices or by means of panel overlap.

Join Profiles

Flush join profiles, width 16 mm, manufactured from 0.35 mm aluminium Recessed join profiles, width 16 mm, manufactured from 0.65 mm aluminium Recessed join profiles, width 27 mm, manufactured from 0.65 mm aluminium

Join profiles to be manufactured from pre-painted, stove enamelled aluminium, corrosion resistant alloy EN-AW-3005 or equivalent (according to EN 1396 and ECCA). Join profiles have a standard length of 5000 mm. Join profiles to be coupled in longitudinal direction by means of butting them together.

Stringers

Rows of 0.95 mm thick aluminium rollformed stringers shall be installed at _____ centre to centre on a sub-construction consisting of a supporting steel or aluminium framing of sufficient strength and rigidity to provide

resistance to wind-pressure/suction. Stringers are provided with prongs to hold panels in a module of 146 mm (V2) or 157.7 mm (V3) or 90 mm (V4) or 100 mm (V5) or 111 mm (V6) or 116.6 mm (V8).

Part 3. Additional specification

profiles

Edge, trims drip sections, capping etc. made of stove enameled aluminium strip, with Luxacote® paint finish (± 30 micron).

Coating

Architect will make a colour selection from the standard Hunter Douglas colour range for Luxalon® exterior 84R panels code no. Traffic White

Installation

All materials shall be installed in strict compliance with all local codes; ordinances and manufacturers recommendations including specific additional requirements as may be called for in the specifications or shown on the drawings.

- .

2.3 OPERABLE STEEL VENTILATION LOUVRES

Product:

Louvres will be Louvreclad Axis Series® with up to 86% free open area.

Base Material & Finish

Louvres will be manufactured in (Colorbond /Unicote) finish in (select colour).

Accessories

Louvres will be fitted with (nominate options/accessories from the selection).

Operation Method

The operation method will be electric motor/manual leaver/other (choose method)

Control System

Automated Control will be by _____ (specify sensors and control system) if required.

Installation and Mounting

Installation and mounting details will be designed and engineered to suit the project in accordance with NCC and relevant Australian Standards and proprietary systems and recommendations as designed and manufactured by Louvreclad Pty Ltd. Phone: 1300 165 678 Email: sales@louvreclad.com

Base Material Options

- Zinalume
- Colorbond
- Unicote

Finishes Available

Choose from the following range of finishes:

- complete Bluescope or Unicote colour-coated steel ranges

Other Louvre Accessories

- Rain/weather sensors
- Security screens and bars

Accessories – Bird/Vermin Mesh

Select from the following if required:

- galvanised
- stainless steel

Insect Mesh

Select from the following:

- stainless steel

Note: for mesh accessories, a standoff frame is required to stop the blades fouling with the mesh.

Operating Options

If specifying operable louvres please nominate the operating system from the following:

- electric actuator connected to Mechanical Building Management System

COMPLIANCE

All works are to be designed and engineered under the current version of the Building Code of Australia, together with any further state and municipal requirements. Comply with current edition of required Standards and Codes, including but not limited to:

AS1170/NZS – STRUCTURAL DESIGN / LOAD CODES

In general, Louvreclad products are bespoke custom products installed to the exterior building envelope. As such, Louvreclad will undertake a project-specific structural design review to ensure supplied and installed products meet the requirements of AS/NZS1170.1 – Permanent, imposed, and other actions, AS/NZS1170.2: Wind actions, AS1170.4 – Earthquake actions in Australia.

QUALITY ASSURANCE

ISO 9001:2015: Quality Management Systems

ISO 14001:2018: Environmental Management Systems

ISO 45001:2018 Occupational Health and Safety Management Systems

WARRANTIES

- Bluescope Steel manufacturer's 15–25-year warranty.
- Louvreclad standard one-year workmanship warranty. Extended Warranty available (POA)

CERTIFICATION

- A structural design certificate that complies with NCC and relevant Australian standards will be issued.
- Non-combustible AS1530.3 AND AS1530.1 Test Certificates
- Project-specific test data and certification certificates

COMPLETION

- Operations & Maintenance Manual issued on completion of work.

RELEVANT EXPERIENCE

The Façade Contractor shall provide details of existing examples in Australia of the proposed or similar systems, including the name, address and contact details of an independent person knowledgeable about each example.

Submit details of the experience of all proposed subcontractors and suppliers demonstrating continuous experience with the proposed systems and/or specified products and their required roles.

Façade Contractor Not less than 10 years

Façade System Designer/s Not less than 10 years

Façade System Engineer/s

Chartered Engineer with no less than 10 years' experience and where applicable must also have a building practitioner license applicable to that Australian state/territory e.g. RBPV for Victorian projects.

Installer Not less than 5 years

Glazier Not less than 5 years

Supervisor and Trade Quality Coordinator (TQC) Not less than 10 years

Ancillary materials

Extruded gaskets and seals

Materials: Non cellular (solid) elastopressive seals as follows:

- Flexible polyvinyl chloride (PVC): To BS 2571, 100% solids with high consistency, ultra-violet stabilised.
- Rubber products (neoprene, ethylene propylene diene monomer (EPDM) or silicone rubber): To BS 4255-1.

Flashings

General: Corrosion resistant, compatible with the other materials in the installation, and coated with a non-staining compound where necessary.

Standard: To AS/NZS 2904.

Jointing materials

General: Compatible with each other and with the contact surfaces and non staining to finished surfaces. Do not provide bituminous materials on absorbent surfaces.

Nylon brush seals

General: Dense nylon bristles locked into galvanized steel strips and fixed in a groove in the edge of the door or in purpose-made anodised aluminium holders fixed to the door with double sided PVC foam tape.

Pile weather strips

General: Polypropylene or equivalent pile and backing, low friction silicone treated, ultra-violet stabilised.

Standard: To AAMA 701/702.

Weather bars

General: Provide a weather bar under hinged external doors, locate under the centres of closed doors.

2.4 MATERIALS GENERALLY

Structural steel

Design and materials: To AS 4100 (2020).

Welding: To the AS/NZS 1554 series.

Galvanizing: To AS/NZS 4680 (2006).

Wire rope cables

Materials: Stainless steel Type 316 or galvanized steel.

Fabric

Supply: Supply fabric by a single manufacturer as part of a single batch.

Inspection: Check each roll of material for flatness, faults in the fabric and the coatings, by visual inspection in directional sunlight at a distance of 4 m and by passing the membrane over a uniformly illuminated surface.

Stitching: Use UV stabilised HDPE thread with a minimum tensile strength of 180 N. Incorporate lock type stitching with a twin needle machine.

2.5 METAL FINISHES

Anodising

Standard: To AS 1231 (2000).

Thickness: 15 to 20 µm.

Hot-dip galvanizing

Minimum coating mass/thickness: To AS/NZS 4680 (2006).

Powder coating

Application to aluminium and aluminium alloy substrates for architectural applications:

To AAMA 2603 (2022), AAMA 2604 (2022) and AAMA 2605 (2022), as appropriate, and AS 3715 (2002).

Application to metal substrates other than aluminium for architectural applications: To AS 4506 (2005).

3 EXECUTION

3.1 FABRICATION

Aluminium fabrication and construction

Standard: To AS/NZS 1664.1 (1997) or AS/NZS 1664.2 (1997).

Fasteners

Requirement: Provide fasteners of sufficient strength and quality to perform their required function.

Joints

Requirement: Make accurately fitted tight joints so that neither fasteners nor fixing devices create pressure indentations that are visible on exposed faces. Where heads of fasteners are unavoidably visible, finish them to match the adjacent surface.

Protection

Corrosion protection: Provide protection against corrosion that may be caused in metals by products or processes normally employed on a building site or by normal atmospheric or other ambient conditions and by-products including rainwater, drinking and drinking water, airborne salt and airborne pollution.

Durability: Provide materials resistant to exposure to weather and UV radiation so that their colour, surface finish, flexibility and water resistance are maintained.

Temporary measures: Do not use adhesive tape, film or paper, or applied coatings liable to bond to the substrate when exposed to sunlight or weather as temporary measures to protect screen components during the course of the works. If temporary measures are used, remove all traces, particularly from contact mating surfaces before joining up.

Operation

Requirement: Provide moving parts that operate freely and smoothly, without vibration, rattling, binding or sticking, and at correct tensions or operating forces. Lubricate if appropriate.

3.2 WELDING

General

Quality: Provide finished welds descaled and free of surface and internal cracks, slag inclusion and porosity. Provide continuous welding unless permanently concealed.

Restrictions: Do not weld as follows:

- On site.
- On finished surfaces.
- Next to a finished surface or glass, unless the adjacent surface is protected from damage.

3.3 EMBEDDED FIXINGS

General

Fixing: Fix screens to the building structure by one of the following methods:

- Fasteners cast into the concrete of the building structure. Do not displace reinforcement, when locating embedded items.
- Chemical fixings, expanding bolt sockets.
- Bolting or welding to brackets or structural framing.

Embedment

Concrete: To AS 3600 (2018).

Masonry: To AS 3700 (2018).

Fixing brackets

Requirement: Provide fasteners and other methods of attachment of the screens to the structure with the following characteristics:

- Three-way adjustment to accommodate fabrication and construction tolerances.
- Provision for building movements while fixing the screens in their correct positions.
- Adequacy for structural design actions.

Protection

Cast-in items: Prevent the entry of concrete slurry into bolt holes, channels, and other openings for the fasteners. Fill the openings using an easily removed water repellent material before casting in.

Placement

Tolerance:

- Maximum deviation from correct position: 10 mm.

Fastener channels embedded parallel or perpendicular to the edge of a concrete structural member:

- Minimum distance from the concrete edge to the nearest part of the anchor: 100 mm.

3.4 INSTALLATION**Installation tolerance**

Alignment:

- Maximum deviation of any member from its true alignment (plumb, level, or line of slope): 1:1000, up to a maximum of 10 mm in a continuous run of members in one direction.
- Maximum misalignment between adjoining members: 1 mm.

Position:

- Maximum deviation of any part from its true position: 10 mm.

Reference lines and marks

Requirement: Set out on each floor, in agreed locations, accurate perimeter offset reference lines, plumb with corresponding lines on other floors, and height benchmarks.

Wire rope cables

Requirement: Preload cables by cyclic loading to achieve a uniform modulus of elasticity and a linear stress/strain relationship within the working range. Use a swaging system to achieve a breaking strength of terminals not lower than the minimum design strength of the cable system.

Cleaning

Requirement: During erection, promptly remove foreign matter from the screens without damage to finishes. Do not use abrasive cleaners or acid.

3.5 COMPLETION**Cleaning**

Method: Clean all visible surfaces with soft clean cloths and clean water or approved cleanser, finishing with a clean cloth. Do not use abrasive, acidic or alkaline materials.

Operation and maintenance manuals

Requirement: Prepare a manual that includes the manufacturer's recommendations for operation, care and maintenance.

Warranties

0461 GLAZING

1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide glazing, as documented.

Performance

Thermal qualities: U-Value and Solar heat gain coefficient (SHGC) as documented.

1.2 CROSS REFERENCES**General**

Requirement: Conform to the following:

- 0171 General requirements.

1.3 STANDARDS**Glazing**

Glass type and thickness: To AS 1288 (2021), if no glass type or thickness is nominated.

Materials and installation: To AS 1288 (2021).

Quality requirements for cut-to-size and processed glass: To AS/NZS 4667 (2000).

Roof glazing: To AS 1288 (2021) Section 6.

1.4 INTERPRETATION**Abbreviations**

General: For the purposes of this worksection, the following abbreviations apply:

- AGWA: Australian Glass and Window Association.

Definitions

General: For the purposes of this worksection, the definitions given in AS/NZS 4668 (2000) apply.

1.5 SUBMISSIONS**Certification**

Design: Submit an engineer's certificate confirming conformance to AS 1288 (2021).

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.

Toughened glass: For each batch of glass, submit certification from the manufacturer of heat soaking.

Installation: Submit certification from the fabricator that the method of glazing, the selection of sealant systems and conditions next to the glass conform to the following:

- Compatible with the edge seal of insulating glass units (IGUs) and self-cleaning glass.
- Will not be detrimental to the long-term structural performance, weathering capabilities and visual qualities of the glass.

Glazier's data: Submit the glazing subcontractor's statement certifying the following:

- A satisfactory thermal safety assessment.
- The assembled frame provides the required glazing clearances and tolerances, and maximum and minimum joint configurations, based on the bow, warp and kink characteristics of the required glass types, and is ready for glazing.

Execution details

Site glazing: If site glazing is intended, submit proposals.

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION**, **Operation and maintenance manuals**.

Products and materials

Safety glazing materials: Submit evidence of conformity to AS 2208 (2023).

Samples

Requirement: Submit samples to PRODUCTS, **GENERAL**, **Samples**.

Shop drawings

Requirement: Submit shop drawings showing the following:

- Method of glazing.
- Rebate depth.
- Edge restraint.
- Clearances and tolerances.
- Glazing gaskets and sealant beads.

Warranties

Requirement: Submit warranties to **COMPLETION**, **Warranties**.

1.6 INSPECTION**Notice**

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

- Glazing products before they are installed.

2 PRODUCTS

2.1 GENERAL**Samples**

Requirement: Provide samples of glazing materials, each at least 200 x 200 mm, showing the visual properties and range of variation, if any, for each of the following:

- Tinted or coloured glass or plastics glazing.
- Surface modified or surface coated glass.
- Patterned or obscured glass or plastics glazing.
- Ceramic-coated glass.
- Wired glass.
- Insulating glass units.
- Mirror glass.

Storage and handling

Storage: Store glass and glazing materials in a clean, dry area unaffected by weather, to the manufacturer's recommendations. Protect from building materials and loose debris such as wet plaster, mortar, paint and welding splatter.

Handling: Handle glass to the manufacturer's recommendations.

2.2 GLAZING**Performance**

Glazing: Free from defects that detract from appearance or interfere with performance under normal conditions of use.

Plastics glazing: Free from surface abrasions and resistant to yellowing or other colour change. Capable of maintaining physical properties including strength and impact resistance for its design life.

Heat soaking

Requirement: Heat soak glass to AS 1288 (2021) clause 3.8.

Standard: To EN 14179-1 (2016).

Marking: To EN 14179-1 (2016) or certified by the manufacturer to AS 1288 (2021) clause 3.8.2.

Bullet-resistant glazing panels

Requirement: Proprietary bullet-resistant glazing panels.

Safety glazing materials

Standard: To AS 2208 (2023).

Type: Grade A.

Marking: To AS 1288 (2021) clause 5.23.

Heat-strengthened glass

Standard: To ASTM C1048 (2018).

Ceramic-coated glass

Requirement: Heat-strengthened or toughened glass with a coloured ceramic coating fused to and made an integral part of the surface to ASTM C1048 (2018), Condition B.

Opacified glass

Requirement: Glass with an opacifier permanently bonded to the inner face.

Insulating glass units (IGUs)

Requirement: Provide insulating glass units, as documented.

Manufacture, testing and installation: To AS 4666 (2012).

2.3 GLAZING MATERIALS

General

Requirement: Putty, glazing compounds, sealants, gaskets, glazing tapes, spacing strips, spacing tapes, spacers, setting blocks, shims and compression wedges appropriate for the conditions of application and required performance.

Primer

Compatibility: Apply the manufacturer's recommended primer to the surfaces in contact with sealant materials.

2.4 ANCILLARY COMPONENTS AND FITTINGS

Extruded gaskets and seals

General: Provide seals, as documented.

Materials: Non-cellular (solid) elastomeric seals as follows:

- Rubber products: Neoprene, ethylene propylene diene monomer (EPDM) or silicone rubber.
- Flexible polyvinyl chloride (PVC): E type compounds, colourfastness grade B.

Pile weatherstrips

Standard: To AAMA 701/702 (2023).

Material: Polypropylene or equivalent pile and backing, low friction silicone treated, ultraviolet stabilised.

Finned type: A pile weatherseal with a central polypropylene fin bonded into the centre of the backing rod and raised above the pile level.

3 EXECUTION

3.1 GLAZING PROCESSING

General

Processing: Perform required processes on glazing, 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 arised.

3.2 INSTALLATION

Glazing

Requirement: Install the glazing 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 glazing materials.
- No transfer of building movements to the glazing.
- Watertight and airtight for external glazing.

Temporary marking: Use a method that does not damage the glazing. Remove marking only after certification and acceptance of the installation.

Toughened glass: Do not cut, work, or permanently mark after toughening. Use installation methods that prevent the glass making direct contact with metals or other non-resilient materials.

Heat-absorbing glass: In locations exposed to direct sunlight, provide wheel cut edges free from damage or blemishes, with minimum feather.

Preglazing

Window assemblies and glazed doors: Supply inclusive of glazing, shop preglazed.

Curtain walls: Supply inclusive of glazing, shop preglazed.

Site glazing

Minimum dimensional requirements: Edge clearance, edge cover, front clearance and back clearance to AS 1288 (2021).

3.3 COMPLETION**Replacement**

Requirement: After replacing damaged glass, leave the work clean, polished, free from defects, and in good condition.

Cleaning

Method: Clean with soft clean cloths and clean water, finishing with a clean squeegee. Do not use abrasive, acidic or alkaline materials.

Extent: All frames and glass surfaces internally and externally.

Operation and maintenance manuals

Requirement: Prepare a manual that includes the manufacturers' published recommendations for in-service use.

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 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 (2018).

Toughened glass warranty: Provide a manufacturer's warranty 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
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1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide thermal insulation and pliable membrane systems, as documented.

1.2 CROSS REFERENCES**General**

Requirement: Conform to the following:

- 0171 General requirements.

Manufacturers documents

Website: <http://www.bradfordinsulation.com.au/> - rockwool mineral fibre insulation and pliable membranes

Website: <https://shop.intex.com.au/rigid-rockwool-batts-1200-x-600-x-35mm.html> -

1.3 INTERPRETATION**Definitions**

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

- Batts: Flexible insulation supplied as factory cut pieces and composed of mineral fibre (glass and rock fibre) or polyester fibre.
- Bio-soluble: A product that dissolves in bodily fluids and is quickly cleared from the lungs.
- Blankets: Flexible insulation supplied as factory cut rolls and composed of mineral fibre (glass and rock fibre) or polyester fibre, and may be combined with reflective facings.
- Fire hazard properties: To NCC (2022) Schedule 1.
- Pliable building membrane: To AS 4200.1 (2017) and equivalent to sarking-type materials as defined in the NCC.
- Thermal insulation terminology: To AS/NZS 4859.1 (2018).
- Vapour permeable (breathable) membrane: A flexible membrane material, normally used for secondary waterproofing that allows for the transmission of water vapour.

1.4 SUBMISSIONS**Fire performance**

Fire hazard properties: Submit evidence of conformity to PRODUCTS, **FIRE PERFORMANCE**, **Fire hazard properties**.

Products and materials

Thermal insulation properties: Submit evidence of conformity to AS/NZS 4859.1 (2018) and AS/NZS 4859.2 (2018).

Warranties

Requirement: Submit warranties to **COMPLETION**, **Warranties**.

1.5 INSPECTION**Notice**

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

- Insulation or pliable membrane materials after installation and before concealment.

2 PRODUCTS

2.1 GENERAL

Storage and handling

Labelling: Deliver mineral fibre products to site in packaging with third party mark of conformity indicating product is bio-soluble and not listed as hazardous material in the Safe Work Australia *Hazardous Chemical Information System* (HCIS).

2.2 FIRE PERFORMANCE

Fire hazard properties

Insulation materials: Tested to AS/NZS 1530.3 (1999). Fire hazard indices as follows:

- Spread-of-Flame Index: ≤ 9 .
- Smoke-Developed Index: ≤ 8 if Spread-of-Flame Index > 5 .

Materials with reflective facing: Tested to AS/NZS 1530.3 (1999) and the recommendations of Appendix A6.

Pliable membranes: Flammability Index ≤ 5 tested to AS 1530.2 (1993).

2.3 MATERIALS

Thermal insulation

Standard: To AS/NZS 4859.1 (2018).

Wet process fibreboard (softboard): To AS/NZS 1859.4 (2018).

Mineral fibre insulation: Bio-soluble and not listed as a hazardous material in the Safe Work Australia *Hazardous Chemical Information System* (HCIS).

Pliable building membranes

Standard: To AS 4200.1 (2017).

Vapour control membranes:

- Vapour barrier:
 - . Vapour control classification: Class 1 or Class 2, as documented.
- Vapour permeable (breathable) membrane:
 - . Vapour control classification: Class 3 or Class 4, as documented.

Water control (sarking) membrane (other than walls and gables):

- Water control classification: Water barrier.

2.4 COMPONENTS

Fasteners and supports

General: Metallic-coated steel.

Mesh support to roof insulation

Welded safety mesh: To AS/NZS 4389 (2015).

Thermal break strips

Product: Proprietary item.

R-Value ($\text{m}^2\cdot\text{K}/\text{W}$): ≥ 0.2 .

3 EXECUTION

3.1 GENERAL

Thermal insulation

Requirement: To AS 3999 (2015) and BCA (2022) J4D3.

Installation: Firmly butt together with no gaps except as follows:

- Access openings and vents: Do not obstruct.
- Light fittings: To AS/NZS 3000 (2018) clause 4.5.
- Electrical cables: To AS 3999 (2015) clause 2.6.

Pliable building membrane

Installation: To AS 4200.2 (2017) and BCA (2022) J4D3.

3.2 FLOORS**Under suspended framed floors**

Fibre batts: Fit tightly between framing members. If other support is not provided, staple nylon twine to the framing and stretch tight.

Rigid cellular insulation boards:

- Installation: Fix to the underside of timber strip flooring. Butt tightly to joists.
- Fixing: Adhesive or mechanical fasteners.

Over suspended framed floors

Rigid cellular insulation boards:

- Installation: Over sheet flooring and between battens supporting a final flooring finish.

Below concrete slab on ground

Preparation: Sand blinding or working slab, as documented.

Rigid cellular insulation boards:

- Laying pattern: Stretcher bond, with edges tightly butted.
- Damp-proof membrane: Lay over insulation.

Over concrete slab on ground

Substrate preparation: Prepare substrate as follows:

- Clean and remove any deposit or finish that may impair adhesion or location of insulation.
- Remove excessive projections.
- Voids and hollows > 10 mm with abrupt edges: Fill with a cement:sand mix not stronger than the substrate or weaker than the bedding.

Rigid cellular insulation boards:

- Laying pattern: Stretcher bond, with edges tightly butted.
- Fixing: Adhesive fix directly to the concrete floor slab.

Under suspended concrete slab

Fibre batts:

- Fixing: Mechanical fasteners and support mesh or nylon twine.

Rigid cellular insulation boards:

- Fixing: Adhesive or mechanical fasteners.
- Joints: Apply reinforced foil tape to all joints.

3.3 WALLS**Framed walls**

Fibre batts: Friction fit between framing members. If other support is not provided, staple nylon twine to the framing and stretch tight.

Thermal break strips: Provide to steel framing with lightweight external cladding:

- Screw fixing: Button head screws at 1 m centres.
- Adhesive fixing: Wallboard adhesive walnuts at 1 m centres.

Masonry veneer cavity walls

Rigid cellular insulation boards:

- Installation: Fix boards horizontally with the tongue to the top edge, pushed over prefixed wall ties and held firmly against the wall frame. Keep boards clean, dry and free from mortar and grout. Do not bridge the cavity.
- Fixing: Hex head screws at 450 mm centres.

Flashings: Install flashings before installing insulation. Prevent entry of water behind the insulation boards.

Full masonry cavity walls – external face of internal leaf

Rigid cellular insulation boards:

- Installation: Fix boards horizontally with the tongue to the top edge and firmly against the inner masonry skin. Keep boards clean, dry and free from mortar and grout. Do not bridge the cavity.
- Fixing: Proprietary plastic clips on pre-installed wall ties.

Flashings: Install flashings before installing insulation. Prevent entry of water behind the insulation boards.

Full masonry cavity walls – internal face of internal leaf

Substrate preparation: Conform to the following:

- Clean and remove any deposit or finish that may impair adhesion or location of insulation.
- Remove excessive projections and fill voids and hollows with plaster.
- Maximum surface deviation from a 2400 mm straightedge: 6 mm.

Substrate correction: Skim plaster.

Rigid cellular insulation boards:

- Installation: Fix boards horizontally with staggered vertical joints, all close butted and without crushing.
- Fixing: Proprietary adhesive compatible with the insulation. Apply sufficient pressure to evenly distribute adhesive.

Vapour permeable (breathable) membrane

Requirement: Provide a vapour permeable membrane behind external facing material that does not provide permanent weatherproofing or that may be subject to condensation forming on the internal face, including the following:

- Boards or planks fixed vertically or diagonally.
- Boards or planks fixed in exposed locations if wind driven rain can penetrate the joints.
- Unpainted or unsealed cladding.
- Masonry veneer.

Installation: Run the vapour permeable membrane horizontally on the outer face of external wall framing, over the flashing, from the bottom plate up. Pull taut over the framing and fix to framing members. Seal across the wall cavity at the top.

Horizontal laps: At least 150 mm wide, lapped to make sure water is shed to the outer face of the membrane.

End or vertical overlaps laps: At least 150 mm wide made over framing.

Openings: Run the vapour permeable membrane over the openings and leave covered until windows and doors are installed. Cut the membrane on a 45° diagonal from each corner of the opening, fold the flaps inside and fix to the inside frame of the opening. If the membrane is used to provide a continuous airtight layer, seal all joints with pressure sensitive adhesive tape.

Fixing: Install as follows:

- Timber frames: Metallic-coated clouts, 20 mm long 6 to 8 mm staples or punched multi-point metallic-coated steel brads.
- Steel or aluminium frames: Hex head screws, with either 20 mm diameter washers or through hardboard strips.
- Plywood: Alternatives:
 - . Metallic-coated clouts, 20 mm long 6 to 8 mm staples or punched multi-point metallic-coated steel brads at minimum 300 mm centres.
 - . Water based contact adhesive with a 50% adhesive cover.

3.4 CEILINGS

Cathedral ceilings

Rigid cellular insulation boards:

- Installation: Lay boards with their long edges at right angles to the rafters and with the tongue pointing up the slope. Start laying at eaves and progress towards the ridge. Cut boards and tightly fit to abutments and penetrations.
- Fixing: Secure temporarily by occasional nailing to the rafters. Fix permanently by nailing counter battens to the rafters.
- Sealing: Seal gaps with polyurethane foam.

Framed ceilings

Fibre batts: Fit tightly between framing members. If support is not otherwise provided, staple nylon twine to the framing and stretch tight.

Suspended ceilings

Fibre batts and blankets: Lay batts/blankets over the ceiling system close butted to each other and to the suspension rods.

3.5 ROOFS**General**

Requirement: Provide insulation to 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

Requirement: Provide support to the following:

- Water control (sarking), vapour barrier or reflective thermal insulation membranes laid over roof framing members that are spaced at more than 900 mm centres.
- Blanket type thermal insulation laid over roof framing members as sound insulation to metal roofing.

Installing welded safety mesh: To AS/NZS 4389 (2015).

Metal roofs

Fibre batts: Fit tightly between framing members.

Fibre blanket for sound insulation: Install over the roof framing, reflective thermal insulation (if any), and mesh support, so that the blanket is in continuous contact with the underside of the metal roofing sheets.

Combined fibre blanket and reflective insulation: Lay facing reflective insulation face downwards over safety mesh.

Thermal break strips: Provide to steel framing supporting metal sheet roofing.

- Screw fixing: Button head screws at 1 m centres.
- Adhesive fixing: Wallboard adhesive walnuts at 1 m centres.

Waterproof membrane roofs

Preparation: Make sure membrane is clean and free of loose material. Lay separation layer over membrane with edges lapped 300 mm and turned up at upstands and penetrations.

Rigid cellular insulation boards: Lay boards in brick pattern with shiplap edges pushed together firmly, cut neatly around penetrations and extend up upstands.

Pliable building membranes

Vapour barrier: 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.

Water control (sarking) membrane: Provide sarking under tile and shingle roofing.

3.6 COMPLETION**Warranties**

Requirement: Submit warranties to COMPLETION, Warranties

0472 ACOUSTIC INSULATION**1 GENERAL****1.1 RESPONSIBILITIES****General**

Requirement: Provide acoustic insulation, as documented.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

1.3 INTERPRETATION

Definitions

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

- Acoustic insulation: Materials or methods of construction to reduce the transmission of airborne and structure-borne sound through floors, walls and ceilings or other enclosing elements in buildings.
- Acoustic underlay: A resilient material laid between the subfloor and the flooring material to provide sound isolation.
- Airborne sound: Sound radiated directly from a source, such as a loudspeaker or machine, into the surrounding air.
- Batts: Flexible insulation supplied as factory cut pieces and composed of mineral fibre (glass and rock fibre) or polyester fibre.
- Bio-soluble: A product that dissolves in bodily fluids and is quickly cleared from the lungs.
- Blankets: Flexible insulation supplied as factory cut rolls and composed of mineral fibre (glass and rock fibre) or polyester fibre, and may be combined with reflective facings.
- Fire hazard properties: To NCC (2022) Schedule 1.
- Impact sound: Sound caused by impacts on building structure. Typical sources include footsteps, dropped objects on horizontal surfaces and the slamming of doors.
- Sound insulation (isolation): Reduction of sound energy passing through building elements.
- Structure-borne sound: Sound waves transmitted within the building structure and re-radiated into other spaces as airborne sound. Typical sources include direct impact from dropped objects and vibrating machinery.

1.4 SUBMISSIONS

Fire performance

Fire hazard properties: Submit evidence of conformity to **FIRE PERFORMANCE, Fire hazard properties**.

Products and materials

Acoustic insulation properties: Submit evidence of conformity to documented requirements for insulation.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties**.

1.5 INSPECTION

Notice

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

- Insulation after installation and before concealment.

2 PRODUCTS ---

2.1 GENERAL

Storage and handling

Labelling: Deliver mineral fibre products to site in packaging with third party mark of conformity indicating product is bio-soluble and not listed as hazardous material in the Safe Work Australia *Hazardous Chemical Information System* (HCIS).

2.2 FIRE PERFORMANCE

Fire hazard properties

Insulation materials: Tested to AS/NZS 1530.3 (1999). Fire hazard indices as follows:

- Spread-of-Flame Index: ≤ 9 .

- Smoke-Developed Index: ≤ 8 if Spread-of-Flame Index is more than 5.
- Facing materials: Flammability Index no more than 5 when tested to AS 1530.2 (1993).

2.3 MATERIALS

General

Mineral fibre insulation: Bio-soluble and not listed as a hazardous material in the Safe Work Australia *Hazardous Chemical Information System* (HCIS).

Bulk insulation

Mineral fibre blankets and batts: Glass wool or rock wool bonded with thermosetting resin.

Polyester blankets and batts: Thermally bonded polyester fibres.

Board insulation

Mineral fibre panels: High density glass wool or rock wool bonded with thermosetting resin.

Wet process fibreboard (including softboard): To AS/NZS 1859.4 (2018).

Composite plasterboard panels: Proprietary items.

Flexible sheet insulation

Impregnated vinyl: Mass loaded vinyl sheeting.

Recycled rubber/cork: Recycled rubber granules and/or cork bound with polymers.

2.4 COMPONENTS

Fasteners and supports

General: Metallic-coated steel.

Resilient mounts: Proprietary fixing clips with rubber or acrylic pads.

Adhesives

General: Compatible with the substrate and the insulation and conforming to the insulation manufacturer's recommendations.

Sealants

Acoustic sealant: Non-hardening sealant compatible with the substrate materials.

Fire-resisting sealant: Non-hardening sealant compatible with the substrate materials and having a fire-resistance rating equal to that of the building element it seals.

Sealant strips: Closed cell resilient foam.

3 EXECUTION

3.1 GENERAL

Bulk insulation

General: Firmly butt together with no gaps except as follows:

- Access openings and vents: Do not obstruct.
- Light fittings: To AS/NZS 3000 (2018) clause 4.5.
- Electrical cables: To AS 3999 (2015) clause 2.6.

3.2 FLOORS

Under suspended framed floors

Fibre batts: Fit tightly between framing members. If other support is not provided, staple nylon twine to the framing and stretch tight.

Mineral fibre panels:

- Installation: Fix to the underside of timber strip flooring. Butt tightly to joists.
- Fixing: Adhesive or mechanical fasteners.

Over concrete slab

Substrate preparation: Prepare substrate as follows:

- Clean and remove any deposit or finish that may impair adhesion or location of insulation.
- Remove excessive projections.
- Voids and hollows more than 10 mm with abrupt edges: Fill with a cement:sand mix not stronger than the substrate or weaker than the bedding.

Mineral fibre panels:

- Laying pattern: Stretcher bond, with edges tightly butted.
- Fixing: Adhesive fix directly to the concrete floor slab.

Under suspended concrete slab

Fibre batts:

- Fixing: Mechanical fasteners and support mesh or nylon twine.

Mineral fibre panels:

- Fixing: Adhesive or mechanical fasteners.

Acoustic underlays

Handling: Store horizontally and keep dry.

Conditioning: Roll out underlay and leave in place for a minimum of 12 hours to acclimatise.

Installation: Adhesive fixed or loose laid, as documented.

3.3 WALLS

Framed walls and partitions

Fibre batts: Friction fit between framing members. If other support is not provided, staple nylon twine to the framing and stretch tight.

Mineral fibre panels: Fix to face of studs with adhesive and temporarily fasten with single screw until plasterboard installed.

Full masonry cavity walls – external face of internal leaf

Mineral fibre panels:

- Installation: Fix panels firmly against the inner masonry skin. Keep boards clean, dry and free from mortar and grout. Do not bridge the cavity.
- Fixing: Proprietary plastic clips on pre-installed wall ties.
- Sheet size: Select or cut to suit wall tie spacing.

Flashings: Install flashings before installing insulation. Prevent entry of water behind the insulation.

Full masonry cavity walls – internal face of internal leaf

Substrate preparation: Conform to the following:

- Clean and remove any deposit or finish that may impair adhesion or location of insulation.
- Remove excessive projections and fill voids and hollows with plaster.
- Maximum surface deviation from a 2400 mm straightedge: 6 mm.

Substrate correction: Skim plaster.

Mineral fibre panels:

- Installation: Fix boards horizontally with staggered vertical joints, all close butted and without crushing.
- Fixing: Proprietary adhesive compatible with the insulation. Apply sufficient pressure to evenly distribute adhesive.

3.4 CEILINGS

Framed ceilings

Fibre batts: Fit tightly between framing members. If support is not otherwise provided, staple nylon twine to the framing and stretch tight.

Suspended ceilings

Fibre batts and blankets: Lay batts/blankets over the ceiling system close butted to each other and to the suspension rods.

3.5 FLANKING SOUND INSULATION

Baffles

General: Install plenum baffles tightly butted to building structure, service ducts, pipes and conduits and to the top of the partition or to the top of the suspended ceiling structure directly above the line of the partition. Seal joints, penetrations and intersections and maintain the required performance.

Bulk insulation: Install individual layers to fill space between building structure and the top of the partition or the top of the suspended ceiling.

Flexible sheet insulation: Fix to soffit through a continuous furring channel, hang to meet the top of the partition and extend horizontally 900 mm over the suspended ceiling.

Abutments

Trim: Install over sealant. Allow for movement at abutting surfaces.

Cable management

Power outlets: Do not install general purpose socket-outlets back to back. Separate adjoining socket-outlets with a continuous layer of the documented wall insulating material.

Ducted skirtings: If a ducted skirting extends continuously across an abutment, pack the cavities firmly with bulk insulating material for 300 mm each side of the abutment, and scribe and seal the joint.

3.6 COMPLETION

Warranties

Requirement: Submit warranties to COMPLETION, Warranties

0511 LINING

1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide internal lining systems, as documented.

Performance

Requirement: Provide lining system with a surface that is:

- Resistant to impacts expected in use.
- Resistant to moisture encountered under expected environmental conditions.
- Free of irregularities.
- A suitable substrate for the nominated final finish.

1.2 CROSS REFERENCES**General**

Requirement: Conform to the following:

- 0171 *General requirements*.

1.3 INTERPRETATION**Abbreviations**

General: For the purposes of this worksection, the following abbreviation applies:

- MDF: Medium density fibreboard.

Definitions

General: For the purposes of this worksection, the definitions given in AS/NZS 4491 (1997) and the following apply:

- Decorative overlaid wood panels: Particleboard or fibreboard with a bonded decorative finishing surface such as thermosetting resin (low pressure melamine), PVC film, paper foils or wood veneer.
- Dry process fibreboard: Panel material with a nominal thickness of 1.5 mm or greater, manufactured from lignocellulosic fibres (derived from wood or other materials) with application of heat and pressure, the bond of which is derived from a synthetic adhesive added to the fibres and the panels are manufactured with a forming moisture content less than 20%.
- Fibre cement sheet linings: Treated cellulose fibre in a matrix of cement and sand autoclaved sheet, sealed on one side.
- 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 material (e.g. paper) impregnated with thermosetting resins and bonded together under heat and pressure of at least 5 MPa.
- Wet process fibreboard: Panel material with a nominated thickness of 1.5 mm or greater, manufactured from lignocellulosic fibres (derived from wood or other materials) with application of heat and/or pressure, the bond of which is derived from the felting of the fibres and the panels are manufactured with a forming moisture content greater than 20%.

1.4 TOLERANCES**Permitted deviations**

Bearing surface of finished framing:

- Gypsum lining: To AS/NZS 2589 (2017) clause 4.2.2.
- Other lining: 4 mm from a 1.8 m straightedge.

1.5 SUBMISSIONS

Fire performance

Fire hazard properties: Submit evidence of conformity to **FIRE PERFORMANCE, Fire hazard properties**.

Samples

Requirement: Submit samples to PRODUCTS, **GENERAL, Samples**.

Shop drawings

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

- Decorative panels: Panel set-out, large scale panel fixing details, attachment devices and other components.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties**.

1.6 INSPECTION

Notice

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

- Substrate or framing before installation of linings.
- Finished surface of installation before applying:
 - . Sealer.
 - . Finish coatings or decorative papers.

2 PRODUCTS

2.1 GENERAL

Samples

Prefinished panels: For each finish, provide a 300 x 600 mm sample panel with associated trim.

Storage and handling

Requirement: Store lining stacked in pallets horizontally on a smooth, level surface. Prevent distortion or moisture ingress.

Timber or fibreboard panels: Store off the ground in a well-ventilated area.

Handling: Do not drag sheets across each other or across other materials. Protect edges, corners and surface from damage.

Certification

Timber based products: Label panels under the authority of a recognised certification scheme to *0185 Timber products, finishes and treatment*, as applicable to the product. Locate the label on faces or edges that will be concealed in the works.

2.2 FIRE PERFORMANCE

Fire hazard properties

Group number: To AS 5637.1 (2015).

2.3 PLASTERBOARD

General

Standard: To AS/NZS 2588 (2018).

2.4 FIBRE CEMENT

General

Standard: To AS/NZS 2908.2 (2000).

Wall and ceiling linings: Type B Category 2.

Minimum thickness: 4.5 mm.

2.5 PARTICLEBOARD

General

Standard: To AS 1859.1 (2017).

2.6 WET PROCESS FIBREBOARD

General

Hardboard, medium board and softboard: To AS/NZS 1859.4 (2018).

General purpose (GP) board

Location: Interior use generally.

Moisture resistant (MR) (tempered) fibreboard

Location: Internal areas with humid conditions or subject to occasional wetting.

Veneered general purpose board

Location: Timber veneer faced to one or both sides for decorative ceiling and wall lining.

Softboard

Location: Pinboards and insulation boards for roofing/ceiling, walls, partitions and doors.

2.7 DRY PROCESS FIBREBOARD (INCLUDING MEDIUM DENSITY FIBREBOARD)

General

Standard: To AS/NZS 1859.2 (2017).

Melamine overlaid medium density fibreboard: Medium density fibreboard (STD MDF) overlaid on both sides with low pressure melamine.

2.8 HIGH PRESSURE DECORATIVE LAMINATE SHEET

General

Standard: To AS/NZS 2924.1 (2024).

2.9 COATED STEEL

General

Standard: To AS 1397 (2021), for atmospheric corrosivity categories C1 or C2:

- Coating class interior: Z275.
- Coating class exterior: Z450.

2.10 ADHESIVES, SEALANTS AND FASTENERS

Adhesives

Wallboards: Gunnable synthetic rubber/resin based mastic contact adhesive formulated for bonding flooring and wallboards to a variety of substrates.

Sealants

Fire-resisting sealant: Non-hardening sealant, compatible with the materials to be sealed and having a fire-resistance rating equal to that of the building element it seals.

Acoustic sealant: Non-hardening sealant compatible with the materials to be sealed.

Fasteners

Steel nails: Hot-dip galvanized.

3 EXECUTION

3.1 CONSTRUCTION GENERALLY

Conditions

Requirement: Do not start lining work until the building or installation area is enclosed and weathertight, and all wet trades have been completed.

Preparation

Requirement: Before fixing linings, check and adjust the alignment of substrates or framing, if necessary.

Substrate: Make sure substrates are plumb, level, in true alignment and to the lining manufacturer's recommendations.

Timber, steel framing and battened masonry: To AS/NZS 2589 (2017) clause 4.2.

Pre-conditioning

General: Acclimatise timber panels in the in-service conditions for 2 to 3 weeks before installing.

Battens

General: Fix at each crossing with structural framing members, to solid walls or ceiling support. Provide wall plugs in solid substrates.

Ceiling linings

General: Do not install until the timber roof structure has been fully loaded for at least 14 days.

Accessories and trim

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

Adhesives

General: Provide adhesive types appropriate for the purpose and apply them so they transmit the loads imposed without causing discolouration of the finished surfaces.

Fire-resisting and acoustic rated installations

Sealing: Apply sealant to the manufacturer's recommendations and as follows:

- Around services pipes and penetrations.
- Electrical outlets and recessed lights: Line back and sides of fixture with plasterboard and seal around fixture junction with sealant.
- Around perimeter of lining panels: Provide continuous runs of sealant.

3.2 PLASTERBOARD**Installation**

Gypsum plasterboard and fibre reinforced gypsum lining: To AS/NZS 2589 (2017).

Level of finish and jointing: To AS/NZS 2589 (2017) clause 3.1.

Supports

General: Install timber battens or proprietary cold-formed galvanized steel furring channels as follows:

- If framing member spacing exceed the recommended spacing.
- If direct fixing of plasterboard is not possible, due to the arrangement or alignment of the framing or substrate.
- If the lining is the substrate for tiled finishes.
- If required for penetrations for services, including mechanical grilles and lighting fixtures.
- If required to support fixtures.

Multiple sheet layers

Application: Fire-resisting and acoustic rated walls.

Joints: Fill and flush up all joints and fasteners in each layer and caulk up perimeters and penetrations before installing following layers. Stagger all sheet joints by minimum 200 mm.

Joints

Flush joints: Provide recessed edge sheets and finish flush using perforated paper reinforcing tape.

Butt joints: Make joints over framing members or provide back blocking.

External corner joints: Make joints over metallic-coated steel corner beads.

Dry joints: Provide square edged sheet and finish with a PVC-U joining section.

Control joints: Provide purpose-made metallic-coated control joint beads at not more than 12 m centres in walls and ceilings and to coincide with structural control joints.

Wet areas: Install additional supports, flashings, trim and sealants as required.

Joints in tiled areas: Do not apply a topping coat after bedding perforated paper tape in bedding compound.

3.3 FIBRE CEMENT**Installation**

Joints and layout: Run sheets across the framing members. In flush jointed applications, stagger end joints in a brick pattern and locate them on framing members, away from the corners of large openings. Provide supports at edges and joints.

Supports

General: Install timber battens or proprietary cold-formed galvanized steel furring channels as follows:

- If framing member spacing exceed the recommended spacing.

- If direct fixing of fibre cement is not possible, due to the arrangement or alignment of the framing or substrate.
- If the lining is the substrate for tiled finishes.
- If required for penetrations for services, including mechanical grilles and lighting fixtures.
- If required to support fixtures.

Fixing

Timber framed construction: Nail only or combine with adhesive.

Steel framed construction: Screw only or combine with adhesive.

Wall framing: Conform to the following:

- Do not fix to top and bottom plates or noggings.
- In tiled areas: Provide an extra row of noggings immediately above wall-to-floor flashings. Fix sheet at 150 mm centres to each stud and around the perimeter of the sheet.

Masonry wall construction: Conform to the following:

- Direct fixing: Adhesive fix to the masonry except where lining forms a substrate for tiled finish.
- Furring channels: Fix using screw and/or adhesive.

Ceilings: Fix using screw and/or adhesive to ceiling furring members. Do not fix sheets directly to the bottom chords of trusses.

- Ceiling battens: Fix at 600 mm maximum centres.

Wet areas: Do not use adhesive fixing alone.

Multiple sheet layers

Application: Fire-resisting and acoustic rated walls.

Joints: Fill and flush up all joints and fasteners in each layer and caulk up perimeters and penetrations before installing following layers. Stagger all sheet joints by minimum 200 mm.

Joints

Joint width:

- Butt joints: 1 to 2 mm.
- Expressed joints: 10 mm maximum.

Joint backing for expressed joints: Black self-adhesive polyurethane tape.

Flush joints: Provide recessed edge sheets and finish flush using perforated paper reinforcing tape.

External corner joints: Make joints over metallic-coated steel corner beads.

Dry joints: Provide square edged sheet and finish with a PVC-U joining section.

Control joints: Provide control joints to coincide with structural control joints and as follows:

- Walls:
 - . Timber framing: ≤ 7.2 m centres.
 - . Steel framing 0.55 to 0.75 mm BMT: ≤ 9 m centres.
 - . Steel framing 0.8 to 1.6 mm BMT: ≤ 6 m centres.
- Ceilings: To divide into bays not larger than 10.8 x 7.2 m.
- Soffit linings: To divide into bays not larger than 4.2 x 4.2 m or 5.6 x 3.6 m.
- Control joint beads: Purpose-made metallic-coated.
- Support: Provide framing parallel to the joint on each side. Do not fix the lining to abutting building surfaces.

Wet areas: Provide additional supports, flashings, trim and sealants to manufacturer's recommendations.

Joints in tiled areas: Bed perforated paper tape in bedding compound. Do not apply a topping coat.

- Control joints:
 - . Timber framing: Not more than 4.2 m centres and space to suit joints required in tiling.
 - . Steel framing: Not more than 4.8 m centres and space to suit joints required in tiling.
- Internal corners: Reinforce with preformed angles to manufacturer's recommendations.

3.4 TRIM AND ACCESSORIES

General

Requirement: Provide trim such as beads, mouldings and stops to make neat junctions between lining components, finishes and adjacent surfaces.

Proprietary items: Provide complete with installation accessories.

Timber and MDF trim: Fix using full length so that trim is secure and without movement. Where nail or screw fixings are used, make sure fastener finishes sufficiently below face of trim so that stopping piece finishes flush with the face.

Plasterboard cornices

Fixing: Mitre at corners and adhesive fix with cornice cement. Pin in place at cornice edges until adhesive sets, remove pins and fill holes.

Plaster cornices and roses

Fixing: Pin or prop in place and fix with wet gypsum plaster and scrim straps over framing members.

Fire-resisting walls

Requirement: Seal to soffit with sealant with an equivalent fire-resistance level before fixing decorative cornices, if any.

3.5 COMPLETION

General

Damaged or marked lining and components: Replace.

Exposed surfaces: Touch up shop applied finishes and restore damaged or marked areas.

Timber panels: If appearance is not uniform, replace panels.

Cleaning: Clean completed surfaces to remove irregularities and leave panels smooth and clean, to the manufacturer's recommendations. If required, sand with fine paper to remove irregularities and refinish panel surface.

- Debris and unused material: Remove from site.

0520 PARTITIONS - COMBINED

1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide partition systems, as documented.

Performance

Strength and stability: To remain stable, and without rattle and signs of deflection or permanent deformation under normal conditions of use, including the slamming of doors.

Serviceability: To support imposed dead loads, seismic loads, wind loads, including designated eccentric loads and not to deflect in excess of the following, with H being the height of the partition:

- The lesser of H/240 or 30 mm for partitions subjected to wind loads and lined with flexible material.
- The lesser of H/360 or 20 mm for partitions subjected to wind loads and lined with brittle materials.
- H/500 for eccentric loads.
- **Company Websites:** <https://www.laminex.com.au/brands/laminex-waterloo-partitioning-systems#downloads>

1.2 CROSS REFERENCES**General**

Requirement: Conform to the following:

- 0171 General requirements.

1.3 INTERPRETATION**Definitions**

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

- Partition - fully demountable: A partition system in which any component may be demounted without damage, using only small hand tools, and subsequently reassembled without cutting, trimming or refinishing.
- Partition - glazed: A partition system consisting of a suite of exposed sections forming door and window frames, ceiling channels, sills, glazing and accessories; and generally intended for use in conjunction with framed and lined partition systems.
- Partition - semi demountable: A partition system in which the major components are designed to be removed and re-used but panels or linings, which are likely to be damaged during removal, are not.

1.4 TOLERANCES**Demountable partitions**

Deviation (from true grid lines and planes): 1:1000 to a maximum of 3 mm.

Misalignment (of adjoining surfaces at panel junctions): 1 mm.

Panel thickness: ± 0.5 mm.

Length and width: 0.1% of the dimension or 0.5 mm, whichever is the greater.

Flatness, twist, winding and bow: 1 mm deviation from a 2.4 m straightedge placed in any position.

Maximum deviation of edges from the intended true line: ± 1 mm.

Framed and lined partitions

Finished framing: To AS/NZS 2589 (2017) clause 4.2.2.

1.5 SUBMISSIONS**Certification**

Installed partitions: Submit a certificate from an independent testing authority as evidence that the partition system installed conforms to the documented weighted sound reduction index (R_w).

Toughened glass: For each batch of glass, submit certification from the manufacturer as evidence of heat soaking.

Fire performance

Fire hazard properties: Submit evidence of conformity to **FIRE PERFORMANCE, Fire hazard properties**.

Fire-resistance level: Submit evidence of conformity to **FIRE PERFORMANCE, Fire-resistance of building elements**.

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION, Operation and maintenance manuals**.

Products and materials

Manufacturer's data: Submit manufacturer's standard product literature for each system type.

Safety glazing materials: Submit evidence of conformity to AS 2208 (2023).

Type tests: Submit test results to PRODUCTS, **TESTING** for the following:

- Impact resistance.
- Pressure resistance.
- Weighted sound reduction index (R_w).

Records

Timber framing moisture content: Submit records of moisture content values.

Samples

Requirement: Submit samples to PRODUCTS, **GENERAL, Samples**.

Shop drawings

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

- Plans, sections and elevations of the installation.
- Full size sections of members and details of partition intersections and terminations.
- Dimensions, clearances, tolerances and provision for expansion.
- Junctions and trim to adjoining surfaces.
- Doors (note if supplied by others) and frames, including door seals, and door stops coordinated with documented door thicknesses.
- Coordination with documented door hardware.
- Glass types, thicknesses and glazing methods.
- Details of safety markings that make glass visible.
- Glass processing required for fixing hardware to frameless glass doors.
- Methods of fixing partitions.
- Details of acoustic treatments to joints.
- Method of providing reticulation of services, access to services and service outlets.
- Performance data of components and assemblies.
- Specification of materials and finishes.

Subcontractors

General: Submit names and contact details of proposed suppliers and installers.

Substrate acceptance

Requirement: Submit evidence of the installer's acceptance of the wall, floor and ceiling substrate before starting installation.

Tests

Site tests: Submit results, as follows:

- Airborne sound insulation rating of completed installation.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties**.

1.6 INSPECTION**Notice**

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

- Set-out before installation.
- Partition framing before installation of linings and finishes.

- Framed and lined partitions ready to receive the framed and glazed component.
- Completion of installation.

2 PRODUCTS

2.1 GENERAL

Storage and handling

Glass and glazing materials: Store in a clean, dry area unaffected by weather and to the manufacturer's recommendations. Protect from building materials and loose debris such as wet plaster, mortar, paint and welding spatter.

Handling glass: To the manufacturer's recommendations and without damage.

Samples

Demountable partitions: For each partition type, provide samples of the following:

- Each panel type in the selected finish and colour, at least 300 x 300 mm.
- Each type of cover strip, door frame, ceiling channel, bead and other exposed components of the partition suite, in the selected finish and colour, at least 100 mm long.
- Each type of timber veneer, showing the limits of the range of variation in colour, grain pattern and other visible characteristics, at least 300 x 300 mm.
- Each type of glass, at least 100 x 100 mm.
- Floor and ceiling fixings and adjustments.
- Suite of electrical devices and cover plates if provided as part of a proprietary system.
- Skirting, skirting duct, and skirting duct stop ends, returns and removable covers, at least 100 mm long.

Glazing framing systems: Provide samples of the following:

- Prefinished production extrusions showing the limits of the range of variation in the selected finish, at least 100 mm long.
- Joints made by proposed techniques.
- Skirting, skirting duct, and skirting duct stop ends, returns and removable covers, at least 100 mm long.

Glazing materials: Provide samples of glazing materials, each at least 200 x 200 mm, showing specified visual properties and the range of variation, if any, for each of the following:

- Tinted or coloured glass or plastics glazing.
- Surface modified or surface coated glass.
- Patterned or obscured glass or plastics glazing.
- Ceramic-coated glass.
- Mirrored glass.

Sealants

General: Sealant types appropriate for the partition's documented acoustic rating and fire-resistance level, and compatible with partition materials and building substrate.

2.2 FIRE PERFORMANCE

Fire hazard properties

Group number: To AS 5637.1 (2015).

Fire-resistance of building elements

Fire-resistance level: Tested to AS 1530.4 (2014).

2.3 TESTING

General

Impact resistance:

- Lightweight partitions: To the NCC cited ASTM E695 (2003).
- Glazed partitions:
 - . Flat glass: To AS 2208 (2023) Appendix D.

- Curved glass: To AS 2208 (2023) Appendix J.
- Pressure resistance: To the NCC cited ASTM E72 (2015).
- Weighted sound reduction index (R_w): To the NCC cited AS/NZS ISO 717.1 (2004).

2.4 DEMOUNTABLE PARTITIONS

General

Requirement: Proprietary non-load bearing demountable partitioning comprising solid and glazed panels, doors and door frames, and accessories to form a complete and finished partition system, as documented.

Frames

Aluminium extrusions: To AS/NZS 1866 (1997).

2.5 FRAMED AND LINED PARTITIONS

Light steel framing

Requirement: Proprietary framing system of metallic-coated folded steel strip lipped studs and channel section top and bottom tracks and noggings.

Sections and members: To AS/NZS 4600 (2018).

Light timber framing

Timber species: Radiata pine.

Seasoning: Required.

Stress grade: F5 to AS/NZS 1748.1 (2011).

Plasterboard

Standard: To AS/NZS 2588 (2018).

Fibre cement

Standard: To AS/NZS 2908.2 (2000).

Wall and ceiling linings: Type B category 2.

Minimum thickness: 4.5 mm.

Accessories

General: Accessories necessary to complete the installation including the following:

- Corner beads.
- Stop beads.
- Shadowlines.
- Control joints.
- Sheet metal and MDF partition end caps.

Adhesives

General: Adhesives of types appropriate to their purpose and substrates, applied to transmit the loads imposed without causing discolouration of finished surfaces.

2.6 AUTOCLAVED AERATED CONCRETE (AAC) PANELS

General

Requirement: Lightweight concrete partition panels manufactured from a proprietary mixture of sand, lime and cement with a gas-forming additive, and with internal welded steel reinforcing mesh, cured in an autoclave.

Standard: To AS 5146.1 (2015).

Accessories

Requirement: Accessories to the manufacturer's recommendations for the AAC panel system including the following:

- Base angle.
- Deflection head track.
- Steel top hat.
- Mortar.
- Fire-resisting and acoustic rated sealant.
- Panel joint adhesive.

- AAC thin bed adhesive for panel joints.

2.7 GLAZED PARTITIONS

General

Requirement: Proprietary non-load bearing glazed partition suite comprising main frames, door frames, sills, ceiling channels and other extrusions and accessories to form a complete and finished system, as documented.

Frames

Aluminium extrusions: To AS/NZS 1866 (1997).

2.8 GLASS

Standards

Glass type and thickness: To AS 1288 (2021), if no glass type or thickness is nominated.

Materials and installation: To AS 1288 (2021).

Quality requirements for cut-to-size and processed glass: To AS/NZS 4667 (2000).

Terminology for work on glass: To AS/NZS 4668 (2000).

Performance

Glass: Free from defects that detract from appearance or interfere with performance under normal conditions of use.

Plastics glazing: Free from surface abrasions and resistant to yellowing or other colour change.

Capable of maintaining physical properties including strength and impact resistance for its design life.

Heat soaking

Requirement: Heat soak glass to AS 1288 (2021) clause 3.8.

Standard: To EN 14179-1 (2016).

Marking: To EN 14179-1 (2016) or certified by the manufacturer to AS 1288 (2021) clause 3.8.2.

Safety glazing materials

Standard: To AS 2208 (2023).

Type: Grade A.

Marking: To AS 1288 (2021) clause 5.23.

Unacceptable blemishes in heat-treated flat glass (including tinted and coated glass)

Standard: To AS/NZS 4667 (2000).

Ceramic-coated glass

Requirement: Heat-strengthened or toughened glass with a coloured ceramic coating fused to and made an integral part of the surface to ASTM C1048 (2018), Condition B.

2.9 GLAZING MATERIALS

General

Requirement: Putty, glazing compounds, sealants, gaskets, glazing tapes, spacing strips, spacing tapes, spacers, setting blocks, shims and compression wedges appropriate for the conditions of application and required performance.

Glazing tapes

Standards: To AAMA 800 (2016), Products coded 804.3, 806.3 or 807.3, as applicable.

Jointing materials

General: Jointing and pointing materials that are compatible with each other and with the contact surfaces and non-staining to finished surfaces. Do not provide bituminous materials on absorbent surfaces.

Primer

Compatibility: Apply the manufacturer's recommended primer to the surfaces in contact with sealant materials.

Extruded gaskets and seals

General: Provide seals, as documented.

Materials: Non-cellular (solid) elastomeric seals as follows:

- Rubber products: Neoprene, ethylene propylene diene monomer (EPDM) or silicone rubber.
- Flexible polyvinyl chloride (PVC): E type compounds, colourfastness grade B.

2.10 ALUMINIUM FRAME FINISHES

Powder coatings

Application to aluminium and aluminium alloy substrates for architectural applications: To AAMA 2603 (2022), AAMA 2604 (2022) and AAMA 2605 (2022) as appropriate and AS 3715 (2002).

Anodising

Standard: To AS 1231 (2000).

Thickness: 15 to 20 µm.

2.11 PLENUM BAFFLES

General

Requirement: Plenum baffles that maintain the documented fire-resistance level and acoustic performance of the partitions.

Types

Bulk insulation: Layers of bulk insulation batts compressed between the top of the partition and the slab soffit.

Flexible sheet insulation: Mass loaded vinyl sheeting hung as a curtain from the slab soffit.

Plasterboard: Plasterboard sheets bonded together (if more than one layer).

3 EXECUTION

3.1 GENERAL

Preparation

Substrate: Prepare the substrate to receive the partitions.

Carpet: Fix bottom tracks over polyethylene film. Prevent carpet threads from pulling if drilling or installing fasteners.

Protection

General: Protect existing work from damage during the installation and rectify any damage. Provide temporary coverings if required.

Pre-conditioning

General: Acclimatise wood-based system components in the in-service conditions for a minimum period of two weeks before assembly.

Set-out

General: Set out the partition grid on the centreline of framing members, and to coincide with the ceiling grid and other major building grid, as applicable.

3.2 DEMOUNTABLE PARTITIONS

Partition erection

General: Install demountable partitions to the manufacturer's recommendations and as follows:

- Plumb, level, on correct alignments and firmly fixed.
- Supported by fixing the top plate to the ceiling structure or slab soffit, or stabilised by lapping and fastening intersecting or butting plates together.
- With partition panels firmly butted to one another and to adjacent construction.

Building movements: Provide clearances or deflection heads so that partitions are not damaged by structural building movements including long-term slab deflection.

- If fire-resistance levels or acoustic ratings are required, provide a resilient foam or mastic seal having properties equal to those required for the partition.

Fixing

Concealed fixings: For demountable items, provide fixings capable of being repeatedly removed and replaced without damage to finishes.

Fixing to masonry: Provide masonry anchors of expansion or chemical grout type. Do not use explosive-driven fastenings.

Fixing to suspended ceilings: Provide top support to the partition without damage to the ceiling components.

Splicing

General: Splice plates at ends to maintain continuity and alignment.

Sound transmission

General: Seal flanking sound transmission paths during installation, including junctions between partition panels and between panels and other building surfaces, air gaps around doorsets, recesses, such as pelmets and blind boxes, and at cut-outs for services to preserve the sound reduction properties of partitions. Avoid cut-outs back-to-back or next to each other.

Sealing methods: Use appropriate sealing methods, including purpose-made solid profiled inserts, durable resilient gaskets or closed cell foam strips. Provide solid resilient materials in preference to foamed or fluid applied materials, if possible.

Control joints

General: At control joints, provide proprietary nested or tongue and groove panel joints to accommodate expansion and contraction without separation or loss of acoustic performance. Do not bridge control joints with continuous partition system components.

Service access

General: Conceal reticulation of associated building services, either within cavities in the partition structure or within ducted skirtings supplied as part of the partition system, or both. Provide removable or demountable components of the partition system for access to services concealed within partition cavities.

Site tests

Weighted standardised level difference ($D_{nT,w}$): To the NCC cited AS/NZS ISO 717.1 (2004).

3.3 FRAMED AND LINED PARTITIONS**Partition erection**

General: Install partitions plumb, level, on their correct alignment and firmly fixed.

Building movements:

- Provide clearances or deflection heads so that partitions are not damaged by structural building movements including long-term slab deflection.
- If fire-resistance levels or acoustic ratings are required, provide a resilient foam or mastic seal with properties equal to those required for the partition.

Suspended slabs: Provide deflection heads.

Structural floor control joints

General: Do not run or fix partitions framing across control joints.

Acoustic rated partitions

General: Isolate the frames from floors, ceilings and vertical abutments with beads of non-hardening sealant compatible with the materials to be sealed.

Trim

General: Provide trim such as beads, mouldings, stops and skirtings to make neat junctions between lining components, finishes and adjacent surfaces.

Sealing fire-resisting and acoustic rated partitions

General: Apply sealant to the manufacturer's recommendations and as follows:

- Around services pipes and penetrations.
- Electrical outlets and recessed lights: Line back and sides of fixture with plasterboard and seal around fixture junction with sealant.
- Around perimeter of lining panels: Provide continuous runs of sealant.

3.4 LIGHT STEEL FRAMES IN FRAMED AND LINED PARTITIONS**Tracks**

General: Conform to the following:

- Fix bottom tracks to floor substrate.
- Fix top wall tracks to suspended ceiling grid.
- Fix deflection head tracks to the structural soffit above.

Fixing to masonry: Provide masonry anchors of expansion or chemical grout type. Do not use explosive-driven fastenings.

Fixing to metal deck roofs: Provide for vertical uplift movement, as documented.

Fixing to suspended ceilings: Provide intermediate support and bracing at maximum 1500 mm centres and at all load concentrations, doorways and jamb studs.

Seismic movement: If required, do not butt wall tracks or deflection heads against each other. Provide 10 mm clearance between tracks.

Track fixing: Fix top and bottom tracks at 600 mm maximum centres generally, and 100 mm from ends. Splice plates at ends to maintain continuity and alignment.

Stud framing

General: Provide studs in single lengths without splices. Rotate intermediate studs into tracks for friction fixing. Screw fix jamb studs, corner studs and wall intersection studs to tracks.

Fixing: Fix noggings at 1350 mm maximum centres vertically and as required for skirtings and wet area lining. Make sure that faces of noggings and studs are accurately aligned.

Lintels: Install a stiffened top plate lintel for spans of 1800 mm or greater.

Stud spacing: Conform to the sheeting manufacturer's recommendations for curved partitions.

Jambs

General: Install boxed double studs at jambs and heads to all openings.

Additional frame support

General: Provide frame support for fixing the following:

- Floor and wall mounted fixed joinery units, furniture and equipment.
- All wet area fittings and fixtures.
- All grabrails and handrails.

Timber nogging: Provide 240 x 40 mm timber nogging with proprietary stud fixing brackets for wall-hung sanitary fittings.

Stud stiffening: Provide stud stiffening to support wall-hung joinery units and equipment with:

- Full height close fitting timber inserts.
- Boxed steel lipped studs.

Stud service holes

General: Use factory pre-cut flared holes, or provide site cut holes punched or drilled on the centreline of the member and fit proprietary plastic bushes or grommets. Splice additional stiffening to studs if site cut service holes exceed 1/3 the depth of the member.

Metal separation

General: Isolate non-ferrous service pipes and accessories from the metal framing.

Earthing

Permanent earthing: Required.

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

Cavity walls

General: If bridging is nominated, provide to the manufacturer's recommendations.

Staggered stud framed walls

General: Provide studs staggered at 300 mm centres set in oversized top and bottom plates so that each face has stud fixings at 600 mm centres.

3.5 LIGHT TIMBER FRAMES IN FRAMED AND LINED PARTITIONS

Moisture content

General: Do not install framing that does not meet the following values tested to AS/NZS 1080.1 (2012):

- Air conditioned buildings: 8 to 10%.
- Intermittently heated buildings: 10 to 12.5%.
- Unheated buildings: 12 to 15%.

Framing

General: Construct wall frames to the NCC cited AS 1684.4 (2010) Section 6, as appropriate for internal walls.

Double faced walls: Provide gauged timbers in studs, noggings and plates.

3.6 AUTOCLAVED AERATED CONCRETE (AAC) PANELS IN FRAMED AND LINED PARTITIONS

Support framing

General: Install deflection head track and base angle to building structure, with mechanical fasteners at maximum 600 mm centres.

Cutting

General: Cut panels as required for recommended clearance between top of panel and structural soffit, and where panels abut columns and adjacent construction.

Cut edges: Protect exposed reinforcing with anti-corrosion agent to manufacturer's recommendations.

AAC panel installation

General: Install panels to manufacturer's recommendations and as follows:

- Minimum 35 mm into the deflection head track.
- Secure into the base angle.
- Progressively apply panel adhesive to vertical joints between adjacent panels.
- Fit panels snugly together to fully bed adhesive.

Standard: To AS 5146.3 (2018).

Control joints

General: Provide minimum 10 mm wide control joints as follows:

- Spaced at maximum 6 m centres in continuous partition runs.
- Where AAC panels abut adjacent building elements.

Sealant

Locations: Install fire-resisting and acoustic sealant as documented and as follows:

- At both sides of deflection head track at junction with structural soffit.
- At all control joints.
- At services penetrations.

3.7 PLASTERBOARD LINING IN FRAMED AND LINED PARTITIONS

Installation

Gypsum plasterboard and fibre reinforced gypsum lining: To AS/NZS 2589 (2017).

Multiple sheet layers

Application: Fire-resisting and acoustic rated partitions.

Joints:

- Fill and flush up all joints and fixings in each layer and caulk up perimeters and penetrations before installing following layers.
- Stagger all sheet joints: Minimum 200 mm.

Joints and joint treatment

General: Install joint accessories as documented, in conformance with manufacturer's recommendations. Install plumb, level and true to line.

Flush joints: Use joint reinforcing tape bedded in joint compound with recessed edge sheets and finish flush.

Butt joints: Make joints over framing members or provide back blocking.

External corner joints: Bed purpose fabricated perforated metallic-coated steel corner beads in joint compound.

Ceiling junctions: Install purpose fabricated perforated metallic-coated steel shadowline to top of partition.

Sheet metal partition end caps: Provide purpose fabricated perforated metallic-coated steel end caps, sized for partition thickness and bedded in joint compound.

MDF end caps: Provide recessed edge sheets and finish flush using joint reinforcing tape and joint compound.

Dry joints: Provide square edged sheet and finish with a PVC-U joining section.

Control joints: Provide purpose-made perforated metallic-coated control joint beads at not more than 12 m centres in partitions and to coincide with structural control joints. Bed in joint compound.

Wet areas: Provide additional supports, flashings, trim and sealants as required.

Joints in tiled areas: Bed reinforcing tape in joint compound. Do not apply a topping coat.

3.8 FIBRE CEMENT LINING IN FRAMED AND LINED PARTITIONS

Installation

General: Install as follows:

- Run sheets across the framing members.
- In flush jointed applications, stagger end joints in a brick pattern and locate joints on framing members, away from the corners of large openings.
- Provide supports at edges and joints.
- Do not fix to top and bottom plates or noggings.

Timber framing: Nail only or combined with adhesive.

Steel framing: Screw only or combined with adhesive.

Tiled and wet areas: Provide an extra row of noggings immediately above wall-to-floor flashings. Fix sheet at 150 mm centres to each stud and around the perimeter of the sheet. Do not use adhesive fixing alone.

Multiple sheet layers

Application: Fire-resisting and acoustic rated partitions.

Joints:

- Fill and flush up all joints and fixings in each layer and caulk up perimeters and penetrations before installing following layers.
- Stagger all sheet joints: Minimum 200 mm.

Joints and joint treatment

General: Install joint accessories as documented, in conformance with manufacturer's recommendations. Install plumb, level and true to line.

Flush joints: Use joint reinforcing tape bedded in joint compound with recessed edge sheets and finish flush.

External corner joints: Bed purpose fabricated perforated metallic corner beads in joint compound.

Ceiling junctions: Install purpose fabricated perforated metallic-coated steel shadowline to top of partition.

Sheet metal partition end caps: Provide purpose fabricated perforated metallic-coated steel end caps, sized for partition thickness and bedded in joint compound.

MDF end caps: Provide recessed edge sheets and finish flush using joint reinforcing tape and joint compound.

Dry joints: Use square edged sheet and finish with a PVC-U joining section.

Control joints: Provide control joints to coincide with structural control joints and as follows:

- Walls: ≤ 7.2 m centres.
- Control joint beads: Purpose-made metallic-coated.
- Support: Provide framing parallel to the joint on each side. Do not fix the lining to abutting building surfaces.

Wet areas: Provide additional supports, flashings, trim and sealants to manufacturer's recommendations.

Joints in tiled areas: Bed reinforcing tape in joint compound. Do not apply a topping coat.

- Control joints: At maximum 4.2 m centres and spaced to suit joints required in tiling.
- Internal corners: Reinforce with preformed angles to manufacturer's recommendations.

3.9 GLAZED PARTITION SYSTEMS

General

Requirement: Conform to manufacturer's recommendations and assembly details.

Frame erection

Frames: Install main frames, sills, ceiling channels, door and window frames and other framing members as follows:

- Plumb, level, square, straight and true.
- Fixed or anchored to the building structure.
- Isolated from any building loads, including loads caused by structural deflection or shortening.
- Joints tightly fitted and neatly aligned.
- Door and window openings accurately sized.
- Use concealed fixings.

Sealant

Acoustic sealant: If required to maintain rated acoustic performance, bed sill and ceiling channels in acoustic sealant.

Glass processing

Processing: Perform required processes on glass, including cutting, obscuring, silvering and bending. Form necessary holes, including for fixings, hardware, equipment, access openings and speaking holes. Process exposed glass edges to a finish not inferior to ground arised.

Framed glazing

Assembly: Provide proprietary glazing beads and resilient (PVC, butyl or similar) glazing tapes, gaskets and inserts, to hold the glass firmly without distortion and to withstand the documented loadings.

Frameless glazing

Assembly: Join the vertical edges of adjacent glass panels with a clear structural silicone jointing compound.

Support: For frameless installations not fixed directly to the building structure, provide adequate connection of the top and bottom glazing channels or bead to resist lateral loads.

3.10 PLENUM BAFFLES

Baffles

General: Install plenum baffles tightly butted to building structure, service ducts, pipes and conduits and to the top of the partition or to the top of the suspended ceiling directly above the line of the partition. Seal joints, penetrations and intersections and maintain the required performance.

Bulk insulation: Install individual layers to fill space between building structure and the top of the partition or the top of the suspended ceiling.

Flexible sheet insulation: Fix to soffit through a continuous furring channel, hang to meet the top of the partition and extend horizontally 900 mm over the suspended ceiling.

Fire-resisting partitions

General: If a suspended ceiling of equivalent fire-resistance is not provided, extend the partitions to the underside of the structural soffit or provide plenum baffles of equivalent fire-resistance level.

Acoustic rated partitions

General: If a suspended ceiling of equivalent sound insulation rating is not provided, extend the partitions to the underside of the structural soffit or provide acoustic rated plenum baffles. Make sure the ceiling and baffle provide a combined rating equivalent to the partition rating.

3.11 COMPLETION

Cleaning

General: Remove protective coverings, replace damaged glass and leave the work clean, polished, free from defects and in good condition.

Rectification

General: Correct any defects to joints, remove any excess joint compound and leave the partition installation complete, clean and ready for the application of finishes.

Paint

General: Within 14 days of the date for practical completion, provide touch-up paint for each demountable partition colour used, including application instructions.

Operation and maintenance manuals

Requirement: Prepare a manual that includes the following:

- Full product information for each system, including product designations, components list, colours and finishes, and accessories.

- Information on all glass, including type, thickness and details of any colouration or treatment affecting the physical appearance of the installation.
- Information on all doors and hardware supplied as part of the system, including door type, size, finishes and hardware details.
- Maintenance recommendations.
- Copies of type tests and compliance certificates for fire, acoustic or other system performance requirements.
- Detailed instructions for demounting and re-erecting each demountable partition system without damage and to maintain acoustic and fire-resisting properties. Include information on the relocation of built-in services.

0525 CUBICLE SYSTEMS

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide cubicles, as documented.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

1.3 INTERPRETATION

Abbreviations

General: For the purposes of this worksection, the following abbreviations apply:

- ABS: Acrylonitrile-Butadiene-Styrene.

Definitions

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

- Acrylic polymer resin panels: Thermoplastic or thermosetting acrylic resin panels derived from acrylic acid, methacrylic acid or other related compounds, with mineral fillers and pigments.
- Compressed fibre cement sheets: Factory prefinished double faced autoclaved high density fibre cement sheets with square stone cut edges ground smooth and arrised.
- Decorative overlaid wood panels: Particleboard or fibreboard with a bonded decorative finishing surface such as thermosetting resin (low pressure melamine), PVC film, paper foils or wood veneer.
- 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 material (e.g. paper) impregnated with thermosetting resins and bonded together under heat and pressure of at least 5 MPa.
- Metal faced board: Sheet metal (usually stainless steel) adhesive fixed to moisture resistant particleboard.

1.4 TOLERANCES

General

Deviation (from true grid lines and planes): 1:1000 to a maximum of 3 mm.

Misalignment (of adjoining surfaces at panel junctions): 1 mm.

Panel thickness: ± 0.5 mm.

Length and width: 0.1% of the dimension or 0.5 mm, whichever is the greater.

Flatness, twist, winding and bow: 1 mm deviation from a 2.4 m straightedge placed in any position.

Maximum deviation of edges from the intended true line: ± 1 mm.

1.5 SUBMISSIONS

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION, Operation and maintenance manuals**.

Products and materials

Manufacturer's data: Submit manufacturer's standard product literature for each system type.

Samples

Requirement: Submit samples to **PRODUCTS, GENERAL, Samples**.

Shop drawings

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

- Overall layout and dimensions.
- Materials, thicknesses and finishes of elements including doors, divisions, fronts, pedestals and top rail.
- Assembly components, including suspension beam and fixing hardware.
- Door hardware type and location.
- Relationship of assembly to adjacent building elements.

Subcontractors

General: Submit names and contact details of proposed suppliers and installers.

Substrate acceptance

Requirement: Submit evidence of the installer's acceptance of the wall, floor and ceiling substrate before starting installation.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties.**

1.6 INSPECTION**Notice**

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

- Set-out before installation.
- Completion of installation.

2 PRODUCTS

2.1 GENERAL**Samples**

Requirement: Provide samples of the following:

- Each selected panel and door finish, at least 300 x 300 mm, with associated selected edge strips and trim.
- Sample panel tested for graffiti removal:
 - . Nominate the cleaning agent.
 - . Mark the sample with spray paint and permanent markers.
 - . Clean half of each marked area.
 - . Repeat with alternate cleaning agents until removal has been achieved.
- All hardware and metal components in the selected finish.

Storage and handling

Requirement: Store in a clean, dry area, unaffected by weather and to the manufacturer's recommendations. Protect from building materials and loose debris, such as wet plaster, mortar, paint and welding spatter.

2.2 PRODUCT SYSTEMS**Acrylic polymer resin panels**

Requirement: Chip, crack and scratch resistant acrylic polymer resin panels.

Stone panels

Requirement: Non-porous, homogenous stone panels.

Sheet faced reconstituted wood-based panels and doors

Particleboard: Moisture resistant particleboard to AS 1859.1 (2017).

Dry process fibreboard (including medium density fibreboard): Moisture resistant or high performance medium density fibreboard to AS/NZS 1859.2 (2017).

Finishes: Conform to the following:

- Decorative overlay: To AS/NZS 1859.3 (2017).
- Edge strip: 2 mm ABS colour matched to decorative overlay.
- High pressure decorative laminates: Sheets made from thermosetting resins to AS/NZS 2924.1 (2024).

- Stainless steel: Type 316.
 - . Edge: Adhesive fixed stainless steel folded channel.

High pressure decorative laminate (HPDL) panels and doors

Material: Compact high pressure decorative laminate panels with an integral surface finish and edges sealed by the manufacturer.

Standard: To AS/NZS 2924.1 (2024).

- Classification: Compact general purpose standard (CGS).

Panel edge: Factory prefinished square cut, ground smooth and arrised. Cleaned and oiled by the manufacturer.

Compressed fibre cement panels

Material: Factory prefinished compressed cellulose cement sheets with square stone cut edges ground smooth and arrised.

Standard: To AS/NZS 2908.2 (2000).

Panel finish: Factory applied two-pack polyurethane.

2.3 COMPONENTS**Suspension beam**

General: For suspended systems, provide a suspension beam consisting of a galvanized mild steel channel, located immediately above the ceiling framing along the line of the partition fronts.

Hardware

Fixing hardware: Bolts, dowels, brackets, standards, cappings and stabilising bars supplied to complete the cubicle assembly.

Door furniture: As documented.

3 EXECUTION**3.1 GENERAL****Pre-conditioning**

General: Acclimatise wood-based system components in the in-service conditions for a minimum period of two weeks before assembly.

Control of movement

Assembly: Accommodate thermal expansion of panels.

3.2 PANELS**Manufactured cubicle system installation**

Assembly: Attach divisions and nibs to walls and fronts with purpose-made proprietary fixings. Cut nibs and divisions that abut walls, as required, so that assembly is plumb. Seal edges as recommended by the manufacturer.

Floor mounted/overhead braced type: Fix fronts to the floor with proprietary fittings and at the top to a metal channel head rail, supplied as part of the system. Run head rail across the fronts and fix to the walls at each end. Form the channel into a box section over doorways by snapping in a mating channel insert.

Heads of openings: Fix stabilising head channels by screwing to the top of the partitions. Provide an infill strip to the channel across the opening.

Ceiling-hung type: Hang the fronts from a suspension beam with attachments incorporating a means of height adjustment, supplied as part of the system.

Freestanding type: Fix fronts to the floor with proprietary fittings.

Stone panels: Avoid on-site cutting and mechanical processing of panels, if possible.

3.3 COMPONENTS**Shower seats**

Fixing: Fix to structural elements using one of the following methods:

- Anodised aluminium channel to exposed edge, secured to walls at each end.
- Product assembly detail.

- Proprietary wall bracket.

Suspension beam

Installation: Install suspension beam as follows:

- Build the ends into masonry structure or provide end fixings to the structure, as necessary, to transfer the load.
- Drill the bottom flange of the channel for the partition fixing bolts.

3.4 COMPLETION

Operation and maintenance manuals

Requirement: Prepare a manual that includes the following:

- Full product information for each system, including product designations, components list, colours and finishes, and accessories.
- Information on all doors and hardware supplied as part of the system including door type, size, finishes, and hardware details.
- Maintenance recommendations.

0531 SUSPENDED CEILINGS - COMBINED

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide suspended ceilings, as documented.

Scope of Work

As documented see Reflected Ceiling Plans for Lev00 – A.300 series

Company Contacts

Website: <https://armstrongceilings.com.au/product/ceilings/ultima-ceiling-tiles/>
<https://armstrongceilings.com.au/product/ceilings/bioguard-acoustic-ceiling-tiles/>

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

1.3 STANDARDS

General

Suspended ceilings: To AS/NZS 2785 (2020).

1.4 INTERPRETATION

Definitions

General: For the purposes of this worksection, the definitions given in AS/NZS 2785 (2020) and the following apply:

- Ceiling unit: Tile, panel, plank, strip or open grid supported within or to a suspended ceiling system.

1.5 TOLERANCES

Suspension system

Flatness, twist, winding and bow: 1.5 mm deviation from a 1.5 m straightedge placed in any position.

Deflection: To AS/NZS 2785 (2020) Table 2.4.5.

Setting out and levelling: To AS/NZS 2785 (2020) Appendix D.

Sheeted or flush ceiling suspension system

Suspension system bearing surface for flush lined ceiling: To AS/NZS 2589 (2017) Table 4.2.2.

Deflection: To AS/NZS 2589 (2017) Table 3.5.1.2.

1.6 SUBMISSIONS

Fire performance

Fire hazard properties: Submit evidence of conformity to **FIRE PERFORMANCE, Fire hazard properties**.

Fire-resistance level: Submit evidence of conformity to **FIRE PERFORMANCE, Fire-resistance of building elements**.

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION, Operation and maintenance manuals**.

Products and materials

Type tests: Submit test results to **PRODUCTS, GENERAL, Tests** for the following:

- Weighted suspended ceiling normalised level difference.
- Weighted sound absorption coefficient.
- Weighted sound reduction index.

Samples

Requirement: Submit samples to PRODUCTS, **GENERAL, Samples**.

Shop drawings

Set-out drawings: Submit proposed set-out, indicating the grid module, type and ceiling unit layout, before installation. Coordinate with plenum services layouts, building structure and other factors affecting the layout.

Subcontractors

General: Submit names and contact details of proposed suppliers and installers.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties**.

1.7 INSPECTION**Notice**

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

- The suspension system before the installation of ceiling units or lining.
- The ceiling assembly before the installation of fittings and site painting, if applicable.
- The completed ceiling.

2 PRODUCTS

2.1 GENERAL**Samples**

Requirement: Provide samples as follows:

- Suspension system: Sections proposed for the suspension system, including suspension rods, clips and wall angles.
- Accessories including access panels and wall trim.
- Ceiling material: Lining or ceiling units, with insulation, showing the extremes and mean of variation in colour, pattern or texture of the proposed finish.

Suspended ceiling systems

Requirement: Provide suspended ceilings as complete systems, fabricated by one manufacturer, as documented.

Storage and handling

Requirement: Store suspended ceiling components in a dry and secure area, and to the manufacturer's recommendations.

Tests

Weighted suspended ceiling normalised level difference: To the NCC cited AS/NZS ISO 717.1 (2004).

Weighted sound absorption coefficient: To AS ISO 11654 (2002), as tested to AS ISO 354 (2006).

Weighted sound reduction index: To the NCC cited AS/NZS ISO 717.1 (2004).

2.2 FIRE PERFORMANCE**Fire hazard properties**

Group number: To AS 5637.1 (2015).

Fire-resistance of building elements

Fire-resistance level: Tested to AS 1530.4 (2014).

2.3 SUSPENSION SYSTEM**Ceiling suspension system**

Consistency: Provide ceiling systems as complete proprietary systems, fabricated by one manufacturer, as documented.

Materials

Coated steel: To AS 1397 (2021).

Aluminium: To AS/NZS 1866 (1997).

Protective coatings for steel components: To AS/NZS 2785 (2020) Appendix F.

Protection against atmospheric corrosion: To AS 2312.1 (2014) and AS/NZS 2312.2 (2014).

2.4 CEILING UNITS

General

Ceiling units: As documented.

2.5 LININGS

Ceiling linings

General: As documented.

Plasterboard

Standard: To AS/NZS 2588 (2018).

Minimum thickness: 10 mm.

Fibre cement

Standard: To AS/NZS 2908.2 (2000).

Internal ceiling linings: Type B Category 2.

External ceiling linings: Type A Category 3.

Minimum thickness: 4.5 mm.

Sealants

Fire-resisting sealant: Non-hardening sealant compatible with the materials to be sealed and having a fire-resistance rating equal to that of the building element it seals.

Acoustic sealant: Non-hardening sealant compatible with the ceiling materials and rated to match the ceiling system's acoustic performance.

2.6 TRIM

General

Trim: Provide trim consistent with the materials and finishes of the ceiling system.

Accessories

General: Provide accessories as part of the proprietary ceiling system necessary to complete the installation.

3 EXECUTION

3.1 GENERAL

Working environment

General: Do not start work before the building is enclosed, wet work is complete and dry, and all work above the ceiling, including services, is complete.

Protection

General: Protect existing work from damage during the installation.

Partitions

General: If partitions are attached to the underside of the ceiling systems, include the partition mass in the seismic mass of the ceiling.

Stability

General: Install the ceilings level and fix to prevent looseness or rattling of ceiling components under normal conditions.

Structure-borne sound

General: Provide a ceiling system that does not amplify structure-borne sound. Provide suitable proprietary products or systems for reducing contact vibrations between structure and ceiling.

Control of movement

Abutments: Install the ceiling to allow for differential movement at abutting surfaces.

Alignment: Align ceiling control joints with structural control joints. Do not bridge structural control joints.

Prefinishes

General: Repair damaged prefinishes by recoating.

Curtain recesses

General: Provide curtain recesses, including the following:

- Lining.
- Curtain track support.
- Accommodation for motors and cabling.

3.2 SUSPENSION SYSTEM

Ceiling grid

Set-out: Align ceiling unit joints and centrelines of visible suspension members with documented set-out points. If not documented, set out with equal margins.

Suspension system

General: Fix suspension system to the structural soffit.

Support members: Install support members as follows:

- Space as required by the loads on the system and the type of ceiling.
- Allow for the installation of services and accessories, including ductwork, light fittings and diffusers.
- Provide additional back support or suspension members for the fixing of services and accessories to prevent distortion, overloading or excessive vertical deflection.
- Allow for access for maintenance of services.

Failure: Provide a ceiling system that will not progressively fail with failure of any one suspension point.

Height adjustment: Provide height adjustment with a length adjustment device at each suspension point, permitting length variation of at least 50 mm.

Grid members: If required, notch grid members at the junction with the perimeter trim to make sure the ceiling units lay flat on the perimeter trim.

Restriction: Do not attach the suspension system to the lip or flange of purlins.

Services

Support: Conform to the following:

- If the service has not been designed to accept the ceiling load, do not fix suspension members to services.
- Where services obstruct the ceiling supports, provide bridging and suspension on each side of the services.
- Do not support services terminals on ceiling units.

Bracing

General: Provide bracing to prevent lateral movement and to resist the imposed horizontal seismic force.

Bulkheads

General: Integrate bulkheads with the ceiling structure and brace to prevent lateral movement. If the ceiling is terminated at a bulkhead, provide for seismic requirements.

External suspended soffits

General: Support external suspended soffits on rigid members capable of carrying the loads from imposed actions. Install members to minimise any eccentricity, and carry the positive and negative loads from wind actions through to the supporting structure.

Fasteners

General: Provide concealed fasteners. If material supporting hangers is less than 3 mm thick, do not use screw fasteners.

3.3 CEILING UNITS

Installation

Fitting: Fit ceiling units accurately and neatly, without distortion.

Lock clips: If ceiling units are exposed to loads from wind actions or if required for security, insert lock clips at the junction of carrier rails and units.

Pattern and texture: Set out patterned or heavily textured materials with a consistent direction of pattern or texture.

Service penetrations

General: Provide openings for all services elements, including light fittings, ventilation outlets, detectors, sprinklers and loudspeakers. Where services pass through ceiling grid members, provide additional grid members and support.

Cut ceiling unit edges

General: Conceal or finish to match prefinished edges, including at openings for services elements.

3.4 PLASTERBOARD**Installation**

Gypsum plasterboard and fibre-reinforced gypsum plaster: To AS/NZS 2589 (2017).

Level of finish and jointing: To AS/NZS 2589 (2017) clause 3.1.

Suspended flush ceilings: Fix using screws or screws and adhesive to ceiling members or support frame.

Multiple sheet layers

Application: Fire-resisting and acoustic rated ceilings.

Joints: Fill and flush up all joints and fixings in each layer and caulk up perimeters and penetrations before installing following layers. Stagger all sheet joints by minimum 200 mm.

Joints

Flush joints: Provide recessed edge sheets and finish flush using perforated paper reinforcing tape.

Butt joints: Make joints over framing members or otherwise provide back blocking.

External corner joints: Make joints over metallic-coated steel corner beads.

Control and movement joints: Align lining control joints with structural movement joints and as follows:

- Ceilings:
 - . Internal: At maximum 12 m centres.
 - . External: At maximum 6 m centres.
- Control joint beads: Purpose-made metallic-coated.
- Seismic joint: Purpose-made flexible joint and cover.
- Location: Position joints to intersect light fixtures, vents or air diffusers, as required.

Wet areas: Install additional supports, trim and sealants, as required.

3.5 FIBRE CEMENT**Installation**

General: Run sheets across the framing members. In flush jointed applications, stagger end joints in a brick pattern and locate them on framing members, away from the corners of large openings. Provide supports at edges and joints.

Suspended flush ceilings: Fix using screws or screws and adhesive to ceiling members or support frame.

Multiple sheet layers

Application: Fire-resisting and acoustic rated ceilings.

Joints: Fill and flush up all joints and fixings in each layer and caulk up perimeters and penetrations before installing following layers. Stagger all sheet joints by minimum 200 mm.

Joints

Flush joints: Provide recessed edge sheets and finish flush using perforated paper reinforcing tape.

External corner joints: Make joints over metallic-coated steel corner beads.

Dry joints: Provide square edged sheet and finish with a PVC-U joining section.

Non-set joints: Provide square edge joint with metal or socket strip backing.

Control and movement joints: Align lining control joints with structural movement joints to the manufacturer's recommendations and as follows:

- Control joint beads: Purpose-made metallic-coated.
- Seismic joint: Purpose-made flexible joint and cover.
- Support: Provide framing parallel to the joint on each side. Do not fix the lining to abutting building surfaces.

- Location: Position joints to intersect light fixtures, vents or air diffusers, as required.

Wet areas: Install additional supports, trim and sealants, as required.

3.6 ACCESS PANELS

Finish

General: Match the access panels to the ceiling in appearance and performance.

Identification

General: Provide each access panel with an identification mark.

Non-demountable ceilings

General: Provide access panels supported and anchored to permit ready removal and refixing.

Reinforcement

General: Reinforce the back of the access panel to prevent warping and facilitate handling.

3.7 TRIM

General

Trim: Install trim at junctions with other building elements and surfaces, including walls, beams and penetrations, consistent with the materials and finishes of the ceiling system.

Accessories

General: Install accessories as part of the proprietary ceiling system necessary to complete the installation.

3.8 COMPLETION

General

Exposed surfaces: Touch up shop applied finishes and restore damaged or marked areas.

Cleaning: Clean completed surfaces

Debris and unused material: Remove from site.

Spares

General: Provide spare matching ceiling components, as follows, and store the spare materials on site where directed:

- Supporting system: One spare supporting member (hanger or framework member) for every 100 members or part thereof of the same type installed in the ceiling.
- Ceiling units: One spare unit for every 50 units or part thereof installed in the ceiling.
- Accessories: One spare of each type for every 50 units or part thereof installed in the ceiling.

Operation and maintenance manuals

Requirement: Prepare a manual that includes the manufacturer's recommendations for the care and maintenance of the ceiling, and operating instructions for demounting, if applicable.

0531P RONDO IN SUSPENDED CEILINGS - COMBINED

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide suspended ceilings using RONDO ceiling support system, as documented.

1.2 COMPANY CONTACTS

RONDO technical contacts

Website: www.rondo.com.au/contact-us/

1.3 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

- 0453p RONDO in doors and access panels.
- 0342 Light steel framing for structural ceiling framing.
- 0472 Acoustic insulation for acoustic insulation to walls and ceiling systems.
- 0522p RONDO in partitions - framed and lined.
-

1.4 STANDARDS

General

Suspended ceilings: To AS/NZS 2785 (2020).

1.5 MANUFACTURER'S DOCUMENTS

Technical manuals

Resources: www.rondo.com.au/resources

Product: www.rondo.com.au/products/ceilings/

Product manual: www.rondo.com.au/resources/installation/product-manuals/

1.6 INTERPRETATION

Definitions

General: For the purposes of this worksection, the definitions given in AS/NZS 2785 (2020) and the following apply:

- Ceiling unit: Tile, panel, plank, strip or open grid supported within or to a suspended ceiling system.

1.7 TOLERANCES

Suspension system

Flatness, twist, winding and bow: 1.5 mm deviation from a 1.5 m straightedge placed in any position.

Deflection: To AS/NZS 2785 (2020) Table 2.4.5.

Setting out and levelling: To AS/NZS 2785 (2020) Appendix D.

Sheeted or flush ceiling suspension system

Suspension system bearing surface for flush lined ceiling: To AS/NZS 2589 (2017) Table 4.2.2.

Deflection: To AS/NZS 2589 (2017) Table 3.5.1.2.

1.8 SUBMISSIONS

Fire performance

Fire hazard properties: Submit evidence of conformity to PRODUCTS, **FIRE PERFORMANCE**, **Fire hazard properties**.

Fire-resistance level: Submit evidence of conformity to PRODUCTS, **FIRE PERFORMANCE**, **Fire-resistance of building elements**.

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION**, **Operation and maintenance manuals**.

Products and materials

Type tests: Submit results as follows:

- Weighted suspended ceiling normalised level difference: To AS/NZS ISO 717.1 (2004).
- Weighted sound absorption coefficient: To AS ISO 11654 (2002), as tested to AS ISO 354 (2006).
- Weighted sound reduction index: To AS/NZS ISO 717.1 (2004).

Samples

Requirement: Submit samples to PRODUCTS, **GENERAL**, **Samples**.

Shop drawings

Set-out drawings: Submit proposed set-out, indicating the grid module, type and ceiling unit layout, before installation. Coordinate with plenum services layouts, building structure and other factors affecting the layout.

Subcontractors

Requirement: Use specialist installers recommended by the ceiling system manufacturer.

Warranties

Requirement: Submit warranties to **COMPLETION**, **Warranties**.

1.9 INSPECTION

Notice

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

- The suspension system before the installation of ceiling units or lining.
- The ceiling assembly before the installation of fittings and site painting, if applicable.
- The completed ceiling.

2 PRODUCTS

2.1 GENERAL

Product substitution

Other products: Conform to **SUBSTITUTIONS** in *0171 General requirements*.

Samples

Requirement: Provide samples as follows:

- Suspension system: Sections proposed for the suspension system, including suspension rods, clips and wall angles.
- Accessories including access panels and wall trim.
- Ceiling material: Lining or ceiling units, with insulation, showing the extremes and mean of variation in colour, pattern, or texture of the proposed finish.

Storage and handling

Requirement: Store suspended ceiling components in a dry and secure area, and to the manufacturer's recommendations.

Product identification

General: Marked to show the following:

- Manufacturer's identification.
- Product brand name.
- Product type.
- Quantity.
- Product reference code and batch number.
- Date of manufacture.

2.2 FIRE PERFORMANCE

Fire hazard properties

Group number: To AS 5637.1 (2015).

Fire-resistance of building elements

Fire-resistance level: Tested to AS 1530.4 (2014).

2.3 SUSPENSION SYSTEM

RONDO ceiling systems

General: As documented.

Ceiling systems:

- RONDO KEY-LOCK® Concealed ceiling system.
- RONDO DUO® Exposed grid ceiling system.
- RONDO Xpress® Drywall grid ceiling system.
- RONDO DONN® Exposed grid ceiling system.
- Accessories: To RONDO's recommendations.

Materials

Protective coatings for steel components: To AS/NZS 2785 (2020) Appendix F.

Protection against atmospheric corrosion: To AS 2312.1 (2014) and AS/NZS 2312.2 (2014).

2.4 CEILING UNITS

General

Ceiling units: As documented.

2.5 LININGS

Ceiling linings

General: As documented.

Plasterboard

Standard: To AS/NZS 2588 (2018).

Minimum thickness: 10 mm.

Fibre cement

Standard: To AS/NZS 2908.2 (2000).

Internal ceiling linings: Type B Category 2.

External ceiling linings: Type A Category 3.

Minimum thickness: 4.5 mm.

Sealants

Fire-resisting sealant: Non-hardening sealant compatible with the materials to be sealed and having a fire-resistance rating equal to that of the building element it seals.

Acoustic sealant: Non-hardening sealant compatible with the ceiling materials and rated to match the ceiling system's acoustic performance.

2.6 TRIM

General

Trim: Provide trim consistent with the materials and finishes of the ceiling system.

Accessories

General: Provide accessories as part of the proprietary ceiling system necessary to complete the installation.

3 EXECUTION

3.1 GENERAL

Working environment

General: Do not start work before the building is enclosed, wet work is complete and dry, and all work above the ceiling, including services, is complete.

Protection

General: Protect existing work from damage during the installation.

Partitions

General: If partitions are attached to the underside of the ceiling systems, include the partition mass in the seismic mass of the ceiling. Brace the partition using independent wall bracing if finishing at ceiling level or just above ceiling level. Do not rely on the suspended ceiling framing for lateral stability of the partition walls.

Bracing: Brace partitions attached to the ceiling at concentrated load points such as window and door openings and shelving.

Stability

General: Install the ceilings level, to the nominated plane and fix to prevent looseness or rattling of ceiling components under normal conditions.

Structure-borne sound

General: Provide a ceiling system that does not amplify structure-borne sound. Provide suitable proprietary products or systems for reducing contact vibrations between structure and ceiling.

Control of movement

Abutments: Install the ceiling to allow for differential movement at abutting surfaces.

Alignment: Align ceiling control joints with structural control joints. Do not bridge structural control joints.

Prefinishes

General: Repair damaged prefinishes by recoating.

Curtain recesses

General: Provide curtain recesses, including the following:

- Lining.
- Curtain track support.
- Accommodation for motors and cabling.

3.2 SUSPENSION SYSTEM

Installation of RONDO ceiling support systems

Requirement: To the RONDO Professional Design Manual, or RONDO designed details.

Ceiling grid

Set-out: Align ceiling unit joints and centrelines of visible suspension members with documented set-out points. If not documented, set out with equal margins. Maintain a consistent and uniform grid set-out conforming to RONDO's span tables, or as documented.

Clearances: Allow for adequate clearance between ceiling grid and building facade elements.

Suspension system

Support members: Install support members as follows:

- Space as required by the loads on the system and the type of ceiling.
- Allow for the installation of services and accessories, including ductwork, light fittings and diffusers.
- Provide additional back support or suspension members for the fixing of access panels or air registers to prevent distortion, overloading or excessive vertical deflection.
- Allow for access for maintenance of services.

Alignment: Align suspension system with ceiling grid members.

- Vertical misalignment: < 5° (9H in 100V) in either direction.

Clearances: Provide minimum clearance between suspension system and services in the plenum space, to RONDO's recommendations.

Height adjustment: Provide height adjustment with a length adjustment device at each suspension point, permitting length variation of at least 50 mm.

Grid members: If required, notch grid members at the junction with the perimeter trim to make sure the ceiling units lay flat on the perimeter trim.

- Minimum bearing length: 7 mm.

Restriction: Do not attach the suspension system to the lip or flange of purlins.

Services

Support: Conform to the following:

- Do not fix suspension members to services.
- If services obstruct the ceiling supports, provide bridging and suspension on each side of the services.
- Do not support services terminals on ceiling units.
- Clearances: Maintain clearance between services and the suspension system to RONDO's recommendations.

RONDO DUO ceiling grids: If the weight of the service exceeds 7.5 kg, provide independent suspension to the service.

Bracing

General: If the ceiling grid is unable to transfer sufficient load at the perimeter junction, provide plenum bracing to RONDO's recommendations to prevent lateral movement of the ceiling grid and to resist the imposed horizontal seismic force.

Bulkheads

General: Integrate bulkheads with the ceiling structure and brace to prevent lateral movement. If the ceiling is terminated at a bulkhead, provide for the resulting seismic force within the bulkhead bracing.

External suspended soffits

General: Install RONDO stud dropper and stud rail framing with top-hats for suspended external soffits. For direct fix framing use RONDO top hat framing members.

Fasteners

General: Provide concealed fasteners to the manufacturer's recommendations. Use RONDO CERT-R-FIX fasteners to AS 5216 (2021) for fixing into concrete. If material supporting hangers is less than 1.2 mm thick, do not use single screw fasteners in tension.

3.3 CEILING UNITS**Installation**

Fitting: Fit ceiling units accurately and neatly, without distortion.

Tile hold down clips: If ceiling units are required to be restrained for security or to prevent dislodgement of the ceiling tile under seismic actions, insert tile hold down clips at the junction of carrier rails and units.

Pattern and texture: Set out patterned or heavily textured materials with a consistent direction of pattern or texture, or as documented.

Service penetrations

General: Provide openings for all services elements, including light fittings, ventilation outlets, detectors, sprinklers and loudspeakers. If services pass through ceiling grid members, provide additional grid members and support.

Cut ceiling unit edges

General: Conceal, or finish to match prefinished edges, including at openings for services elements.

3.4 PLASTERBOARD**Installation**

Gypsum plasterboard and fibre-reinforced gypsum plaster: To AS/NZS 2589 (2017).

Level of finish and jointing: To AS/NZS 2589 (2017) clause 3.1.

Suspended flush ceilings: Fix using screws or screws and adhesive to ceiling members or support frame.

Multiple sheet layers

Application: Fire-resisting and acoustic rated ceilings.

Joints: Fill and flush up all joints and fixings in each layer and caulk up perimeters and penetrations before installing following layers. Stagger all sheet joints by minimum 200 mm in both directions.

Joints

Flush joints: Provide recessed edge sheets and finish flush using perforated paper reinforcing tape.

Butt joints: Make joints over framing members or otherwise provide back blocking.

External corner joints: Make joints over RONDO P01 corner beads.

Control joints and movement joints: Align lining control joints with structural movement joints and as follows:

- Ceilings:
 - . Internal: At maximum 12 m centres.
 - . External: At maximum 6 m centres.
- Control joint beads: RONDO P35 expansion joint.
- Seismic joint: RONDO sliding joint.
- Location: Position joints to intersect light fixtures, vents or air diffusers, as required.

Wet areas: Install additional supports, trim and sealants, as required.

3.5 FIBRE CEMENT**Installation**

General: Run sheets across the framing members. In flush jointed applications, stagger end joints in a brick pattern and locate them on framing members, away from the corners of large openings. Provide supports at edges and joints.

Suspended flush ceilings: Fix using screws or screws and adhesive to ceiling members or support frame.

External areas: Close up ceiling grid spacing to the manufacturer's recommendations for fibre cement, as appropriate.

Multiple sheet layers

Application: Fire-resisting and acoustic rated ceilings.

Joints: Fill and flush up all joints and fixings in each layer and caulk up perimeters and penetrations before installing following layers. Stagger all sheet joints by minimum 200 mm in both directions.

Joints

Flush joints: Provide recessed edge sheets and finish flush using perforated paper reinforcing tape.

External corner joints: Make joints over RONDO P01 corner beads.

Dry joints: Provide square edged sheet and join with a RONDO Exangle joining section.

Control and movement joints: Align lining control joints with structural control joints and for flush jointing as follows:

- Control joint beads: RONDO P35 expansion joint.
- Seismic joint: RONDO sliding joint.
- Support: Provide framing parallel to the joint on each side. Do not fix the lining to abutting building surfaces.
- Location: Position joints to intersect light fixtures, vents or air diffusers, as required.

Wet areas: Install additional supports, trim and sealants, as required.

3.6 ACCESS PANELS

General

Requirement: Provide RONDO access panels to *0453p RONDO in doors and access panels*.

Finish

General: Match the access panels to the ceiling in appearance and performance.

Identification

General: Provide each access panel with an identification mark.

Non-demountable ceilings

General: Provide access panels supported and anchored to permit ready removal and refixing.

Reinforcement

Frames: Frame the ceiling opening on all sides to allow fixing of the access panel. Provide independent suspension to the framing, as required.

3.7 TRIM

General

Trim: Install trim at junctions with other building elements and surfaces, including walls, beams and penetrations, consistent with the materials and finishes of the ceiling system.

Accessories

General: Install accessories as part of the proprietary ceiling system necessary to complete the installation.

Plasterboard cornices

Fixing: Mitre at corners and adhesive fix with cornice cement. Pin in place at cornice edges until adhesive sets, remove pins and fill holes.

Vertical movement: If minor vertical movement of the ceiling is anticipated, use flexible mastic to joints to vertical surfaces.

Plaster cornices and roses

Fixing: Pin or prop in place and fix with wet gypsum plaster and scrim straps over framing members.

Fire-resisting walls

Requirement: Seal to soffit with sealant with an equivalent fire-resistance level before fixing decorative cornices, if any.

3.8 COMPLETION

General

Exposed surfaces: Touch up shop applied finishes and restore damaged or marked areas.

Cleaning: Clean completed surfaces

Debris and unused material: Remove from site.

Spares

General: Provide spare matching ceiling components, as follows, and store the spare materials on site where directed:

- Supporting system: One spare supporting member (hanger or framework member) for every 100 members or part thereof of the same type installed in the ceiling.
- Ceiling units: One spare unit for every 50 units or part thereof installed in the ceiling.
- Accessories: One spare of each type for every 50 units or part thereof installed in the ceiling.

Operation and maintenance manuals

Requirement: Prepare a manual that includes the manufacturer's recommendations for the care and maintenance of the ceiling, and operating instructions for demounting, if applicable.

Warranties

Type: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the manufacturer and the installer.

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

Use only if warranties extending beyond the defects liability period are available for the particular system. Insert the required warranty period and terms, which should be negotiated beforehand. If the warranty is in the form of separate material and installation warranties, the signatures of both manufacturer and installer are required.

Compliance with this subclause targets the Operations and Maintenance requirement within the Minimum Expectation level of the Verification and Handover credit in Green Star Buildings (2021).

0551 JOINERY

4 GENERAL

4.1 RESPONSIBILITIES

General

Requirement: Provide joinery, as documented including the Finishes and Fixtures Schedule.

Scope of Work

Level 00:

- Control counter joinery cabinets and benchtops
- Kitchenette joinery cabinets and benchtops and overhead cabinets
- Control Stainless steel benches
- Kitchen stainless steel benches
- Wall mounted Aluminium bench seats to Male and Female Amenities, Referees 1 and 2
- Kitchen Pantry Compactus

Company contacts:

Alpha Catering: <https://alphacateringequipment.com.au/benches/bench-with-splashback>

Aluminium Seating Specialists: <https://aluminiumseating.com.au/product/madison-wall-mounted-bench-seat/>

Dexion Compactus: <https://www.dexion.com.au/interior-storage/compactus/>

Laminex: <https://www.laminex.com.au/colour-collection>

4.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 *General requirements.*
- 0185 *Timber products, finishes and treatment.*

4.3 SUBMISSIONS

Certification

Requirement: Submit one of the following, as evidence of conformity to documented requirements for grading, species and board size:

- Supplier's certificate, which may be included on an invoice, delivery docket or packet label.
- Report by an independent inspecting authority.

Moisture content: Submit documentation noting moisture content of timber products.

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION**, **Operation and maintenance manuals**.

Products and materials

Manufacturer's data: Submit manufacturer's product data.

Proprietary items: Submit the manufacturer's standard drawings and details showing:

- Methods of construction.
- Assembly and fixing, with dimensions and tolerances.

Samples

Requirement: Submit samples to PRODUCTS, **GENERAL**, **Samples**.

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.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties.**

4.4 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.

5 PRODUCTS

5.1 GENERAL

Samples

Requirement: Provide samples as follows:

- Boards: Two of each type, complete with finish and edge stripping.
- Joints: Two of each type.
- Typical hardware item: Two samples, showing each finish.
- Stone cladding: Provide three variants, two samples of each variant showing maximum variation.
- Timber veneer: Provide three variants, two samples of each variant showing maximum expected variation.
- Fabric: Two swatches of each type.
- Stainless steel items: Two of each type.
- Timber bench cupboard door: One sample, complete with hardware.
- Drawer front: One sample, complete with hardware.
- Timber stair, balustrade and handrail: One finished sample.

Clear finished timber: Provide samples as follows:

- 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.

Storage and handling

Requirement: 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. Store in an adequately ventilated space away from heat and direct sunlight. Keep storage time to a minimum by delivering items only when required for installation.

5.2 JOINERY MATERIALS AND COMPONENTS

Certification

Timber based products: Label panels under the authority of a recognised certification scheme to *0185 Timber products, finishes and treatment*, as applicable to the product. Locate the brand on faces or edges that will be concealed in the works.

Visible work

Clear finished timber and veneer: Make sure 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 (1999).

Hardwood for furniture: To AS 2796.3 (1999).

Seasoned cypress pine: To AS 1810 (1995).

Softwood for trim: To AS 4785.1 (2002).

Softwood for furniture: To AS 4785.3 (2002).

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 finished sizes apply.

Plywood

Interior use generally: To AS/NZS 2270 (2006).

Interior use, exposed to moisture: To AS/NZS 2271 (2004).

Visible surface with a clear finish: Veneer quality A.

Other visible surfaces: Veneer quality B.

Wet process fibreboard (including hardboard)

Standard: To AS/NZS 1859.4 (2018).

Particleboard

Standard: To AS 1859.1 (2017).

Melamine overlaid particleboard: Particleboard overlaid on both sides with low pressure melamine.

Dry process fibreboard (including medium density fibreboard)

Standard: To AS/NZS 1859.2 (2017).

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 (2017).

High pressure decorative laminate (HPDL) sheets

Standard: To AS/NZS 2924.1 (2024).

Minimum thickness: Conform to the following:

- Horizontal surfaces fixed to a continuous substrate: 1.2 mm.
- Vertical surfaces fixed to a continuous substrate: 0.8 mm.
- Post formed laminate fixed to a continuous substrate: 0.8 mm.
- Vertical surfaces fixed intermittently, including to studs: 3.0 mm.
- Edge strips: 0.4 mm.

Stone facings

General: Provide stone slabs within the visual range of the approved samples.

Vinyl benchtopping

General: Fully flexible homogeneous sheet.

Fixing: Spray adhesives to flat surfaces and double-stick contact adhesive method to curved surfaces.

Splashbacks

Glass: Toughened safety glass to AS 2208 (2023).

Stainless steel: Type 304, No. 4 finish.

5.3 VENEERS

Timber veneer

Requirement: Provide veneers in specified matching arrangement, flitch batched and falling within the visual range of the approved samples.

Veneer quality: To AS/NZS 2270 (2006).

Minimum grade:

- 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.

Vinyl veneer

Type: Proprietary unbacked vinyl fabric factory-bonded to the designated surface.

5.4 JOINERY ASSEMBLIES

General

Standard: To AS 4386 (2018).

Thickness: 16 mm.

Fabrication: Form up with front and back members and full height cross members at not more than 900 mm centres.

Fasteners: Conceal with finish.

Installation: Scribe to floor and secure to wall to provide level platform for carcasses.

Carcasses

Thickness: 16 mm.

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

Thickness: 16 mm.

Door size: Not exceeding 1.5 m² on face, with 2400 mm maximum height or 900 mm maximum width.

Drawer fronts: Rout for drawer bottoms.

Drawer backs and sides

Material: PVC film wrapped particleboard.

Thickness: 12 mm.

Installation: Mitre corners leaving outer skin of foil intact, finish with butt joints, glue to form carcass and screw to drawer front. Rout for drawer bottoms.

Drawer bottoms

Material: PVC film laminated hardboard.

Thickness: 3 mm.

Drawer and door hardware

Hinge types: Concealed metal hinges with the following features:

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

Piano hinges: Chromium-plated steel, extending full height of doors.

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

- 30 kg loading capacity.
- Integrated soft and self-closing action.
- Closure retention.
- White thermoset powder coating or nickel-plated.

5.5 WORKING SURFACES

Laminated benchtops

Exposed edges: Conform to one of the following:

- Extend laminate over shaped nosing, finishing more than 50 mm back on underside. Splay outside corners at 45°.
- Provide solid timber profiled edge.

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.

5.6 OTHER MATERIALS

Tactile ground surface indicators

Tactile ground surface indicators to stairs: To AS/NZS 1428.4.1 (2009).

6 EXECUTION

6.1 TOLERANCES

General

Requirement: Fabricate and install joinery items to substrates undamaged, plumb, level, straight and free of distortion.

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

6.2 JOINERY

General

Joints: Provide materials in single lengths if possible. If joints are necessary, locate over supports.

Framing: Frame and trim where necessary for openings, including those required by other trades.

Concealed surfaces: Prime surfaces concealed by substrates.

Deficiencies: Examine joinery units for completeness and remedy deficiencies.

Substrate: Damp clean and vacuum substrate surfaces that will be permanently concealed.

Acclimatisation

General: 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.

Accessories and trim

General: Provide accessories and trim necessary to complete the installation.

Fasteners

Visibility: Do not provide visible fasteners except in the following locations:

- Inside cupboards and drawer units.

- Inside open units, in which case provide proprietary caps to conceal fixings.

Visible fasteners: Where fasteners 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 that are to have clear or tinted finish, provide matching wood plugs showing face (not end) grain. In surfaces that are to have melamine finish, provide proprietary screws and caps finished to match.

Fixing to substrate: Fix joinery units to substrates as follows:

- Floor mounted units: 600 mm centres maximum.
- Wall mounted units: To each nogging and/or stud stiffener.

Fasteners: Screws with washers into timber or steel framing, or masonry anchors.

Adhesives

General: Provide adhesives to transmit the loads imposed and for the rigidity of the assembly, without causing discolouration of finished surfaces.

Finishing

Junctions with structure: Scribe plinths, benchtops, splashbacks, ends of cupboards, kickboards and returns to follow the line of structure.

Joints: Scribe internal and mitre external joints.

Edge strips: Finish exposed edges of sheets with edge strips that match sheet faces.

Matching: For surfaces that are to have clear or tinted finish, arrange adjacent pieces to match the grain and colour.

Hygiene requirements: For all parts of a food handling joinery unit, such as voids at the backs of the units, seal all carcass, wall/floor junctions, and cable and pipe entries with silicone beads for vermin-proofing. Apply water resistant sealants around all plumbing fixtures and make sure 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 that matches the finish colour.

Stone, porcelain or concrete benchtops: Avoid on-site cutting and mechanical processing of panels, if possible.

Glass splashbacks

Adhesive: 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.

6.3 TIMBER STAIRS

Set-out

General: Before setting out the stair materials, verify exact dimensions between finished floor levels.

Set out stair rod to give uniform risers and uniform treads respectively in each flight.

Fabrication

Closed strings: Trench for treads and risers.

Cut strings: Profile for treads and risers. Mitre riser ends.

Treads: Arris nosings to a pencil round. Return nosings at cut strings. Groove for riser tongue in closed rise stair. Set rise 19 mm back from nosing.

Nosing strip: To BCA (2022) D3D14 and BCA (2022) D3D15.

Top tread: Flush with finished floor, otherwise to match stair treads. Provide similar tread section as nosing to floor edges around stairwell.

Risers: Tongue to tread. Mitre to string in cut string stairs.

Installation

General: Glue joints in internal work. In closed rise stairs, wedge treads and risers to strings. Plant 2 glue blocks behind each tread to riser junction. Trim floors to carry ends of stairs and around stair well.

Stair bolts to open rise close string stairs: Provide 8 mm diameter mild steel stair bolts, one at each end and one at centre of flight, transversely between strings. Draw strings tight against ends of treads.

Fascia: Provide fascia of depth sufficient to overlap 19 mm below ceiling, fixed to floor joists hard up under nosing.

Trim: Provide beads and mouldings as necessary, including a scotia or similar planted under the tread nosing against the risers and cut strings, a bead between wall strings and wall, and a bead behind the fascia over the ceiling finish.

Soffit lining: Fix to 38 x 38 mm nailing battens notched and nailed to the underside of treads and risers of closed riser stairs at the centre of flights and at each side.

6.4 PROPRIETARY TIMBER CIRCULAR STAIR

General

Requirement: Provide a proprietary spiral or geometric circular timber stair system assembled from prefabricated components, inclusive of balustrade, self-supporting between floors.

6.5 TIMBER BALUSTRADES

General

Requirement: Provide balustrading to stair and landing, consisting of newels, handrail, balusters and associated mouldings.

Newels

General: Halve and bolt to strings. Turn tops to detail.

Handrails

Installation: Install handrails on edge, stubbing tenon to newels.

Bullnose arrises: 13 mm radius.

Balusters

Installation: Stub tenon to handrail at top and to tread or floor at bottom.

Spacing: Evenly spaced at maximum 100 mm centres.

6.6 TRIM

General

Requirement: Provide trim, such as architraves, beads, mouldings, stops and skirtings, to make neat junctions to openings and between lining components, finishes and adjacent surfaces.

Fixing

Masonry walls: Screw with wall plugs at 600 mm centres maximum.

Stud walls: Nail to plate or framing at 600 mm centres maximum.

6.7 COMPLETION

Protection

Timber treads: Provide full timber or plywood casing.

Cleaning

Requirement: 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, sanitary ware, glass, tiles and laminates.

Temporary coatings: On or before completion of the works, or before joining up to other surfaces, remove all traces of temporary protective coatings.

Operation and maintenance manuals

Requirement: Prepare a manual that includes the manufacturer's published recommendations for service use.

0552 METALWORK - FABRICATED

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide metal fixtures, as documented and including the following:

Level 00

- Stair 1 stainless steel 40mm diameter round wall mounted handrails Bleacher Stairs
- Steel Frame supports for Bleachers to Level00 Training and Court hall to be lined with 19mm marine plywood.
- Fabricate Steel Awnings over door ways as documented out of powder coat 150x50mm SHS perimeter frame and clad with Mini orb roof sheet in monument colour.
- Supply and install manufactured stainless steel grabrails to accessible change rooms including shower rails, ambulant grabrails.
- Supply and fix powder coat Palisade security fencing to the perimeter compound retaining walls
- Supply and fit all retractable backboard, sports post floor inserts/sockets for netball,volleyball pickleball/badminton and the like, indoor cricket nets, retractable dividing curtain to the sports hall as documented.
- Fabricate and install Con-Form EasyMech MR – Surface mounted HVAC Plant Platforms with EasyScreen perimeter screens and Louvres as documented. Include all connecting walkway platforms
- Fabricate and install Roof Access Ladders to provide for servicing access to Roof Mounted HVAC systems.

Performance

Requirements:

- Undamaged, plumb, level and straight or as documented.
- Free of surface defects or distortions or as documented.

Company Contacts

Website: <https://con-formgroup.com.au/easymechplatformrange/>

Website: <https://anchorsafe.com.au/products/ladder-systems/>

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.
- 0193 Roof Access Safety Systems

1.3 STANDARDS

General

Structural design actions: To AS/NZS 1170.1 (2002).

Stairs and balustrades: To the NCC cited AS 1428.1 (2009).

1.4 TOLERANCES

General

Requirement: ±2 mm from design dimensions.

1.5 SUBMISSIONS

Design documentation

General: Engage a professional engineer and submit certification for the design and installation of:

- [complete/delete]

Execution details

Welding procedures: Submit details of proposed welding procedures and risk mitigation before fabrication.

Welding dissimilar metals: Submit the following details:

- Type and thickness of materials to be welded.
- Proposed joint preparation and welding procedures.
- Proposed filler metal.
- Expected dilution (proportion of fused parent metal in the weld metal).

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION, Operation and maintenance manuals.**

Products and materials

Proprietary items: Submit the manufacturer's standard drawings and details showing:

- Methods of construction.
- Assembly and fixing, with dimensions and tolerances.

Stainless steel: For each batch of stainless steel supplied to the works, submit a certificate of conformance or test certificate, as documented.

Certification: Submit certification for all noted in this section. Handrails,

Stainless steel welding: Before fabrication commences, submit evidence of qualification of the welding procedure by testing to AS/NZS 1554.6 (2012) clause 4.7 or evidence of prequalification to AS/NZS 1554.6 (2012) clause 4.12.

Samples

Requirement: Submit samples to **PRODUCTS, GENERAL, Samples.**

Shop drawings

General: Submit shop drawings to a scale that best describes the detail, showing the following information:

- Overall and detail dimensions.
- 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, fabricators and installers.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties.**

1.6 INSPECTION**Notice**

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

- Arrival of materials on site or in workshop.
- 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.

2 PRODUCTS**2.1 GENERAL****Samples**

Requirement: Provide samples of the following:

- Each type of joint.

- Each type of finish illustrating the range of variation.
- Sections for use in fabricated work.

Storage and handling

Requirement: Store and handle fabricated metalwork, as follows:

- Deliver to site in unbroken wrapping or packing.
- Store on a level base, away from uncured concrete and masonry and areas of wet plaster.
- Do not store in contact with other materials that may cause staining, denting or other surface damage.
- Use gloves when handling precoated finishes.
- Keep storage time to minimum by delivering items only when required for installation.

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.

2.2 MATERIALS**Metals and components**

Performance: Provide metals and components in quantity, lengths and cross-sections of strength and stiffness suited to their required function and as documented.

Stainless steel

Plate, sheet and strip: To ASTM A240/A240M (2023).

Bar: To ASTM A276/A276M (2024).

Tube: To ASTM A554 (2021).

Type: [complete/delete]

Aluminium

Plate sheet and strip: To AS/NZS 1734 (1997).

Bar, rod and wire: To AS/NZS 1865 (1997).

Tube: To AS/NZS 1867 (1997).

Aluminium alloys, composition and designation: To AS 2848.1 (1998).

Steel

Steel plate: To AS/NZS 3678 (2016).

Hot rolled bars and sections: AS/NZS 3679.1 (2016).

Welded sections: To AS/NZS 3679.2 (2016).

Fasteners

Performance: Provide fasteners to resist galvanic corrosion in materials of structural and mechanical strengths and corrosion resistance at least equal to that of the lowest resistant metal in the connection.

Materials: Provide fasteners as follows:

- To copper and copper alloys: Copper or copper-alloy fixing devices only.
- To aluminium and aluminium alloys: Aluminium alloy or non-magnetic stainless steel fixing devices only.
- To stainless steel: Appropriate stainless steel fixing devices only.

2.3 OTHER MATERIALS**Tactile ground surface indicators**

Tactile ground surface indicators to stairs: To AS/NZS 1428.4.1 (2009).

3 EXECUTION**3.1 CONSTRUCTION GENERALLY****Aluminium structures**

Standard: To AS/NZS 1664.1 (1997) or AS/NZS 1664.2 (1997).

Metals

Incompatible metals: Separate using concealed layers of suitable materials in appropriate thicknesses.

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 deforming the cross-section and the material thickness.

Colour finished work: Match colours of sheets, extrusions and heads of fasteners.

Thermal movement: Accommodate thermal movement in joints and fastenings.

Joints

General: Fit joints to an accuracy appropriate to the class of work. Finish visible joints made by cutting, drilling, 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 or as documented.

Splicing

General: Provide structural members in single lengths.

3.2 WELDING AND BRAZING**Welding**

Quality: Provide finished welds that are free of surface and internal cracks, welding slag, and porosity.

Corners and edges: Grind smooth sharp, marred, or roughened corners and edges.

Rough surfaces: Deburr and grind smooth.

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/NZS 1554.1 (2014) Section 6, AS/NZS 1554.6 (2012) Section 6 or AS/NZS 1665 (2004) Section 6, as appropriate.

Brazing

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

Butt joints: Do not use butt joints for joints subject to load. If butt joints are used, do not rely on the filler material only.

Filler metal: [complete/delete]

Base metal(s): [complete/delete]

3.3 STAINLESS STEEL FABRICATION - BALUSTRADES**Welding stainless steel**

Qualification of welders: To AS 1796 (2022).

Riveting

General: Use 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 CUSTOM-BUILT STEEL STAIRS**General**

Design and construction: To BCA (2022) D3.

Fabrication

Method: Welding.

Joints: Produce smooth unbroken surfaces at joints or as documented. Scribe the joints to all steel members. 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 and bases, and attach the steel member to the building structure with fixings compatible with the substrate.

Proprietary items: Install to the manufacturer's recommendations.

Galvanizing

General: If possible, complete fabrication before galvanizing; otherwise apply a zinc-rich primer to affected joint surfaces.

Other protective coatings

General: Apply other protective coatings as documented and to the manufacturer's recommendations.

3.5 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.

Other protective coatings

General: Apply other protective coatings as documented and to the manufacturer's recommendations.

3.6 CORNER GUARDS**Guards**

General: Where projecting corners of the structure require protection 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 that does not cause distortion in the guard surface, and consists of either concealed built in lugs, or flush countersunk head fixings into appropriate anchors.

3.7 COMPLETION**Cleaning**

Temporary coatings: On or before completion of the works, or before joining up to other surfaces, remove all traces of coatings used as temporary protection.

Operation and maintenance manuals

Requirement: Prepare a manual that includes the manufacturer's published recommendations for service use.

Warranties

Requirement: Submit warranties to COMPLETION, Warranties

4 SELECTIONS**4.1 CUSTOM-BUILT STEEL STAIRS****Custom-built steel stair components to Structural Engineers detail and sizing**

Member	Sizes (mm)	Finish
Stringers	steel	

Member	Sizes (mm)	Finish
Treads/risers	21mm Marine Plywood	Carpet
Landing frame		
Landing deck		
Handrail	40mm	
Balustrade	40mm	
Posts		
TGSI's		
Nosings		
0553 STAINLESS STEEL BENCHING		

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide stainless steel fixtures, as documented including to the following area:

- Level 00 Control and Kitchen includes stainless steel benches with open midshelf and splashbacks where abutting a wall and freestanding islands.
- Allow for a double sink with no midshelf and an allowable area for under bench dishwasher and connecting drainage service to the hydraulic engineers detail.

Performance

Requirements:

- Free of surface defects or distortions.
- Installed to conform to health authorities having jurisdiction over the installation.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 *General requirements.*
- 0185 *Timber products, finishes and treatment.*

1.3 SUBMISSIONS

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION**, **Operation and maintenance manuals.**

Shop drawings

General: Submit shop drawings showing the following:

- Bench/bench junctions.
- Welded joints.
- Dimensions, material, grade and finish.
- Standard drawings for proprietary 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.
- Installation details required by health authorities.

Warranties

Requirement: Submit warranties to **COMPLETION**, **Warranties.**

1.4 INSPECTION

Notice

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

- Fabrication complete, before delivery.

- Installation complete.

2 PRODUCTS

2.1 GENERAL

Certification

Timber based products: Brand panels under the authority of a recognised certification scheme to *0185 Timber products, finishes and treatment*, as applicable to the product. Locate the brand on faces or edges that will be concealed in the works.

Formaldehyde emission class

Plywood formaldehyde emission class to AS/NZS 2271 (2004):

Particleboard formaldehyde emission class to AS 1859.1 (2017):

Storage and handling

Requirement: Transport all benching to site, and store and handle as follows:

- Do not store in contact with other materials that may cause staining, denting, distortion or other surface damage.
- Keep storage time to minimum by delivering items only when required for installation.

2.2 MATERIALS

Stainless steel

Plate, sheet and strip: To ASTM A240/A240M (2023).

Bar: To ASTM A276/A276M (2024).

Tube: To AS 1528.1 (2019) or ASTM A554 (2021).

Type: 304.

Stainless steel sheet

Surface finish: No. 4 finish to ASTM A480/A480M (2023), not including to underside of shelves, and door and drawer backs.

Particleboard

Standard: To AS 1859.1 (2017).

Classification: Moisture resistant (MR).

Plywood

Standard: To AS/NZS 2271 (2004).

Visible surface with a clear finish: Veneer quality A.

Other surfaces: Veneer quality C or D.

Bond: Type A.

2.3 COMPONENTS

Fasteners

Material: Stainless steel.

Dimensional system: Metric.

Bolt and screw heads: Polished, pan type or countersunk.

Hardware

Material: Stainless steel.

Sealants

Type: Neutral cure one-part silicone.

Performance:

- Flexible.
- Resistant to physical and chemical damage characteristic of installed environment.
- Resistant to growth of mould, bacteria and fungi.
- Colourfast.

Curing period: Less than 4 days to a depth of 10 mm.

Peel strength (minimum): 100 kPa.

Adhesive

Type: Spray contact adhesive.

3 EXECUTION**3.1 FABRICATION GENERALLY****Stainless steel welding**

Standard: To AS/NZS 1554.6 (2012).

Process: Gas tungsten arc welding.

Weld type: Butt.

Subsurface (internal) weld quality: Category 2.

Surface (external) weld quality: Class B.

Surface finish: Condition I, 0.5 µm average surface roughness.

Welding materials: Compatible with metal being welded.

Weld quality: Continuous exposed welds, free from imperfections such as cracks and pits. Grind and polish to achieve required surface finish.

Joints: Strength at least that of parent metal. Free from crevices and folds.

Joint position: At corners and edges. Minimise joints in flat panels.

Protection

General: Provide temporary self-adhesive plastic film to stainless steel surfaces.

Hardware fixing

General: Drill and tap, or weld fix.

Finishing grain direction

Benches and shelves: Lengthwise.

Bowls: Horizontal to sides, parallel to bench grain to bottom. Mitre at bottom corners.

Abutting surfaces: Parallel where possible.

3.2 BENCHTOP FABRICATION**Benchtops**

Material: Stainless steel sheet.

Thickness: 2 mm.

Bench width: 700mm deep

Bench height to top of dry bench: 900mm

Bench height to top of perimeter bead of wet bench: 900mm

Bench lengths: Maximum, to minimise number of bench/bench junctions.

Exposed corner radii: Minimum 5 mm, including for vertical corners of splashback.

Exposed edges: Bevelled or rounded off.

Wet bench perimeter: Except at wall flashing, provide a raised bead, with a fascia.

Dry bench perimeter: Except at wall flashing, provide a fascia.

Fascia

Fascia height: 40mm

Fascia return: 700mm

Drainer

Surface: Plain.

Falls to sinks: 1:50, 450 mm length.

Falls to dishwashing machine: Between 1:100 and 1:72, 1800 mm maximum length.

Wall splashback

Type: Integral.

Height above bench: 300mm TBC

Ends: Return.

Return to non-tiled wall: [complete/delete]

Return to tiled wall: [complete/delete]

Vertical corners of splashback: Fuse from behind.

Fixing to support frame

Type: Spot weld threaded stainless steel M5 studs to underside of benchtop, centred over framing members. Provide 2 studs per front-to-back framing member, with star washers and nuts. Make sure stud fixing does not indent the benchtop.

Sound deadening

Type: [complete/delete]

3.3 BOWL FABRICATION

Bowls

Type: Deep drawn stainless steel.

Thickness:

- Capacity < 75 L: 1.6 mm.
- Capacity ≥ 75 L: 2 mm.

Minimum internal radii: 25 mm.

Dimensions:

- Depth (mm): 225mm
- Length (mm): 450mm
- Width (mm): 535mm

Wastes:

- Size (minimum): DN 50 to AS 2887 (1993).
- Nut and washer: To AS 1589 (2001) or AS 2887 (1993). Locate with the washer to the underside of the bowl.
- Position: Centred in single bowls and adjacent for double bowls.
- Plug: Heavy-duty commercial.
- Pot sinks: Extended lever handle type, with 50 mm ball valve.

Falls: In the long dimension.

Fall to waste (minimum):

- Capacity < 75 L: 10 mm.
- Capacity ≥ 75 L: 25 mm.

3.4 FRAME FABRICATION

Benchtop support frame

Support: Provide sufficient support so that no load is placed on the waste pipe or water connections.

Design deflection (maximum): 3 mm, and no permanent deflection reducing the drainage efficiency of drainers or sinks.

Members: 31.8 x 31.8 x 1.6 mm stainless steel tube. Seal ends.

Extent: Perimeter and at sides of bowls, with additional members spaced as follows:

- 1.6 mm sheet: 350 mm maximum centres.
- 2 mm sheet: 500 mm maximum centres.

Maximum unsupported area: 0.3 m².

Connections: Welded.

Fixing to benchtop: Pre-drill for studs.

Bench legs

Location: Set back 50 mm from bench edge, and 50 to 150 mm clear of walls.

Members: 31.8 x 31.8 x 1.6 mm stainless steel tube. Seal ends.

Fixing to benchtop support frame: Weld all around at junctions.

Spacing: 1200 mm maximum.

Feet: Stainless steel or chrome-plated aluminium, adjustable vertically ±25 mm. Make sure threaded section do not protrude from leg.

3.5 SHELVING FABRICATION

Under bench shelving

Material: Stainless steel.

Thickness: 1.6 mm.

Width: 700

Exposed edges: 35mm

Height to underside of shelf edge: 425mm

Shelf support: Provide 30 x 30 x 5 mm stainless steel angles as follows:

- Extent: Perimeter, with additional angles equally spaced to support a maximum 0.3 m², per member.
- Connections: Welded.

Fixing of support to legs: Welded or threaded.

Fixing of shelf to support: [complete/delete]

3.6 COMPLETION

Cleaning

General: Wipe down with a damp, soft, clean cloth.

Grease removal: Wipe using a moist, soft cloth with ammonia solution or household liquid grease remover.

Surface protection

Temporary self-adhesive plastic film: Remove from stainless steel surfaces.

Operation and maintenance manuals

Requirement: Prepare a manual that includes the manufacturer's published recommendations for service use.

Warranties

Requirement: Submit warranties to COMPLETION, Warranties

0573 FIRE EXTINGUISHERS AND BLANKETS

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide portable fire extinguishers and fire blankets, as documented.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.
- 0581 Signage.

1.3 SUBMISSIONS

Products and materials

Requirement: Submit evidence of suitability for use, to NCC (2022) A5G1, for all fire protection products.

Records

General: Submit any routine service records to AS 1851 (2012).

Warranties

Requirement: Submit warranties to COMPLETION, Warranties.

2 PRODUCTS

2.1 EXTINGUISHERS

Portable fire extinguishers

General: To AS/NZS 1841.1 (2007).

Type:

- Water: To AS/NZS 1841.2 (2007).
 - Wet chemical: To AS/NZS 1841.3 (2007).
 - Foam: To AS/NZS 1841.4 (2007).
 - Powder: To AS/NZS 1841.5 (2007).
 - Carbon dioxide: To AS/NZS 1841.6 (2007).
 - Non-rechargeable: To AS/NZS 1841.8 (2007).
- Selection, location and distribution: To AS 2444 (2001).

2.2 BLANKETS

Fire blankets

General: To AS/NZS 3504 (2006).

Selection and location: To AS 2444 (2001).

3 EXECUTION

3.1 INSTALLATION

Fire fighting equipment

Standard: Installation to AS 2444 (2001).

Signage: Provide signs to **STATUTORY SIGNS** in *0581 Signage*.

3.2 COMPLETION

Routine service

Portable fire extinguishers: To AS 1851 (2012) Section 10.

Fire blankets: To AS 1851 (2012) Section 11.

Baseline data

Requirement: Provide baseline data to AS 1851 (2012).

Warranties

Requirement: Submit warranties to COMPLETION, Warranties

0581 SIGNAGE

4 GENERAL

4.1 RESPONSIBILITIES

General

Requirement: Provide signage systems, as documented.

Performance

Requirement: Provide signage as follows:

- Appropriately secured.
- Located within a clear line of vision.
- With characters and symbols contrasting with the background.
- With clean, well-defined edges or arrises, and free from blemishes.

4.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 *General requirements.*
- 0921 *Low voltage power systems.*

4.3 STANDARDS

Signs

Safety signs - design and use: To AS 1319 (1994).

Signs and graphics for disability access: To the NCC cited AS 1428.1 (2009) and AS 1428.2 (1992).

Tactile wayfinding signs: To AS 1428.4.2 (2018).

4.4 INTERPRETATION

Definitions

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

- Changeable letter systems: Sign systems consisting of display boards or holders into which removable individual letters, numbers, symbols or other characters can be inserted.
- Changeable plate systems: Sign systems consisting of fixed plate holders to which removable interchangeable sign plates can be attached or inserted.
- Digital signs: Sign systems consisting of electronic display panels that can be programmed to display images, videos or web pages.
- House signage: Internal and external project specific signs.
- Illuminated signs: Signs consisting of cabinets enclosing a light source, illuminating translucent face panels bearing the specified signage.
- Statutory signs: Signs prescribed by the NCC and statutory authorities.
- Variable room identification systems: Changeable plate systems incorporating fixed room numbers and removable name strips.

4.5 SUBMISSIONS

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION**, **Operation and maintenance manuals**.

Samples

Requirement: Submit samples to **PRODUCTS**, **GENERAL**, **Samples**.

Shop drawings

General: Submit shop drawings showing the following, if appropriate:

- Layout, construction and fixing details for custom designed (non-standard) signage.
- Large scale (full size if practicable) lettering layouts for individual letter signs.
- Computer generated graphic images.

- Full size spacing templates for individually mounted characters.
- Location templates for anchorages to permanent construction, including the type of anchorage.
- Wiring diagrams for illuminated signs.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties.**

4.6 INSPECTION**Notice**

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

- Custom-built signage and graphic items fabricated and ready to be delivered to the site.
- Signage and graphic items delivered to site before installation.
- Building locations or substrates prepared to receive signage and graphic items before they are installed.
- Completion of installation.

5 PRODUCTS**5.1 GENERAL****Samples**

Requirement: Provide samples for each colour and finish of exposed signage materials and accessories, showing the extreme and mean of each colour and texture range.

5.2 MATERIALS**Standards**

Aluminium:

- Plate for engraving: Alloy and temper designation 6063-0 to AS 2848.1 (1998).
- Casting: To AS 1874 (2000).
- Finishes:
 - . Anodising: To AS 1231 (2000).
 - . Powder coating: To AS 3715 (2002) and AAMA 2604 (2022).

Stainless steel:

- External: Type 316. Mirror electropolish surface finish.
- Internal: Type 304. No. 4 brushed (general purpose polished) surface finish.

Plastics:

- PVC-U sheet: Semi-rigid sheet.
- Rigid cellular polystyrene: To AS 1366.3 (1992), class VH for cut-out shapes.

Brass and bronze: Plate, sheet and strip: To AS 1566 (1997).

- Finish: Patinated.

Glass type and thickness: To AS 1288 (2021).

Photoluminescent exit signs: To BCA (2022) E4D8(a)(ii).

Adhesive

General: Proprietary solvent based contact adhesive compatible with the substrate and signage material.

5.3 SYSTEMS**Digital signage systems**

Requirement: Provide an integrated digital signage system comprising compatible display panels, media player/s, software and connecting network.

6 EXECUTION

6.1 WORKMANSHIP

Production

General: Form signage and graphic items accurately with clean, well-defined edges or arises, free from blemishes.

Engraving to two-layer plastic laminate: Engrave 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 lettering: 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 skills.

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.

6.2 INSTALLATION

General

Requirement: Install signage and graphic items level and plumb, securely mounted, with concealed corrosion and theft-resistant fixings.

Self-adhesive signs

Requirement: Fix free of bubbles and creases.

Aluminium and stainless steel signs

Pin fixing: Epoxy fix to substrate.

Illuminated signs

Electrical fittings: Provide a junction box for power connection, necessary lamps with proper mountings, protection and accessories including wiring transformers and insulators. Install signs and conceal cabling to *0921 Low voltage power systems*.

Digital signs

Display panel mountings: Provide wall mountings compatible with the documented display panels.

Power and data: Provide the necessary power and data cabling to display panels and media players. Conceal cabling and terminate with plugs and outlets appropriate to the documented hardware.

Wireless network: Provide a wireless network system compatible with the display system's hardware.

Testing

Requirement: Test illuminated and digital signage systems after installation to confirm that they operate as intended.

6.3 COMPLETION

Cleaning

General: Remove protective coverings, replace damaged signage and leave the work clean, polished, free from defects and in good condition.

Operation and maintenance manuals

Requirement: Prepare a manual that includes the manufacturers' data as follows:

- Recommendations for service use, care and maintenance.
- List of manufacturers and suppliers of replacement parts.

6.4 STATUTORY SIGNS

Termite protection

Location	In or near meter box or similar
Message	Details of termite management system Indicate: - The method of protection - The date of installation - The life expectancy of a chemical barrier as listed on the appropriate authority's pesticides register label - The installer's recommendation for inspections
Sign type	Laminated page(s)
Conformance	BCA (2022) B1D4(i)(ii) AS 3660.1 (2014) Appendix A

Required fire door and required smoke door

Location	On or adjacent to the door, on the side of the door that faces a person seeking egress, and if the door is in the held open position, on either the wall adjacent the doorway or both sides of the door.
Message if auto door with auto hold open device	FIRE SAFETY DOOR – DO NOT OBSTRUCT
Message if self-closing door	DO NOT OBSTRUCT DO NOT KEEP OPEN FIRE SAFETY DOOR
Message if door discharging from a fire isolated exit	FIRE SAFETY DOOR – DO NOT OBSTRUCT
Letter height (minimum)	20 mm
Sign type	
Conformance	BCA (2022) D3D28

Non-required stair, ramp or escalator

Location	Outside the shaft near all doors opening to the shaft
Message	DO NOT USE THIS STAIRWAY IF THERE IS A FIRE (or) Do not use this stairway if there is a fire
Letter height (minimum)	20 mm (upper case) 16 mm (lower case)
Sign type	
Conformance	BCA (2022) Spec 14

Exit signs, Class 2 or 3 buildings and Class 4 parts, in lieu of illuminated exit signs

Location	On, above or adjacent to every door described in BCA (2022) E4D5, BCA (2022) E4D6 and BCA (2022) E4D7.
Message	EXIT (with arrow in the direction of egress, if required)
Letter height (minimum)	25 mm
Sign type	
Conformance	BCA (2022) E4D5, BCA (2022) E4D6 and BCA (2022) E4D7

Braille and tactile exit signage

Location	To BCA (2022) Spec 15 for every door described in BCA (2022) E4D5
Message	Exit (and) Level (followed by the floor level number) (Braille and tactile signage)
Letter height (minimum)	BCA (2022) Spec 15
Mounting height	Braille and tactile signage between 1200 mm and 1600 mm above finished floor level
Sign type	
Conformance	BCA (2022) E4D5, BCA (2022) D4D7 and BCA (2022) Spec 15

Fire exit offence notice (NSW)

Location	In a conspicuous position adjacent to doors to fire-isolated stairs
Message	OFFENCE RELATING TO FIRE EXITS It is an offence under the <i>Environmental Planning and Assessment Act 1979 (NSW)</i> (a) to place anything in or near this fire exit that may obstruct persons moving to and from the exit, or (b) to interfere with or obstruct the operation of any fire doors, or (c) to remove, damage or otherwise interfere with this notice.
Letter height (minimum)	8 mm (title), 2.5 mm (remainder)
Sign type	
Conformance	<i>Environmental Planning and Assessment (Development Certification and Fire Safety) Regulation 2021 (NSW)</i> cl 108

Fire exit offence notice (ACT)

Location	In a conspicuous position adjacent to doors to fire-isolated stairs
Message	OFFENCES RELATING TO FIRE STAIRS Under the <i>Emergencies Act 2004 (ACT)</i> it is an offence to: 1. Place anything in this stairway or any associated passageway leading to the exterior of the building which may impede the free passage

	of persons; or 2. Interfere with or cause obstruction or impediment to the normal operation of fire doors providing access to this stairway; or 3. Remove, damage or otherwise interfere with this notice.
Letter height (minimum)	20 mm (title), 3 mm (remainder)
Sign type	Embossed or engraved and filled
Conformance	BCA (2022) Schedule 4 ACT

Sliding fire door

Location	Each side of door directly over the opening
Message	WARNING - SLIDING FIRE DOOR
Letter height (minimum)	50 mm
Sign type	
Conformance	BCA (2022) C4D7

Fire control room

Location	External face of the door
Message	FIRE CONTROL ROOM
Letter height (minimum)	50 mm
Sign type	
Conformance	BCA (2022) Spec 19

Lifts – warning

Location	Near every call button for passenger lift(s)
Message	DO NOT USE LIFTS IF THERE IS A FIRE (or) Do not use lifts if there is a fire
Letter height (minimum)	10 mm (upper case) 8 mm (lower case)
Sign type	Incised, inlaid or embossed letters on metal, wood, plastic or similar plate securely and permanently attached to the wall; or letters incised or inlaid directly into the surface of the material forming the wall
Conformance	BCA (2022) E3D4

Escalators and moving walks

Location	Each end of escalator or moving walk
Message	Prescribed notice/pictogram AS 1735.5.1 (2019) Annex G
Letter height (minimum)	
Sign type	By manufacturer
Conformance	AS 1735.5.1 (2019) clause 7.2

Fire hose reels and fire hydrants

Location	Cupboard door or adjacent the FHR
Message	FIRE HYDRANT (and/or) FIRE HOSE REEL

Letter height (minimum)	50 mm
Sign type	Adhesive backed vinyl
Conformance	AS 2441 (2005) clause 10.4.4 AS 2419.1 (2021) clause 11.3.5

Fire hose reel – Location sign

Location	Above or adjacent the FHR if located in a recess, cavity or obscure location
Message	To AS 2441 (2005) Figure 10.1
Letter height (minimum)	16 mm
Mounting height (minimum)	2000 mm above finished floor level or at a height visible to a person approaching the fire hose reel location
Sign type	Adhesive backed vinyl
Conformance	AS 2441 (2005) clause 4.1

Fire brigade booster assembly cabinet – Location sign

Location	Cabinet doors
Message if fire hydrant booster is installed	FIRE HYDRANT BOOSTER ASSEMBLY
Message if fire hydrant booster and sprinkler booster are installed	FIRE HYDRANT BOOSTER AND SPRINKLER BOOSTER ASSEMBLY
Message if combined fire hydrant and sprinkler booster is installed	COMBINED FIRE HYDRANT AND SPRINKLER BOOSTER ASSEMBLY
Message if a feed fire hydrant is enclosed in the cabinet	(Symbol FH within a 100 mm circle of thickness and colour to match lettering)
Letter height (minimum)	50 mm
Sign type	Adhesive backed vinyl
Conformance	AS 2419.1 (2021) clause 11.3.1 AS 2118.6 (2012) clause 2.2.3

Fire brigade booster assembly – Attack fire hydrant

Location	Behind or adjacent to attack fire hydrant
Message	ATTACK HYDRANT
Letter height (minimum)	25 mm
Sign type	
Conformance	AS 2419.1 (2021) clause 11.3.1

Fire brigade booster assembly – Notice of pressure

Location	Within the cabinet or enclosure
Message	TEST PRESSURE: ◊ kPa BOOST PRESSURE: ◊ kPa
Letter height (minimum)	25 mm
Sign type	
Conformance	AS 2419.1 (2021) clause 11.3.4

Fire brigade booster assembly – Sprinkler connection

Location	Location or enclosure of the fire brigade booster connection
Message	SPRINKLER BOOSTER CONNECTION (and)

	(Maximum allowable inlet pressure at connection)
Letter height (minimum)	50 mm
Sign type	
Conformance	AS 2118.1 (2017) clause 4.14.1

Boosters in series with pumps

Location	Adjacent to the pressure gauge
Message	WARNING THIS BOOSTER IS CONNECTED IN SERIES (RELAY) WITH THE FIXED ON-SITE FIRE PUMPS WHICH MAY BE RUNNING. THIS GAUGE SHOWS THE DISCHARGE PRESSURE AT THE OUTLET OF THE FIXED ON-SITE PUMP
Letter height (minimum)	25 mm (title), 15 mm (remainder)
Sign type	
Conformance	AS 2419.1 (2021) clause 11.3.7.1

Full-duty fire hydrant pumps

Location	At each pump location the fire brigade booster assembly
Message	WARNING AUTOMATIC STARTING FULL-DUTY FIRE HYDRANT PUMPS INSTALLED IF PUMP INDICATOR LIGHTS ARE NOT OPERATING, REFER TO TACTICAL FIRE PLANS IN FIRE CONTROL ROOM FOR THE OPERATION OF PUMPS AND BOOSTING BY A FIRE BRIGADE PUMPING APPLIANCE
Letter height (minimum)	25 mm (title), 15 mm (remainder)
Sign type	
Conformance	AS 2419.1 (2021) clause 11.3.7.2

Fire pump room

Location	Fire pump room door
Message for fire pump room	FIRE PUMP ROOM
Message for combined fire hydrant and sprinkler pump room	COMBINED FIRE HYDRANT AND SPRINKLER PUMP ROOM
Letter height (minimum)	50 mm
Sign type	
Conformance	AS 2419.1 (2021) clause 6.11.1 AS 2118.6 (2012) clause 2.2.3

Wall wetting sprinklers – Isolating valve

Location	Adjacent to the isolating valve
Message	WALL WETTING SPRINKLERS ISOLATING VALVE
Letter height (minimum)	25 mm
Sign type	
Conformance	AS 2419.1 (2021) clause 7.6.3

Fire services tanks

Location	On storage tank
Message	(Type of water supply, e.g. PRIMARY WATER SUPPLY FOR FIRE HYDRANT SYSTEM) (and) EFFECTIVE CAPACITY (number of litres) L
Letter height (minimum)	100 mm
Sign type	
Conformance	AS 2419.1 (2021) clause 11.3.6.1

Fire services tanks – Quick fill valve

Location	Near quick fill valve
Message	QUICK FILL VALVE
Letter height (minimum)	25 mm
Sign type	
Conformance	AS 2419.1 (2021) clause 11.3.6.2

Block plan

Location	At booster assembly cabinet or enclosure, and in fire control room or pump room, if applicable.
Message	(Block plan to AS 2419.1 (2021) clause 11.5 or AS 2118.1 (2017) clause 8.3)
Letter height (minimum)	
Sign type	
Conformance	AS 2419.1 (2021) clause 11.5 AS 2118.1 (2017) clause 8.3

Sprinkler stop valve

Location	On wall, close to the stop valve
Message	SPRINKLER STOP VALVE INSIDE
Letter height (minimum)	35 mm, 25 mm (for INSIDE)
Sign type	White lettering on black background
Conformance	AS 2118.1 (2017) clause 8.4

Sprinkler stop valve – Emergency instructions

Location	At the control valve assembly
Message	(Emergency instructions to AS 2118.1 (2017) clause 8.5 or AS 2118.4 (2012) clause 4.8) (and) (Valve arrangement diagram)
Letter height (minimum)	
Sign type	
Conformance	AS 2118.1 (2017) clause 8.5 AS 2118.4 (2012) clause 4.8

Sprinkler valve set

Location	At each sprinkler valve set
Message	SPRINKLER CONTROL ASSEMBLY
Letter height (minimum)	
Sign type	

Conformance	AS 2118.6 (2012) clause 2.2.3
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Hose reel system valve

Location	At any system valve that can isolate flow in the hose reel water supply main
Message	FIRE SERVICE VALVE – CLOSE ONLY TO SERVICE FIRE HOSE REELS
Letter height (minimum)	8 mm
Sign type	Label with engraved non-ferrous metal tag
Conformance	AS 2441 (2005) clause 6.2

Portable fire extinguishers – Cabinet

Location	Cabinet
Message	FIRE EXTINGUISHER
Letter height (minimum)	32 mm
Sign type	Adhesive backed vinyl
Conformance	AS 2444 (2001) clause 3.6

Portable fire extinguishers – Location sign

Location	To AS 2444 (2001) clause 3.2 at every installed extinguisher nominated in BCA (2022) E1D14
Message	FIRE EXTINGUISHER (and prescribed graphic)
Letter height (minimum)	16 mm
Mounting height (minimum)	2000 mm above finished floor level
Sign type	Computer generated adhesive backed vinyl graphic
Conformance	AS 2444 (2001) clause 3.3

Fire point

Location	To AS 2444 (2001) clause 3.8 at each fire point
Message	FIRE POINT (and prescribed graphic)
Letter height (minimum)	
Sign type	Computer generated adhesive backed vinyl graphic
Conformance	AS 2444 (2001) clause 3.8

Fire blankets

Location	To AS 2444 (2001) clause 6.4 at every blanket location nominated in AS 2444 (2001) clause 6.3
Message	FIRE BLANKET (and prescribed graphic)
Letter height (minimum)	16 mm
Mounting height (minimum)	2000 mm above finished floor level
Sign type	Computer generated adhesive backed vinyl graphic
Conformance	AS 2444 (2001) clauses 6.3, 6.4 and Figure 6.1

Regulatory car park signs – Low clearance

Location	Entry to overhead obstruction where clearance is: 3 m or less – car and light van use only 4.6 m – all other cases
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Message	LOW CLEARANCE (measured minimum clearance rounded down to the nearest 0.1 m)
Sign type	AS/NZS 2890.1 (2004) R6-11 or R6-16
Conformance	AS/NZS 2890.1 (2004) clause 4.3.4

Regulatory car park signs – Stop and Give Way

Location	As required for traffic control
Message	Graphic nominated in AS/NZS 2890.1 (2004) clause 4.3.4(b)
Sign type	AS/NZS 2890.1 (2004) R1-1 (Stop), R1-2 (Give Way)
Conformance	AS/NZS 2890.1 (2004) clause 4.3.4

Regulatory car park signs – Speed limit

Location	As required for traffic control
Message	Graphic nominated in AS/NZS 2890.1 (2004) clause 4.3.4(c)
Sign type	AS/NZS 2890.1 (2004) R4-1
Conformance	AS/NZS 2890.1 (2004) clause 4.3.4

Regulatory car park signs – Hump warning

Location	As required for traffic control
Message	Graphic nominated in AS/NZS 2890.1 (2004) clause 4.3.4(d)
Sign type	AS/NZS 2890.1 (2004) W5-10
Conformance	AS/NZS 2890.1 (2004) clause 4.3.4

Regulatory car park signs – Steep grade warning

Location	As required for traffic control
Message	Graphic nominated in AS/NZS 2890.1 (2004) clause 4.3.4(e)
Sign type	AS/NZS 2890.1 (2004) W5-12 (Down), W5-13 (Up)
Conformance	AS/NZS 2890.1 (2004) clause 4.3.4

Regulatory car park signs – Accessible parking facilities

Location	Designated car space
Symbol	Graphic size and position nominated in the NCC cited AS/NZS 2890.6 (2009) clause 3.1, Figure 3.1. Space delineation and shared space markings to the NCC cited AS/NZS 2890.6 (2009) clause 3.2.
Sign type	Pavement marking paint.
Conformance	NCC cited AS/NZS 2890.6 (2009) clause 3.1

Unisex accessible sanitary facilities

Location	To BCA (2022) Spec 15
Message	- Braille and tactile signage incorporating the international symbol of access. - Indicate suitability for left or right handed use.
Symbol size	AS 1428.2 (1992) clause 16, Table 1.

Letter height (minimum)	Braille: BCA (2022) Spec 15 Raised characters: Sans serif type font 20 mm.
Sign type	
Conformance	NCC cited AS 1428.1 (2009) clause 8.1 BCA (2022) D4D7

Ambulant sanitary facilities

Location	To BCA (2022) Spec 15
Message	Braille and tactile signage incorporating the male/female ambulant symbol.
Symbol size	AS 1428.2 (1992) clause 16, Table 1.
Letter height (minimum)	Braille: BCA (2022) Spec 15 Raised characters: Sans serif type font 20 mm.
Sign type	
Conformance	NCC cited AS 1428.1 (2009) clause 8.1 BCA (2022) D4D7

Airlocks to sanitary facilities

Location	Entry doors to airlocks serving areas containing sanitary facilities
Message	Braille and tactile signage incorporating the symbols identifying each sanitary facility within
Symbol size	AS 1428.2 (1992) clause 16, Table 1
Letter height (minimum)	Braille: BCA (2022) Spec 15 Raised characters: Sans serif type font 20 mm
Sign type	
Conformance	NCC cited AS 1428.1 (2009) clause 8.1

Non-accessible sanitary facilities

Location	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 with directional arrow.
Letter height	AS 1428.2 (1992) clause 17, Table 2
Symbol size	AS 1428.2 (1992) clause 16, Table 1
Sign type	
Conformance	NCC cited AS 1428.1 (2009) clause 8.1 BCA (2022) D4D7

Non-accessible pedestrian entrance

Location	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 (1992) clause 17, Table 2
Symbol size	AS 1428.2 (1992) clause 16, Table 1
Sign type	
Conformance	NCC cited AS 1428.1 (2009) clause 8.1

	BCA (2022) D4D7
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Hearing augmentation

Location	Where hearing augmentation is installed to BCA (2022) D4D8
Message	Braille and tactile signage incorporating the international symbol of deafness in white on a blue background. 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 (2022) Spec 15
Symbol size	AS 1428.2 (1992) clause 16, Table 1
Sign type	
Conformance	NCC cited AS 1428.1 (2009) clause 8.2.2 BCA (2022) D4D8 BCA (2022) Spec 15

Access to lift pits

Location	At the landing side of the doorway
Message	DANGER LIFTWELL – ENTRY OF UNAUTHORIZED PERSONS PROHIBITED – KEEP CLEAR AT ALL TIMES
Letter height (minimum)	35 mm
Sign type	Incised, inlaid or embossed
Conformance	BCA (2022) D2D22

Emergency access doors in a single enclosed lift shaft

Location	On the landing side face of the access door
Message	DANGER LIFTWELL ACCESS KEEP FURNITURE AND FIXTURES CLEAR
Letter height (minimum)	35 mm
Sign type	Incised, inlaid or embossed
Conformance	BCA (2022) Spec 24

Plant room – Generating sets

Location	To adjacent wall clearly visible on approach to, and located within 1 m of, the generating set, and to single doors or left hand leaf of double doors
Message	Prescribed DANGER sign to AS 1319 (1994) (and) THIS EQUIPMENT STARTS AUTOMATICALLY
Letter height (minimum)	50 mm, black on white background
Sign type	
Conformance	AS 1319 (1994) clause 2.3.4 AS/NZS 4509.1 (2009) clause 6.3

Main switchboard – Main entry, excluding Class 1 dwellings

Location	Each entry that may be used by emergency services or at Fire detection control and indicating
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	equipment (FDCIE)
Message	Indicate location of main switchboard. Incorporate the term Main Switchboard into notice
Letter height (minimum)	
Sign type	
Conformance	AS/NZS 3000 (2018) clause 2.10.2.4

Main switchboard – Room or enclosure, excluding Class 1 dwellings

Location	The room or enclosure containing the main switchboard
Message	MAIN SWITCHBOARD
Letter height (minimum)	
Sign type	
Conformance	AS/NZS 3000 (2018) clause 2.10.2.4

Fire orders – Alpine areas

Location	Near main entrance and on each storey.
Message	FIRE ORDERS followed by an explanation of the following: - Method of operation of the alarm system and location of call points - Location and method of operation of all the firefighting equipment - Location of all exits - Evacuation procedure
Letter height (minimum)	
Sign type	
Conformance	BCA (2022) G4D8

Safety curtains – NSW

Application	In a Class 9b building used as a place of public entertainment.
Location	On curtain
Message	Safety curtain
Letter height (minimum)	Readable from all parts of the auditorium.
Sign type	
Conformance	BCA (2022) Schedule 5 NSW I4D15

Safety curtains – Operating controls – NSW

Application	In a Class 9b building used as a place of public entertainment
Location	At safety curtain operating controls
Message	(Indicate its use and operation)
Letter height (minimum)	Readable at control location.
Sign type	
Conformance	BCA (2022) Schedule 5 NSW I4D15

Stages – Automatic smoke and heat vents for stages – NSW

Application	In a Class 9b building used as a place of public entertainment.
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Location	At operating controls
Message	(Indicate method of activation)
Letter height (minimum)	
Sign type	
Conformance	BCA (2022) Schedule 5 NSW I4D59

Doorways and doors – Public entertainment – NSW

Application	In a Class 9b building used as a place of public entertainment
Location	Any doorway or opening within sight of the audience but not intended for egress
Message	(Indicate its purpose)
Letter height (minimum)	
Sign type	Must not be internally illuminated
Conformance	BCA (2022) Schedule 5 NSW D3D24

Sliding doors – Public entertainment – NSW

Application	In a Class 9b building used as a place of public entertainment
Location	Any sliding door that leads directly to a road or open space and forms a main entrance, and is capable of swinging in the direction of egress.
Message	(Indicate, to persons seeking egress, the potential for swinging the door open in an emergency)
Letter height (minimum)	
Sign type	
Conformance	BCA (2022) Schedule 5 NSW D3D24

Stage – Load notice – NSW

Application	In a Class 9b building used as a place of public entertainment
Location	Adjacent to the stage floor
Message	(Indicate the actual distributed and concentrated load for which the stage has been designed)
Letter height (minimum)	50 mm
Sign type	
Conformance	BCA (2022) Schedule 5 NSW I4D14

0611 RENDERING AND PLASTERING**1 GENERAL****1.1 RESPONSIBILITIES****General**

Requirement: Provide render and plaster finishes, as documented.

Level 00

- Player male and female changerooms,
- Public male and female amenities

- Access changerooms

This section applies to all wet areas where core filled blockwork requires finishing with ceramic tiles. The substrate is to be a 6mm scratch coat to the nominated tile height for adherence of tiles.

Performance

Requirements:

- 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.
- Without obvious shrinkage cracks.
- As a suitable substrate for the nominated final finish.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 *General requirements.*
- 0331 Brick and block construction.

1.3 INTERPRETATION

Abbreviations

General: For the purposes of this worksection, the following abbreviations apply:

- CRF: Cement render – finish.
- CRM: Cement render – medium.
- CRS: Cement render – stronger.
- CRW: Cement render – weaker.
- GPF: Gypsum plaster – finish.

Definitions

General: For the purposes of this worksection, the definitions given in AS 1672.1 (1997) and the following apply:

- Base coat: A plaster coat applied before the application of the finish coat.
- Binder: Material binding aggregate particles together into a heterogeneous mass.
- Bonding treatment: A treatment of a substrate that improves adhesion of a rendering or plastering 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.
- Laitance: Scum or whitish deposit that rises to the surface of newly placed, over-wet concrete or over-trowelled mortar.
- Lath: An applied substrate for render or plaster.
- Plaster: A mixture of binders, aggregate and water, which is typically applied to internal substrates, in a plastic state and dries and cures to a hard surface, which may subsequently be decorated or remain self-finished:
 - . Cement plaster: Contains general purpose cement as the principal binder.
 - . Gypsum plaster: Contains hydrated or anhydrous calcium sulfate as the principal binder.
- Plastering: The process of applying plaster to a substrate with a float or trowel.
- Render: A mixture of binders, aggregate, water and with or without admixtures, which is typically applied to external substrates, in a plastic state and dries and cures to a hard surface, which may subsequently be decorated or remain self-finished.
 - . Cement render: Contains general purpose cement as the principal binder.
- Rendering: The process of applying render to a substrate with a float or trowel.
- Rendering or plastering system: One or more coats of render or plaster and associated treatments comprising some or all of the following in sequence:
 - . Bonding treatment.

- . Base coat(s).
- . Finish coat.
- . Finishing treatment.
- Substrate: The surface to which a material or product is applied.

1.4 TOLERANCES

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 $\pm 10\%$ over the length of the arris.

1.5 SUBMISSIONS

1.6 INSPECTION

Notice

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

- Prototypes ready for inspection.
- Substrates immediately before applying base coats.
- Finishing treatments before decoration.

2 PRODUCTS

2.1 GENERAL

Storage and handling

General: Store materials in a dry, well-ventilated and secure storage area, unaffected by weather.

2.2 MATERIALS AND COMPONENTS

Accessories

Beads: Proprietary PVC or metal sections manufactured for fixing to substrates and/or embedding in the render or plaster to form and protect edges and junctions.

Lath: Provide a proprietary product manufactured from PVC or raised expanded metal for use with render or plaster.

Metallic-coatings to AS 1397 (2021): For metal beads or lath in cement render or plaster, to the **Corrosion resistance and durability table**.

Admixtures

Plasticisers or workability agents: Do not use.

Aggregates

Sand: Fine, sharp, well-graded sand with a clay content between 1% and 5% tested to AS 1141.12 (2015), and free from efflorescing salts.

Sand grading for base coat plaster table

Sieve size (mm)	Percent passing	
	Minimum	Maximum
4.75	100	100

Sieve size (mm)	Percent passing	
	Minimum	Maximum
2.36	90	100
1.18	60	90
0.6	35	70
0.3	10	30
0.15	0	5
0.075	0	3

Render and plaster for autoclaved aerated concrete

General: Provide a proprietary product manufactured for use with the wall system.

Bonding agents

General: Proprietary products manufactured for bonding cement-based render or plaster to solid substrates.

Cement

Standard: To AS 3972 (2010).

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

Requirement: To the **Corrosion resistance and durability table** or provide proprietary products with metallic and/or organic coatings of equivalent corrosion resistance and as follows:

- Galvanizing: To AS/NZS 4680 (2006).

Corrosion resistance and durability table

Atmospheric corrosivity category to AS 4312 (2019)	Metal lath, beads and embedded items	Minimum cement content (mix type) above damp-proof course
C1 and C2	Galvanize after fabrication 300 g/m ²	CRW
	Stainless steel Type 316	
	Powder coated aluminium	CRM
C3	Stainless steel Type 316	CRM
	Powder coated aluminium	
C4	Stainless steel Type 316	CRS
	Powder coated aluminium	

Note: For categories C5 and CX seek specialist advice.

Curing products

General: Provide proprietary products manufactured for use with the render or 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 (1997).

Lime putty

General: Prepare lime putty as follows:

- Stand dry hydrated lime to AS 1672.1 (1997) and water for 24 hours or more without drying out.

- Stand quicklime and water for 14 days or more without drying out.

Mixes

General: Select a mix proportion to suit the conditions of application.

Measurement: Measure binders and sand by volume using buckets or boxes. Do not allow sand to bulk by absorption of water.

Mixing: Machine mix for 3 to 6 minutes.

Strength of successive coats: Make sure successive coats are no richer in binder than the coat to which they are applied.

Mix proportion table – Cement render, by volume

Mix type		Substrate	Upper and lower limits of proportions by volume		
			Cement	Lime	Sand
Single or multi-coat systems with integral finishing treatments Base coats in multi-coat systems with cement or gypsum finishes	CRS	Dense and smooth concrete and masonry	1 1	0 0.5	3 4.5
	CRM	Regular clay or concrete masonry	1 1	0.5 1	4.5 6
	CRW	Lightweight concrete masonry and other weak substrates	1 1	1 2	6 9
Second coat - Internal	CRF	Cement render base coats	1 1	1 2	6 9
Second coat - External	CRF	Cement render base coats	1 1	1 2	5 6

Mix proportion table – Gypsum finish coat, by volume

Mix type		Substrate	Upper and lower limits of proportions by volume			
			Gypsum	Cement	Lime putty	Sand
Gypsum finish coats	GPF	Cement render base coats	1	-	1.5	-
			1	-	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

GENERAL

Prototypes

3.1 PREPARATION

Substrates

General: Prepare substrates as follows:

- Clean and free from any deposit or finish that may impair adhesion of render or plaster.
- If framed or discontinuous, support members in full lengths without splicing.
- If solid or continuous, remove excessive projections and fill voids and hollows with render or 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. Do not render or plaster substrates showing surface moisture.

Dense concrete: If not sufficiently rough to provide a mechanical key, roughen 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 render or 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 render.
- Beads for control of movement: At all control joints.
- Stop beads: At all terminations of render or plaster and junctions with other materials and render 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 to the substrate, throw a wet mix onto the substrate. Mix proportions to the following:

- Cement render (cement:sand): 1:2.
- Gypsum plaster (gypsum:sand): 1:2.

Curing: Cure as follows:

- Keep continuously moist for 5 days or more and allow to dry before applying render or plaster coats.
- Protect cement render from direct sun and drying winds for at least 16 hours after application.

Thickness: ≥ 3 mm and < 6 mm.

Embedded items

General: To the **Corrosion resistance and durability table**. If there are water pipes and other embedded items, sheath them to allow for thermal movement.

Lath

Location: Provide lath as follows:

- Chases: If chases or recesses are 50 mm wide or greater, fix lath extending 75 mm or more beyond each side of the chase or recess.
- Masonry and concrete substrates: If mechanical key cannot be attained by scabbling and bonding, fix lath.
- Metal and other non-porous substrates: Fix 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 render or plaster.
- Fixing: Mechanically fix at 150 mm maximum centres.
- 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

Rendering and plastering

Base coats: Scratch-comb each base coat in two directions when it has stiffened.

Lath: Press the render or plaster through the apertures of lath and wings of beads.

Incidental work

General: Return render or plaster into reveals, beads, sills, recesses and niches. Render or 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 joinery.

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 the joint in the substrate is not bridged during rendering or plastering.

Size:

- Depth: Extend the joint right through the render or 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 render or plaster across damp-proof courses.

Rendering or plastering on lath: Provide control joints to divide the rendering or plastering area into rectangular panels of 10 m² or less.

V-joints: Provide V-joints, cut right through the render or 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.

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 as follows:

- Fixing centres: ≤ 600 mm.

Decorative joints

General: Apply decorative joints in the second coat of two-coat work as follows: [complete/delete]

Render and plaster thickness table

Substrate	Render and plaster, 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 less than 10°C or more than 30°C, make sure the temperature of mixes, substrates and reinforcement at the time of application is between 5°C and 35°C.

Unused mixes

General: Do not use render or plaster unused after 90 minutes from the time of mixing.

3.3 FINISHES**Finishing treatments**

Plain even surfaces: Work the hardening plaster as follows:

- Bag: Rub the finish coat when set firm with a hessian bag or similar.
- Carborundum stone: Rub the finish coat when set hard with a carborundum stone to achieve a finish free from sand.
- Foam float: Float the 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 the finish coat to a smooth dense surface which is not glass-like and is free from shrinkage cracks and crazing.
- Wood or plastic float: Float the finish coat on application with a wood or plastic float to an even surface.

Ornamental patterned surfaces: Work the hardening plaster with a trowel or other tool for the documented type.

Type of ornamental patterned surface: [complete/delete]

Sprayed textured surfaces: Spray plaster onto a substrate using a purpose-designed machine.

Stippled textured surfaces: Work the hardening plaster with a stiff brush.

Rough cast surfaces: Throw plaster onto a substrate or pebbles onto a plastic plaster base for the documented type.

Type of rough cast surface: [complete/delete]

Specialist plaster finishes

Polymer modified render:

- Base coat render: Proprietary polymer modified cementitious render supplied as a complete plastering system.
- Finish coats: Proprietary coloured and textured polymer modified finish coats.

Polished plaster: In situ applied plaster system incorporating selected stone dust in a proprietary matrix producing a smooth polished surface with visual patterning.

Glass bead coatings: Glass beads bound in a proprietary matrix.

Product or applicator for glass bead coatings: [complete/delete]

3.4 COMPLETION**Curing**

General: Prevent premature or uneven drying out and protect from the sun and wind.

Keeping moist: If a proprietary curing agent is not used, keep the render or 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 render or plaster coats.
- Finish coats: Keep continuously moist for 2 days.

Multiple coats: Cure and dry each successive coat in multiple coat systems.

0621P FOSROC WATERPROOFING - WET AREAS

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide FOSROC wet area waterproofing systems, as documented.

Level 00

- To all Male and Female Change Rooms including locker room designation for carpet finish, Public Male and Female Amenities Accessible Change Rooms
- Café and Control

Level 01

- Male and Female Amenities and Accessible Change
- Kitchen

Performance

Requirements:

- Graded to floor wastes, to dispose of water without ponding.
- Able to prevent moisture entering the substrate or adjacent areas.

1.2 COMPANY CONTACTS

FOSROC technical contacts

Website: www.fosroc.com.au/specification-services

1.3 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

1.4 STANDARDS

Waterproofing wet areas

Standard: To AS 3740 (2021).

1.5 MANUFACTURER'S DOCUMENTS

Technical manuals

Website: www.fosroc.com.au

1.6 INTERPRETATION

Definitions

General: For the purposes of this worksection, the definitions given in AS 3740 (2021) and the following apply:

- Membranes (waterproof): Impervious barriers to liquid water, which may be:
 - . Installed below floor finishes.
 - . Installed behind the wall sheeting or render.
 - . Installed to the face of the wall sheeting or render.
 - . Applied in liquid or gel form and air cured to form a seamless film.
 - . Applied in sheet form with joints lapped and sealed.
- Waterproofing system: Combinations of membranes, flashings, drainage and accessories that form waterproof barriers and that may be:
 - . Loose-laid.
 - . Bonded to substrates.
- Wet area: An area within a building supplied with a floor waste.

1.7 SUBMISSIONS

Products and materials

Manufacturer's data: Submit product data sheets.

Type tests: Submit test results for the following:

- Membranes: To **MEMBRANES, Tests**.

Records

General: Submit photographic records to EXECUTION, **GENERAL, Reporting**.

Flood tests: Submit photographic records to **TESTING, Flood tests**.

Samples

Requirement: Submit samples to PRODUCTS, **GENERAL, Samples**.

Shop drawings

Requirement: Submit shop drawings showing the following:

- Junctions with vertical surfaces and upstands.
- Junctions at perimeters.
- Drainage details.
- Control joints.
- Flashings.
- Penetrations.
- Corners.
- Terminations and connections.
- Membrane layers.

Subcontractors

Requirement: Submit names and contact details of proposed suppliers and installers as recommended by the manufacturer.

Substrate acceptance

Requirement: Submit evidence of installer's acceptance of the flooring substrate before starting installation.

Tests

Site tests: Submit results, as follows:

- Substrate moisture content test.
- Flood test.
- Electronic leak detection test.
- Seam probe test.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties**.

1.8 INSPECTION

Notice

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

- Substrates prepared and ready for installation of the wet area waterproofing systems.
- Following primer application.
- Membranes after installation and before concealment.
- After flood testing, if applicable.

2 PRODUCTS

2.1 GENERAL

Product substitution

Other products: Conform to **SUBSTITUTIONS** in *0171 General requirements*.

Samples

Requirement: Provide 300 x 300 mm samples of each type of membrane.

Storage and handling

General: Store and handle to the manufacturer's recommendations and as follows:

- Protect materials from damage.

Product identification

General: Marked to show the following:

- Manufacturer's identification.
- Product brand name.
- Product type.
- Quantity.
- Product reference code and batch number.
- Date of manufacture.

2.2 MEMBRANES**Standards**

Standard: To AS/NZS 4858 (2004).

Tests

Standard: To AS/NZS 4858 (2004) Table 8.1.

Total VOC limits

Requirement: Conform to the following maximum TVOC content:

- Waterproof membrane: 250 g/L.

2.3 FOSROC LIQUID MEMBRANE SYSTEMS**Fosroc Nitoproof 410**

Description: Flexible, polymer/cementitious, two part liquid waterproofing membrane.

Fosroc Nitoproof 310

Description: Latex-based, fibre enhanced, single component, waterproofing membrane.

Fosroc Nitoproof 810

Description: Highly flexible, water based polyurethane liquid waterproofing membrane.

Fosroc Nitoband Elastic Joint Band System

Description: Flexible bond breaking tape of acrylonitrile butadiene rubber and detailing accessories for sealing critical movement zones, including the following:

- Fosroc Nitoband Elastic Joint Band Tape for floor to wall, wall to wall applications.
- Fosroc Nitoband Elastic Joint Band Corners: 270° external, 90° internal and adjustable internal corners.
- Fosroc Nitoband Elastic Joint Band Pipe Penetration Detailing Squares: For pipes up to 50 mm, 110 and 150 mm.
- Fosroc Nitoband Butyl Square Floor Waste Detailing Collars of various sizes.

Fosroc Nitoprime 120

Description: Water-based, single component, fast drying primer.

Fosroc Nitoprime 115

Description: Water-based solvent free primer for non-porous substrates.

Tile adhesive

Description: A rubber modified, cement-based, flexible tile adhesive.

2.4 ACCESSORIES**Shower tray**

General: Purpose-made jointless shower tray, with wall upstands at least 50 mm higher than the hob upstands. Set hob on the inside of the tray upstands.

Waterstop angles

Material: Rigid, corrosion-resistant angles compatible with the waterproof membrane system.

Flashings

Requirement: Flexible waterproof flashings compatible with the waterproof membrane system.

Sealants

Requirement: Waterproof or water resistant, flexible, mould-resistant and compatible with the waterproofing system and to the manufacturer's recommendations.

3 EXECUTION

3.1 GENERAL**Reporting**

General: Make progressive photographic records of the waterproofing installation. Label photographs with the date and location.

Timing: Record at the following stages:

- After substrate preparation.
- After primer application.
- After membrane installation.
- After protection from traffic provided.

Liquid applied membranes:

- Record wet film thickness once every 10 m² and compare to the manufacturer's requirements.
- On completion of every 100 m² of each coat, compare the amount of membrane used with the manufacturer's application rate and record the result.

3.2 PREPARATION**Substrates**

General: Prepare substrates as follows:

- Clean and remove any deposit or finish that may impair adhesion of membranes.
- If walls are plastered, remove loose sand.
- If walls or floors are framed or discontinuous, make sure support members are in full lengths without splicing.
- If floors are solid or continuous:
 - . Remove excessive projections.
 - . Fill voids and hollows greater than 10 mm with abrupt edges with a cement:sand mix not stronger than the substrate nor weaker than the bedding.
 - . Fill depressions less than 10 mm with a polymer modified cementitious product with feathering eliminated by scabbling the edges.
 - . Cover cracks in substrates wider than 1.5 mm with Fosroc Nitoband Expansion Joint Band System or Fosroc Nitoseal compatible with the respective Fosroc Nitoproof.

Concrete substrates: Cure for more than 28 days.

External corners: Round or arris edges.

Moisture content

Requirement: Verify that the moisture content of the substrate is compatible with the water vapour transmission rate of the membrane system by testing to the recommendations of AS 3740 (2021) Appendix F.

Falls

Membrane applied to substrate: Make sure the fall in the substrate conforms to the fall documented for the finish.

Sheet substrate fastening

Requirement: Provide fasteners compatible with the substrate. Mechanically fasten to the supporting structure.

Waterstop angles

Requirement: Provide waterstop 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 waterstop angle to conform to the requirements of AS 3740 (2021).

Corners: Cut the horizontal leg and bend the vertical leg at corners instead of forming vertical joints between separate lengths of angle.

Fixing: Fix waterstop angles to the substrate with compatible sealant or adhesive and corrosion-resistant countersunk or wafer head screws.

Priming

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

Bond breakers - Fosroc Nitoband Elastic Joint Band System

Requirement: Use Fosroc Nitoband Elastic Joint Band System as the bond breaker after the membrane priming of surfaces, provide bond breakers at all wall/floor, hob/wall junctions, corners, pipe penetration locations and floor wastes and at control joints where the membrane is bonded to the substrate.

Sealant bond breakers: If using a sealant as the bond breaker, apply the sealant before priming the surfaces as follows:

- Application: Form a triangular fillet or cove of sealant to internal corners within the period recommended by the membrane manufacturer before the application of the membrane primer.
- Width: Conform to AS 3740 (2021) clause 4.10.

3.3 INSTALLATION**Ambient conditions**

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

Protection

Damage: Protect membrane from damage during installation and for the period after installation until the membrane achieves its service characteristics that resist damage and an overlaying finish is installed.

Extent of waterproofing

Waterproof or water resistant surfaces: To BCA (2022) F2D2.

Flashings

All flashing areas: Install Fosroc Nitoband Elastic Joint Band system to accommodate any potential movement between the nominated surfaces.

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 waterstop angles.

Vertical flashings: Provide vertical corner flashings continuous across wall/wall junctions to at least 1800 mm above finished floor level of the shower or base of the bath or tray, or 50 mm above the shower rose, whichever is the higher.

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 Fosroc Nitoband Elastic Joint Band System to provide critical movement reinforcement.

Drainage connections

Floor wastes: Provide floor wastes of sufficient height to accommodate the thickness of floor finishes and bedding at the outlet position. Position leak control flange to drain at membrane level. Turn membrane down 50 mm minimum into the floor waste leak control flanges, and adhere to form a

waterproof connection. Embed the Fosroc Nitoband Elastic Joint Band Waste Detailing Collar into the nominated Fosroc Nitoband.

Priming: Fosroc Nitoband Elastic Joint Band Waste Detailing Collar sticks to smooth surfaces without priming. Prime porous surfaces with Fosroc Nitoprime 120.

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 leak control flanges: Provide a continuous waterproof connection between the membrane and the channel.
- Without leak control flanges: Provide continuous waterproofing under the channel and terminate the membrane at a floor waste with a recessed leak control flange.

Membrane terminations

Upstands:

- Shower areas with hobs and step-downs: Minimum 150 mm above the highest finished tile level of the shower area or 25 mm above the maximum retained water level, whichever is the greater.
- Shower areas without hobs: Minimum 150 mm above the highest finished tile level of the floor within the shower area.
- Shower areas with ceiling mounted shower rose: To the full height of the wall.
- Bath without an integral upstand edge without showers over: Minimum 150 mm above the shower rose connection.
- Bath with an integral upstand edge, bath with a shower over or bath adjoining an unenclosed shower: Minimum 150 mm above the bath edge.

Edge protection: Protect edges of the membrane.

Showers with hobs

General: Provide masonry, concrete or corrosion-resistant metal hobs. Fix securely to the floor, seal against walls and make flush all gaps, joints and intersections before applying the membrane.

Masonry or concrete hob: Extend membrane over the hob and into the room at least 50 mm.

- Autoclaved aerated concrete hobs: Prime before applying the membrane.

Metal hob: Provide metal angle with height at least 15 mm above the finished floor level of the floor outside the shower. Terminate the membrane within 5 mm from the top of the angle. Seal the gap between the shower screen and the angle.

Showers with step-downs

Level of shower area: At least 15 mm below the finished floor level outside the shower.

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 waterstop angle fixed securely to the substrate.

Frameless shower screens:

- Install a waterstop angle where the base of the shower screen will be installed and across the opening of the shower.
- Install membranes on both sides of the waterstop angle and turn the membranes up against the angle. Extend the membrane at least 50 mm into the adjacent area
- Finish membrane flush with the underside of tiles.
- Provide a sealant joint between the waterstop angle and tiles.
- Install the shower screen with the inside face flush with the step-down.

Showers without hobs or step-downs

Framed shower screens:

- Install a waterstop angle directly below where the base of the shower screen sill will be installed.
- Size the angle so that the vertical leg finishes at least 5 mm above the level of the tiles.
- Support and adhere the membrane over the waterstop angle and extend the membrane at least 50 mm into the adjacent area.

Frameless shower screens:

- Install a waterstop angle directly below where the base of the shower screen will be installed.
- Support and adhere the membrane over the waterstop angle and extend the membrane at least 50 mm in to the adjacent area.
- Install a capping angle over the membrane and vertical leg of the waterstop angle to protect the exposed membrane.
- Install the shower screen over the capping angle.

Framed or frameless shower screens with trench drain located below screen:

- Install a waterstop 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 waterstop angle and terminate the membrane at floor wastes as documented 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 walls and floor.

Preformed shower bases

Preformed shower bases with integral perimeter upstands:

- Support shower bases to prevent distortion or cracking.
- 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.

Baths and spas

Baths with integral upstands:

- Recess bath edges into walls or batten off wall lining sufficiently to allow water resistant wall finishes to overlap the integral upstands.
- Maintain the structural integrity of walls that are rebated.

Baths without integral upstands or with showers over:

- Form a rebate in the wall to receive the bath edge.
 - . Rendered masonry walls: Form or chase in the render.
 - . Framed and lined walls: Form in the wall lining with a corrosion-resistant lipped channel.
- Waterproof the wall above and below the rebate, including the rebate and the floor area under the bath.
- Seal the edge of the bath into the rebate.

Plinth-mounted insert baths and spas:

- Line framed enclosures for insert baths.
- Form an upstand on the inside edge of the enclosure opening to receive the bath with an angle or compressible foam rod.
- Waterproof walls abutting the enclosure, the top of the plinth and the interior and exterior of the enclosure.
- After tiling the walls, top of the plinth and exterior of the enclosure, install the bath with its downturn edge lip outside the upstand formed on the edge of the opening and seal the lip to the tiles.
- Minimum dimension from wall or free edge of the plinth to insert bath: 100 mm.

Taps and spouts

Requirement: Waterproof penetrations for taps and spouts with Fosroc Nitoband Elastic Joint Band Pipe Penetration Detailing Squares or a membrane compatible sealant.

Provision for servicing: Install taps so tap washers or ceramic discs can be serviced without damaging the waterproofing or seal.

Wall recesses

Requirement: 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.

Curing of liquid membrane systems

General: To the manufacturer's recommendations.

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 (2021).

Bonded or partially bonded membranes: 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.

3.4 TESTING**Substrate tests**

Moisture content: Test substrate for suitability for the installation of membranes to AS 3740 (2021) Appendix F.

- Maximum relative humidity of concrete or cementitious screeds: To AS 3740 (2021) Appendix F2.4.
- Moisture content of timber and plywood substrates: To AS 3740 (2021) Appendix F2.3.

Flood tests

Requirement: To AS 3740 (2021) Appendix C2.

Records:

- Make photographic records of the flooded areas and adjacent areas.
- Label photographs with the date and location.

Electronic leak detection test

Requirement: To AS 3740 (2021) Appendix C3.

Seam probe test

Requirement: To AS 3740 (2021) Appendix C4.

3.5 COMPLETION**Reinstatement**

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

Warranties

Type: 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: [complete/delete]

4 SELECTIONS**4.1 SYSTEMS****FOSROC liquid applied membrane systems schedule**

	14A	14B	14C
Proprietary system	FOSROC Nitoproof 310	FOSROC Nitoproof 410	FOSROC Nitoproof 810
Material type	Latex-based, single component, Class III, fibre enhanced membrane	Fast drying two part, Class II, polymer/cementitious membrane	Solvent-free, single component, Class III, polyurethane liquid applied membrane
Tensile strain (elongation at the break) (%)	> 500	320	> 300
Tensile stress at break (MPa)	> 2	1.3	> 3
VOC content (g/litre)	17	9	< 2

	14A	14B	14C
Colour	Light grey	Grey	Green
Priming: Porous surfaces (e.g. masonry)	Fosroc Nitoprime 120	Fosroc Nitoprime 120	Fosroc Nitoprime 120
Priming: Non-porous surface (e.g. ceramic tile, metals and plastics)	Fosroc Nitoprime 115	Fosroc Nitoprime 115	Fosroc Nitoprime 115
Number of coats (minimum)	2	2	2
Membrane first coat	Fosroc Nitoproof 310	Fosroc Nitoproof 410	Fosroc Nitoproof 810
Membrane second coat	Fosroc Nitoproof 310	Fosroc Nitoproof 410	Fosroc Nitoproof 810
Method of application	Thick brush or roller	Thick brush or roller	Thick brush or roller
Application rate/coat (L/m ²)	0.75	0.75	0.75
Dry film thickness (total) (mm)	1.2	1.2	1.0
Bond breakers	Fosroc Nitoband Elastic Joint Band System	Fosroc Nitoband Elastic Joint Band System	Fosroc Nitoband Elastic Joint Band System
Tile adhesive	Polymer modified cement-based tile adhesive	Polymer modified cement-based tile adhesive	Polymer modified cement-based tile adhesive
Waterstop angles			

0631 CERAMIC TILING

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide tiling systems to walls, floors and other substrates, as documented.

Level 00: Ceramic Floor Tile - Everstone Durastone P4/R11 "Ash Grey" Rockface AG3030R
300x300mm Tiles

- Male Amenities
- Female Amenities
- Access change
- Referee 1
- Referee 2
- Cleaner store
- Adult change

Level 00: Ceramic Wall Tiles 600x300mm HORIZONTAL

- Male Amenities
- Female Amenities
- Access change
- Referee 1
- Referee 2
- Cleaner store
- Adult change
- Kitchenette
- Kitchen

Performance

Requirements:

- Consistent in colour, texture 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.
- 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:

- 0171 General requirements.

1.3 STANDARDS

Tiling

General: Conform to the recommendations of those parts of AS 3958 (2023) referenced in this worksection.

Ceramic tiles

Standard: To AS 13006 (2020).

1.4 INTERPRETATION

Definitions

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

- Acoustic underlay: A resilient material laid between the subfloor and the flooring material to provide sound isolation.
- Adhesives - cementitious (C): Adhesive in which the binders are hydraulic, e.g. General purpose cement, with aggregates and organic additives.

- Adhesives - dispersion (D): Adhesives in which the binders are in the form of aqueous polymer dispersion with mineral fillers and organic additives.
- Adhesives - reaction resin (R): Adhesives in which the binders are synthetic resins with mineral fillers and organic additives. The curing occurs by chemical reaction.
- Bedding: Mixtures of materials that are applied to substrates in a plastic state and which dry, cure and adhere tiles to substrates:
 - . Adhesive bedding: Paving/tiling adhered by adhesives.
 - . Mortar bedding: Paving/tiling adhered in a cementitious mortar bed.
- Fixture: Fixed or permanently attached items in a building that cannot be removed without causing damage and would remain upon a change in occupancy, such as a bath, water closet suite, stove, built-in cupboards.
- Lippage: Height deviation between adjacent units.
- Stepping: The relative surface level of adjacent paving elements within the expanse of the main pavement.
- Substrate: The surface to which a material or product is applied.
- Tile: Thin slab made from clay and/or other inorganic raw materials used generally as coverings for floors and walls and adhered to continuous supporting substrates.
- Tiles – cementitious: Cement-based prefinished tiles.
- Tiles – dry-pressed: Tiles made from a finely milled body mixture and shaped in moulds at high pressure. Also known as Type B.
- Tiles – extruded: Tiles whose body is shaped in the plastic state in an extruder then cut to size. Also known as Type A.
- Underlay: A non-structural layer of rubber, cork, plywood or in situ levelling compound to provide a smooth and flat surface for flooring installation. Rubber and cork underlays have acoustic sound absorbing properties.
- Wet area: An area within a building supplied with a floor waste.

1.5 TOLERANCES

Completed tiling

Requirement: To the recommendations of AS 3958 (2023) clause 5.4.8.

1.6 SUBMISSIONS

Execution details

Grouting: Submit proposals for grouting methods and materials.

Margins: If it appears that minor variations in joint widths or overall dimensions will avoid cut tiles, submit a proposal.

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION, Operation and maintenance manuals**.

Products and materials

Product conformity: Submit the following:

- Tiles: Evidence of conformity to AS 13006 (2020).
- Tile adhesive: Evidence of conformity to AS ISO 13007.1 (2020).
- Acoustic underlay: Evidence of weighted normalised impact sound pressure level to the NCC cited AS ISO 717.2 (2004) as measured for the complete tiling system.

Type tests: Submit test results to **TILES AND ACCESSORIES, Tests** for the following:

- Slip resistance.
- Accelerated wear.

Evidence of delivery: Submit delivery docket as evidence of delivery of specified tiles.

Samples

Requirement: Submit samples to **PRODUCTS, GENERAL, Samples**.

Subcontractors

General: Submit names and contact details of proposed suppliers and installers.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties.**

1.7 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.

2 PRODUCTS**2.1 GENERAL****Samples**

Requirement: Provide labelled samples of tiles, including accessories, grout and sealants, showing the range of variation in colour and finish.

Sample panels: Prepare a sample panel of each type of tiling system as follows:

- Size: > 2 m².
- Include samples of junction details and trim.
- Preserve the panel until related work is complete.

2.2 UNDERLAY**Fibre cement underlay**

Standard: To AS/NZS 2908.2 (2000), Type B, category 2 minimum.

Thickness: 6 mm minimum.

Acoustic underlay

General: Provide a proprietary product recommended by the manufacturer as compatible with the tiling system.

2.3 TILES AND ACCESSORIES**Tiles**

Standard: To AS 13006 (2020).

Coves, nosings and skirtings: Provide matching stop-end, and internal and external angle tiles moulded for that purpose.

Exposed edges: Provide 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 or use proprietary trim.

Accessories

General: Provide tile accessories that match the composition, colour and finish of the surrounding tiles.

Tile trim: Provide proprietary trim for wall tiles and floor tiles, as documented.

Tactile ground surface indicators

Standard: To AS/NZS 1428.4.1 (2009).

Tests

Slip resistance: To AS 4586 (2013).

Accelerated wear: Tested for slip resistance after being subjected to accelerated wear conditioning, as evidence of the permanence of slip resistance.

2.4 ADHESIVES**General**

Standard: To AS ISO 13007.1 (2020).

Type

General: Provide adhesives compatible with the materials and surfaces to be adhered, and as documented.

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 (2010): GP.

- White cement: Iron salts content $\leq 1\%$.
- Off-white cement: Iron salts content $\leq 2.5\%$.

Lime: To AS 1672.1 (1997).

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.

Terracotta tiles: Use proprietary polymer modified mortar.

Mixing: To AS 3958 (2023) clause 5.5.

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.

Terracotta 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:

- Joints < 3 mm: 1:2.
- Joints ≥ 3 mm: 1:3.

Epoxy grout: As documented.

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**

Control joint strip: A proprietary control joint consisting of a neoprene core sandwiched between metal 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 35A.

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.
- Rendered swimming pool shell: A further 21 days minimum.

3.2 PREPARATION

Standard

Preparation: To the recommendations of AS 3958 (2023) 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: Make sure substrates are as follows:

- Clean and free of any deposit or finish that 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 to remove 3 mm of the surface and expose the aggregate; then apply a bonding treatment.

Substrates with wet area membranes

General: Make sure substrates are as follows:

- Clean and free of any deposit or finish that may impair adhesion or location of tiles.
- Compatible with all components of the floor system.

Trial set-out

General: Prepare a trial tile set-out of each area, as follows:

- Maximise the size of equal margins of cut tiles.
- Locate control joints.
- Locate fixtures on walls.
- Align floor and wall tile joints if possible.

3.3 FIXING UNDERLAY

Installation

Requirement: Lay in staggered (brick) pattern, perpendicular to the direction of the subfloor, with joints in the underlay not coinciding with joints in the subfloor. Fix with fasteners and fastener spacing to the manufacturers recommendations. If panels are not tongue and grooved, make sure edges are fully supported.

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 at margins if necessary. Drill holes without damaging tile faces. Cut recesses for fixtures such as soap holders. Rub edges smooth without chipping.

Laying: Return tiles into sills, reveals and openings. Butt up to returns, frames, fixtures and other finishes. Strike and point up beds if 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.

Bath ventilation

General: If required, ventilate the space below fully enclosed baths with at least 2 vermin-proof ventilating tiles.

3.5 SETTING OUT

Tile layout

Requirement: Set out tiles as documented, allowing for control joints, or as follows if desired layout is undocumented:

- General tiling: Provide whole or purpose-made tiles at margins if 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. Align floor and wall tile joints, if possible.
- Feature tiling: Provide trial set out for large or complex areas and patterns.

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.

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 centrelines of tiles. Continue tiling fully behind fixtures that are not built in to the tiling surface. Before tiling make sure 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

Requirement: Grade floor tiling to even and correct falls to floor wastes and elsewhere as required. Make level junctions with walls. If falls are not required, lay level.

Fall: Conform to falls as documented and the following:

- Falls to floor wastes: 1:80 minimum.
- Continuous fall of floor plane to floor waste for NCC Classes 1, 2, 3 and 4 parts of a building: 1:50 maximum.

Change of finish: Maintain finished floor level across changes of floor finish including carpet.

3.7 BEDDING

Standard

Adhesive: To AS 3958 (2023) clause 5.6.

Cement mortar: To AS 3958 (2023) clause 5.5.

Preparation of tiles

Adhesive bedding: Fix tiles dry; do not soak.

Mortar bedding: Soak porous tiles in water for half an hour and then drain until the surface water has disappeared.

Terracotta tiles: Use pre-sealed tiles or apply a breathable sealer and lay dry. If a final sealed finish is selected, use a compatible laying sealer.

Bedding

General: Use bedding methods and materials that 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, tested with a 3 m straightedge.

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, tested with a 3 m straightedge 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 walls and floors: > 90%.
- Wet areas and benchtops: 100%.

Pattern of distribution of adhesive: To the recommendations of AS 3958 (2023) clause 5.6.5. 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 before grouting or allowing foot traffic.

Mortar beds

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.

Mechanical fixing

General: Provide a proprietary system of support and fixing appropriate to the type of tile and the substrate conditions.

3.8 CONTROL OF MOVEMENT

General

Requirement: Provide control joints carried through the tile and the bedding to the recommendations of AS 3958 (2023) clause 5.4.7 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 if 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 internal corners.
- 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 and remove any tile spacers before grouting.

Face grouting: Fill the joints solid and tool flush. Clean off surplus grout. Wash down when the grout has set. When grout is dry, polish the tiled surface with grout film remover and a clean cloth.

Edges of tiles: Grout exposed edge joints.

Epoxy grouted joints: Make sure 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 internal corners of walls.
- 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 fixed to the substrate using mechanical fixings, with top edge flush with the finished floor. If changes of floor finish occur at doorways, make the junction directly below the closed door. Grout up underneath to provide continuous support.

Stepping: Less than 3 mm.

Wall trim

General: Provide where documented. Install flush with adjacent tile surfaces and to manufacturer's recommendations.

Adjustments

Requirement: Check that the height of the floor finish divider 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 corrosion-resistant metal weather bars or threshold plates under hinged external doors, located under the centres of closed doors or to manufacturer's recommendations.

3.11 COMPLETION**Cleaning**

General: Clean tiled surfaces using an appropriate tile cleaning agent, and polish.

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.

Operation and maintenance manuals

Requirement: Prepare a manual describing care and maintenance of the tiling, including procedures for maintaining the slip-resistance classification stating the expected life of the slip-resistance classification.

4 SELECTIONS**4.1 SCHEDULES****Wall tiling schedule**

	A	B	C
Product	Beaumont Tiles		
Tile: Type			
Tile: Size (mm)	300x600mm Horizontal		
Tile: Colour	White		
Tile: Surface	Gloss Rectified Edge		
Adhesive bedding: Type			
Adhesive bedding: Thickness			
Tile pattern	Horizontal		
Mechanical fixing			
Grout: Type			
Grout: Colour	white		

Floor tiling schedule

	A	B	C
Product	Everstone Durastone		
Tile: Type	DS-AG3010B		
Tile: Size (mm)	300x300mm		
Tile: Colour	Ash Grey		
Tile: Surface	Brushed		
Tile: Edge			
Slip resistance classification	P4		
Water absorption group to AS 13006 (2020)			
Adhesive bedding: Type			
Adhesive bedding: Thickness			
Mortar bedding: Thickness (mm)	50mm includes		

	A	B	C
	provided Set downs		
Grout: Type			
Grout: Colour	Grey		

0651 RESILIENT FINISHES

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide resilient floor finishes to substrates, as documented including the following areas:

Kitchen in Forbo Safestep Vinyl Floor Finish-Smoke_175032- R12/P5 Slip Resistance

Control and Kitchenette in Forbo Safestep Vinyl Floor Finish-Smoke 174032- R11/P4 Slip Resistance

1.2 COMPANY CONTACTS

FORBO Flooring Systems technical contacts

Website: www.forbo.com/flooring/en-au/contact-us/

1.3 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

1.4 STANDARDS

General

Installation: To AS 1884 (2021).

1.5 INTERPRETATION

Definitions

General: For the purposes of this worksection, the definitions given in AS 1884 (2021) and the following apply:

- Acoustic underlay: A resilient material laid between the subfloor and the flooring material to provide sound isolation.
- Resilient floor coverings classification: To EN ISO 10874 (2012).
- Substrate: The surface to which a material or product is applied.
- Underlay: A non-structural layer of rubber, cork, plywood or in situ levelling compound to provide a smooth and flat surface for flooring installation. Rubber and cork underlays have acoustic sound absorbing properties.

1.6 SUBMISSIONS

Fire performance

Fire hazard properties: Submit evidence of conformity to **FIRE PERFORMANCE, Fire hazard properties**.

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION, Operation and maintenance manuals**.

Products and materials

Manufacturer's data: Submit the manufacturer's product data sheets for each type of finish, and the manufacturer's recommendations for its application including the following, as appropriate:

- Thickness and width of sheet, or size of tile or plank.
- Adhesive and jointing method.
- Resistance to wear, indentation, chemicals, light and fire.
- Flexibility and bending strength.

Type tests: Submit test results for the following:

- Slip resistance: To **PRODUCTS, GENERAL, Tests**.

Samples

Requirement: Submit samples to **PRODUCTS, GENERAL, Samples**.

Subcontractors

General: Submit names and contact details of proposed suppliers and installers.

Substrate acceptance

Requirement: Submit evidence of installer's acceptance of the flooring substrate before starting installation.

Tests

Site tests: Submit results, as follows:

- Substrate moisture content test.
- Surface pH test.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties.**

1.7 INSPECTION**Notice**

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

- Substrate immediately before fixing resilient finishes or underlay.
- Trial set-out before execution.
- Completed underlay, if any.
- Finished surface before applying sealers or polishes, if any.
- Completed installation.

2 PRODUCTS**2.1 GENERAL****Samples**

Requirement: Provide labelled samples of resilient finishes illustrating the range of colour, pattern or texture of the product.

Minimum size per sample:

- Sheets: 450 x 450 mm.
- Tiles: A whole tile or 0.09 m², whichever is the greater.
- Planks: A whole plank.
- Linear accessories, including coving, skirting, stair nosing and protection strips: 300 mm long.
- Welded joints: 300 mm long.

Identification: Label each sample with brand, product name and manufacturer's code reference, including the code for each coat of multi-coat work.

Storage and handling

Requirement: Store and handle to the manufacturer's recommendations.

Tests

Slip resistance: To AS 4586 (2013).

2.2 FIRE PERFORMANCE**Fire hazard properties**

Critical radiant flux: Tested to AS ISO 9239.1 (2003).

2.3 UNDERLAYS**Cementitious**

General: Polymer modified cementitious smoothing and self-levelling compound.

Thickness: 3 mm minimum.

Fibre cement

Standard: To AS/NZS 2908.2 (2000). Type B, category 2 minimum.

Sheet thickness: 5 mm minimum.

Cork

Standard: To EN 12103 (1999) and EN 12105 (1998).

Wet process fibreboard

Standard: To AS/NZS 1859.4 (2018).

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

Thickness: 5.5 mm.

2.4 ADHESIVES**General**

Requirement: To the resilient finishes manufacturer's recommendations.

2.5 SHEETS, TILES AND PLANKS**Cork tiles**

Standard: To EN 12104 (2023) and EN 12105 (1998).

Corklinoleum

Standard: To EN 688 (2011).

Linoleum

Standard: To AS 1884 (2021) and EN ISO 24011 (2012).

Rubber

Standard: To AS 1884 (2021) and as follows:

- Smooth rubber: To EN 1817 (2020).
- Textured/relief rubber: To EN 12199 (2020).

Polyvinyl chloride (PVC)

Standard: To AS 1884 (2021) and as follows:

- Homogeneous: To EN ISO 10581 (2020).
- Heterogeneous: To EN ISO 10582 (2018).
- PVC on jute or polyester felt backing: To EN 650 (2012).
- Heterogeneous PVC on foam layer: To EN ISO 11638 (2022).
- PVC with particle based enhanced slip resistance: To EN 13845 (2017).
- PVC semi-flexible vinyl composition tiles (VCT): To EN ISO 10595 (2012).

Acoustic sheet vinyl

General: Unbacked flexible sheet vinyl laid over separate closed cell foam acoustic underlay.

Acoustic underlay thickness: 2 mm.

Inlaid vinyl sheet

General: A layer of vinyl chips inlaid in a translucent vinyl matrix, bonded to a moisture resistant backing.

2.6 SYNTHETIC SPORTING SURFACES**Standard**

General: To EN 14904 (2006).

2.7 OTHER MATERIALS**Edge strips and threshold strips**

General: Heavy duty metal moulding or extruded edge strip appropriate to the floor covering type, capable if necessary, of accommodating different levels of adjacent floor finishes.

Type: As documented.

Location: At exposed edges of the floor covering, and at junctions with differing floor finishes or finishes of a different thickness. If edge strips occur at doorways, locate the junctions directly below the closed door.

Stair and landing nosings

Standard: To BCA (2022) D3D14 and BCA (2022) D3D15.

Type: As documented.

Tactile ground surface indicators

Standard: To AS/NZS 1428.4.1 (2009).

3 EXECUTION

3.1 GENERAL

Subcontractors

Requirement: Use specialist installers recommended by the material manufacturers.

3.2 PREPARATION

Substrates

General: To AS 1884 (2021) Section 3.

Substrate tolerance table

Property	Length of straightedge laid in any direction (mm)	Maximum deviation under the straightedge (mm)
Planeness	2000	4
Abrupt deviation tolerance	150	0.5

Concrete substrates

Requirement: Do not start installation of the resilient finishes until the concrete substrate conforms to AS 1884 (2021) clause 3.1 and the adhesive and resilient finish manufacturers' recommendations.

Substrate rectification: Conform to the following:

- Surface treatments: Mechanically remove any incompatible surface treatments, including the following:
 - . Sealers and hardeners.
 - . Curing compounds.
 - . Waterproofing additives.
 - . Surface coatings and contamination.
- Surface quality: Remove projections and fill voids and hollows with a smoothing and self-levelling compound compatible with the adhesive. Allow filling or levelling compound to dry to manufacturer's recommendations.

Cleaning: Remove loose materials or dust.

Timber, plywood, particleboard and fibre cement sheet substrates

Requirement: Do not start installation of the resilient finishes until the timber, plywood, particleboard and fibre cement substrate conforms to AS 1884 (2021) clause 3.6.

Substrate rectification: Remove projections. If conformance to the **Substrate tolerance table** cannot be achieved, provide an underlay in brick pattern with joints avoiding substrate joints.

Cleaning: Remove oil, grease, traces of applied finishes and loose materials or dust.

Working environment

General: Do not start work before the building is enclosed, wet work is complete and dry, overhead work is complete and good lighting is available. Protect adjoining surfaces.

Conditioning

Conditioning of floor covering and subfloor: To AS 1884 (2021) clause 4.1 and manufacturer's recommendations.

Trial set-out

General: Prepare a trial tile and plank set-out to each area.

3.3 TESTING

Moisture content tests

General: Test substrate for suitability for the installation of resilient floor coverings to AS 1884 (2021) Appendix A.

- Maximum relative humidity of concrete: To AS 1884 (2021) Appendix A3.2.
- Moisture content of timber, plywood and particleboard subfloors: To AS 1884 (2021) Appendix A3.3.

Surface pH tests

General: Test concrete subfloor for suitability for the installation of resilient floor coverings to AS 1884 (2021) Appendix C.

- Maximum pH: 10.

3.4 INSTALLATION

General

Requirement: To AS 1884 (2021) Section 5 and the manufacturer's recommendations.

Change of finish

General: Maintain finished floor level across changes of floor finish including carpet.

Cleaning

General: Keep the surface clean as the work proceeds.

Edges

General: Make sure edges are firm, unchipped and machine-cut accurately to size and square to the face, and that edges are square to each other before installation.

Expansion joints

General: To the manufacturer's recommendations for joint widths, and area and length limitations.

Joints

Non-welded: Butt edges together to form tight neat joints showing no visible open seams.

Doorways: If changes of floor finish occur at doorways, locate the joint on the centreline of the door leaf in the closed position.

Junctions

General: Scribe neatly up to returns, edges, fixtures and fittings. Finish flush with adjoining surfaces.

Rolling

General: If rolling is required, roll the finish in multiple directions before the adhesive sets.

Sheet set-out

General: Set out sheets to give the minimum number of joints. Position joints away from areas of high stress. Run sheet joints parallel with the long sides of floor areas, vertically on non-horizontal surfaces.

Tile set-out

General: Set out tiles from centre of room. If possible, cut tiles at margins only to give a cut dimension of at least 100 mm x full tile width. Match edges and align patterns. Arrange the tiles so that any variation in appearance is minimised.

Plank set-out

General: Set out planks from centre of room. Align patterns, texture and grain in one direction.

3.5 TILING

Cork tiles

Laying: Provide a water-based latex adhesive. Do not use pins.

Finishing: Sand after laying.

Rubber tiles

General: Keep tiles flat during storage. Before laying, allow the tiles to relax and decompress, and make sure that the backs are free of loose material.

Laying: Lay tiles in stretcher bond. Match edges and align joints and studs. Make sure the whole surface of the tile or accessory is in contact with the substrate.

Stair finish: Provide as follows:

- Smallest tiles: Half tile.
- Nosing tiles: Purpose-made matching tread, nosing and riser tile. Accurately scribe, cut and fit to perimeters. Close butt seams.

Vinyl tiles and planks

Laying: Lay as follows:

- Loose lay: Interlock tongue and groove edges of rigid planks. Tap down with rubber mallet.
- Adhesive fix: Apply acrylic adhesive over whole subfloor surface.

3.6 SHEETING

Welded joints

Thermal welding: After fixing, groove the seams using a grooving tool and weld the joints with matching filler rod, using a hot air welding gun. When the weld rod has cooled, trim off flush.

Chemical welding: Apply seaming compound 100 mm wide to the substrate centrally under the seam. Roll the seam until the compound is forced up into the joint. Clean off flush with a damp cloth.

Epoxy jointing: Join seams with epoxy adhesive.

3.7 VINYL STAIR FINISH

General

Preformed: Provide purpose-made vinyl stair finish combining riser, nosing and tread in the one element. Lay each step consecutively with the joint at the bottom of each riser.

Formed in situ: Fit the sheet vinyl to each tread, and to the riser above, in one piece, coved in the angle. Accurately scribe, cut and fit to stair nosings and perimeters.

Stair and landing nosing

Installation: To the manufacturer's recommendations.

3.8 JOINTS AND ACCESSORIES

Accessories

General: Provide purpose-made matching moulded accessories for nosings, coves, skirtings, edge cover strips and finishes at junctions, margins and angles, if available. Otherwise, form accessories from the sheet material. Provide solid backing for radiused coves and nosings.

Control joints

Location: Provide control joints as follows:

- Over structural control joints.
- At junctions between different substrates.

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.

Control joint materials – sheet flooring

Proprietary slide plate divider strip: Provide interlocking metal plates grouted into pockets formed in the concrete joint edges to finish flush with the flooring surface.

Edge strips and threshold strips

Installation: To the NCC cited AS 1428.1 (2009) and the manufacturer's recommendations.

Vinyl skirting

Feather edge: Moulded PVC skirting section.

Flat skirting: Flat PVC skirting section.

Fixing: Scribe as necessary. Mitre corners. Fix to walls with contact adhesive.

Minimum height: 100 mm.

Rubber coved skirtings and margins

General: Form from smooth flat sheet matching the colour and total thickness of the rubber flooring. Scribe and mitre at internal corners.

External corners and stop ends: Provide purpose-made matching moulded pieces.

Coved skirtings

Site formed coving: Carry the flooring material up over a profiled coving section to form the skirting and mitre and weld all joints. Make sure the radius of the coving section conforms to the floor finish manufacturer's recommendations for sheeting material and thickness.

3.9 COMPLETION

Cleaning

General: Clean the finished surface. Buff and polish. Before the date for practical completion, mop and leave the finished surface clean and undamaged on completion.

Operation and maintenance manuals

General: Prepare a manual that includes manufacturer's recommendations for care and maintenance for each type of finish.

Protection

Finished floor surface: Keep traffic off floors for a minimum of 24 hours after laying or until bonding has set, whichever period is longer. Avoid contact with water for minimum 7 days after laying.

Reinstatement

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

Spare materials

General: Supply spare matching resilient finishes and accessories of each type for future replacement purposes. Store the spare materials on site where directed.

Quantity: At least 1% of the quantity installed.

4 SELECTIONS**4.1 PRODUCTS****Resilient flooring schedule**

	A	B	C
Type	Forbo	Forbo	
Product	Safestep P5/R12	Safestep P4/R11	
Form			
Colour and pattern	Smoke	Smoke	
Tile laying pattern			
Sheet width (mm)	1000	1000	
Thickness (mm)			
Vinyl chip size (mm)			
Surface	See data sheet	See data sheet	
Slip resistance classification	P5/R12	P4/R11	
Critical radiant flux	See data sheet	See data sheet 27000mm 75mm Cove	
Airborne sound insulation			
Impact sound insulation			
Tile dimensions (mm)	27000mm	27000mm	
Underlay			
Acoustic underlay (separate)	-		
Skirting	75mm Cove	75mm Cove	
Welded joints			
Finish			
Roll after laying			

0652 CARPETS

1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide textile floor coverings and underlays to subfloors, as documented, including the following areas:

Level 00 – Nolan UDA - Yutaka Plank "Shale" YU5211 250x1000mm Plank Tiles

- ENTRY/CIRCULATION,
- ADMIN
- 1ST AID
- MEETING
- STORE 1
- COMMS

Level 00 - Nolan UDA - Dust Control "COAL" DC1104 500x500mm carpet tiles

- (Entry Airlock)

Level 00 - Sports Hall Bleachers - Nolan UDA - reef "tornado" 2.0m x 25m ROLL

Company Website

<https://nolans.com.au/product/yutaka-plank/>

1.2 CROSS REFERENCES**General**

Requirement: Conform to the following:

- 0171 General requirements.

1.3 INTERPRETATION**Abbreviations**

General: For the purposes of this worksection, the following abbreviations apply:

- ACCS: Australian Carpet Classification Scheme.
- CIAL: Carpet Institute of Australia Limited.
- ECS: Environmental Certification Scheme.
- IRA: Insect Resist Agent.

Definitions

General: For the purposes of this worksection, the definitions given in AS 2454 (2007), AS 2455.1 (2019) and AS 2455.2 (2019) apply.

1.4 TOLERANCES**General**

Requirement: To AS/NZS 1385 (2007).

1.5 SUBMISSIONS**Fire performance**

Fire hazard properties: Submit evidence of conformity to **FIRE PERFORMANCE, Fire hazard properties.**

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION, Operation and maintenance manuals.**

Products and materials

Manufacturer's documentation: Submit copies of the following data:

- Product data sheets.

Type tests: Submit test results of the following:

- Carpet properties: To PRODUCTS, **TESTS**.
- Slip resistance: To PRODUCTS, **TESTS**, **Slip resistance**.

Samples

Requirement: Submit samples to PRODUCTS, **GENERAL**, **Samples**.

Shop drawings

General: Submit a floor covering plan to a scale that best describes the detail, including underlay, set-out point, location of joints and conformance to AS 2455.1 (2019) clauses 2.2.2 and 2.2.3.

Subcontractors

General: Submit name and contact details of proposed suppliers and installers.

Substrate acceptance

Requirement: Submit evidence of installer's acceptance of the substrate before starting installation.

Tests

Site tests: Submit results, as follows:

- Substrate moisture content test.
- Substrate alkalinity test.

Warranties

Requirement: Submit warranties to **COMPLETION**, **Warranties**.

1.6 INSPECTION

Notice

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

- Each batch of material upon delivery.
- Substrate immediately before fixing underlay.
- Trial set-out before execution.
- Fixings, edge strips and underlay installed ready to lay carpet.
- Completed carpet after cleaning and before covering for protection.

2 PRODUCTS

2.1 GENERAL

Samples

Requirement: Provide labelled production run samples demonstrating the range of colour, pattern, texture and pile yarn available in each documented carpet type.

Sample size: Provide the following:

- Carpet: Manufacturer's standard swatch.
- Carpet tiles: 4 x tile size.
- Edge strip, trim, extrusions and stair and landing nosings: 300 mm length of each type.
- Underlay: One labelled sample at least 600 x 600 mm.
- Stitched seam: One sample, minimum 1000 mm length.

Penetrations: Provide one production carpet sample with a penetration access cut as documented in EXECUTION, **INSTALLATION - CARPET**.

Storage and handling

Requirement: Store on a flat, clean, dry, well ventilated and secure storage area, elevated above the subfloor and unaffected by weather.

2.2 FIRE PERFORMANCE

Fire hazard properties

Critical radiant flux: Tested to AS ISO 9239.1 (2003).

2.3 CARPET

Batching

Requirement: Carpet from one manufacturing batch and dye lot.

Insect resistance

Requirement: Carpets and underlays comprising materials either inherently resistant to insect attack or treated against insect attack by moth and carpet beetle, by application of insect resist agents (IRA) to the wool and wool blend yarns during wet processing at the manufacturing stage.

Insect resist treatment of wool: Application Level 4 to the recommendations of Woolmark Specification CP-4 (2016).

Electrostatic propensity

Maximum electrostatic propensity value: 2500 V at a relative humidity of 25% tested to AATCC TM 134 (2019).

Stain and soil resistance

Requirement: Colourless acid-based dye stain blocker applied to dyed fibres.

Total VOC

Total VOC emission tested to ISO 10580 (2010): < 0.5 mg/m²/h.

2.4 MODULAR CARPET TILES**General**

Type: Non-stick, non-curling carpet tiles capable of being taken up without damage and then re-laid in different positions.

Marking: On the back, showing manufacturer's instructions or directional arrow for laying.

Tolerances

Requirement: Conform to the following:

- Dimensional tolerance: 0.2%.
- Squareness: Maximum difference of 2 mm between lengths of diagonals.

Sustainable carpet tile backing

Re-usable backing: Proprietary vinyl backing to carpet tiles capable of separation and recycling in new carpet tiles.

2.5 RECESSED MATS**General**

Requirement: Provide mats made to fit each designated mat recess, as documented.

Linked metal mats

Type: Proprietary hinged extruded aluminium slatted mat with capability of accepting different types of inserts.

Frames: If the mat is recessed, provide frames to match the mat material and finish.

2.6 UNDERLAYS**Application**

Performance: To AS 2455.1 (2019) clause 1.5.2.

Cementitious

General: Polymer modified cementitious smoothing and self-levelling compound.

Thickness: 3 mm minimum.

Fibre cement hard underlay

Standard: To AS/NZS 2908.2 (2000).

Thickness: 5 mm minimum.

Dry process fibreboard (MDF) hard underlay

Standard: To AS/NZS 1859.2 (2017).

Classification: Moisture resistant (MR) Medium density fibreboard (MDF).

Thickness: 5.5 mm.

Wet process fibreboard (hardboard) underlay

Standard: To AS/NZS 1859.4 (2018).

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

Thickness: 5.5 mm.

Soft underlay

Standard: To AS 4288 (2003).

2.7 OTHER MATERIALS**Adhesives**

General: Compatible with the floor covering material, and suitable for bonding it to the subfloor to AS 2455.1 (2019) clause 1.5.3.

Friction compound: Suitable for holding carpet tiles in position without permanent sticking.

Hot-melt adhesive tapes

General: Commercial grade glass fibre and cotton thermoplastic adhesive-coated tape 60 mm wide on a 90 mm wide metal foil base and backed with silicone-coated release paper.

Preformed carpet grippers

General: Architectural plywood carpet grippers with 3 rows of corrosion-resistant angled pins of length appropriate to the carpet type to AS 2455.1 (2019) clause 1.5.4.

Size (minimum): 33 mm wide x 7 mm thick.

Location: At edges, except where edge strips are used. Provide double grippers to edges where recommended by the manufacturer.

Edge strips and threshold strips

General: Heavy duty metal moulding or extruded edge strip appropriate to the floor covering type and if required, capable of accommodating varying levels of adjacent floor finishes.

Type: As documented.

Stair and landing nosing strips

Standard: To BCA (2022) D3D14 and BCA (2022) D3D15.

Type: As documented.

Tactile ground surface indicators

Standard: To AS/NZS 1428.4.1 (2009).

Type: As documented.

2.8 TESTS**Slip resistance**

Standard: To AS 4586 (2013).

Textile floor coverings

Requirement: Arrange for sampling and testing of carpet as documented.

Sampling: To AS/NZS 2119 (1997).

Testing: Perform the documented number of tests for each test group (T, S or Q) as follows:

- For each type of carpet documented.
- For each documented area (or part) of installed carpet.

Number of carpet tests table

Test group type	Definition	Number of tests	Per installed area
Type test (T)	Tests on samples of carpet having the same specification, but not necessarily from carpet manufactured for the project. Authenticated test reports less than 12 months old are acceptable.	One	Not applicable
Specification test (S)	Tests on samples taken before laying from carpet manufactured for the project.	One	Each 5000 m ²
Quality assurance test (Q)	Tests on samples taken from the site during	Three	Each 5000 m ²

Test group type	Definition	Number of tests	Per installed area
	laying or from the manufacturer's premises before dispatch to the site.		

Carpet tests table

Carpet property	Test method	Test group
Colourfastness: To artificial light	AS 2001.4.21 (2006)	T S Q
Colourfastness: To water	AS 2001.4.E01 (2001)	T S
Colourfastness: To rubbing	AS/NZS 2111.19.1 (1996)	T S
Colourfastness: To shampoo solution	AS/NZS 2111.19.2 (1996)	T S Q
Colourfastness: To solvents	AS 2001.4.16 (1981)	T S
Treatment: Insect resistance	AS 2001.6.1 (1980)	S
Dichloromethane extractable matter of pile	AS 2001.3.4 (1995)	S Q
Pile structure: Total pile mass (g/m ²)	AS/NZS 2111.11 (1996)	S
Pile structure: Pile length above substrate (mm)	AS/NZS 2111.6 (1996)	S
Pile structure: Surface pile mass above substrate (g/m ²)	AS/NZS 2111.4 (1996)	S Q
Pile structure: Pile thickness above substrate (mm)	AS/NZS 2111.5 (1996)	S
Pile structure: Tuft density (tufts/100 mm)	AS/NZS 2111.9 (1996)	S
Pile structure: Tuft withdrawal force (N)	AS/NZS 2111.15 (1996)	S Q
Burning behaviour	AS/NZS 2111.18 (1997)	T
Bond strength between backing components (N)	AS/NZS 2111.16 (1996)	S Q
Electrostatic protection: Electrostatic propensity	AATCC TM 134 (2019)	S
Soft underlay property: Mass per unit area	AS/NZS 2111.3 (1996)	Q
Soft underlay property: Fibre content	AS 2001.7 (2005)	Q
Soft underlay property: Performance	AS 4288 (2003)	T
Soft underlay property: Thickness	BS 4051 (1987)	Q
Soft underlay property: Thickness deviation	AS 4288 (2003)	Q
Soft underlay property: Extractable matter	AS 2001.3.4 (1995)	Q
Tile dimensions	BS 5921 (1980)	S Q
Pile yarn construction: Yarn count	AS 2001.2.23 (1990)	S
Pile yarn construction: Twist level	AS 2001.2.14 (1987)	S

3 EXECUTION

3.1 PREPARATION

General

Pre-installation requirements: To AS 2455.1 (2019) Section 2.

- Modular carpet tiles: Pre-laying requirements including access panel floors to AS 2455.2 (2019) clause 4.

Working environment: Do not start work before the building is enclosed, wet work is complete and dry, overhead work is complete and good lighting is available.

Protection: Protect adjoining surfaces.

Substrate

General: Conform to the following:

- To AS 2455.1 (2019) or AS 2455.2 (2019), as appropriate.
- Clean and free of any deposit or finish that may impair adhesion or location and functioning of control joints.
- Free of any imperfections, including ridges, indentations and projections that may adversely affect the installed carpet.

Concrete substrate rectification: Remove projections, grind as necessary and fill voids and hollows with a levelling compound compatible with the adhesive to achieve the required tolerance.

Timber substrate rectification: Remove projections. If conformance with the **Substrate tolerance table** cannot be achieved, fix a hard underlay in brick pattern. Make sure joints do not coincide with substrate joints.

Moisture content and alkalinity of concrete substrate: Do not start installation until the moisture content and alkalinity of the concrete substrate has been tested to **TESTING, Substrate tests** and conforms to the values in AS 2455.1 (2019) Appendix B.

Moisture content of timber, plywood or particleboard substrate: Do not start installation until the moisture content of the substrate has been tested to **TESTING, Substrate tests** and conforms to the values as follow:

- Air conditioned buildings: 8 to 10%.
- Intermittently heated buildings: 10 to 12.5%.
- Unheated buildings: 12 to 15%.

Fixtures: Remove door stops and other fixtures. Refix in position undamaged on completion of the installation. Make sure fixings penetrate substrate and are stable.

Substrate tolerance table

Property	Length of straightedge laid in any direction (mm)	Maximum deviation under the straightedge (mm)
Planeness	2000	4
Smoothness	150	1

Conditioning

General: Stabilise the room temperature for seven days before, and two days after laying carpet as follows:

- Areas with air conditioning installed: Run air conditioning at operational temperature.
- Air-conditioned areas not operational: Maintain a room temperature range between 10°C and 35°C.
- Underfloor heating: Turn off heating and allow substrate to stabilise at the temperature recommended by the carpet manufacturer.
- Non-air-conditioned areas: Install at room temperature between 10°C and 35°C.

Carpet: Cut to length and lay in position, 24 hours before installation.

Carpet tiles: Unpack tiles at least 48 hours before installation.

Hardboard underlay: Expose both faces of each sheet for more than 24 hours before fixing.

Soft underlay: Unroll the carpet and allow to come to the temperature of the in-service environment before laying.

Trial set-out

General: Prepare a trial set-out of each type of carpet with underlay, minimum 10 m², including accessories and 3000 mm of typical seam.

3.2 TESTING**Substrate tests**

Moisture content and alkalinity of concrete substrate: Test substrate to AS 2455.1 (2019) Appendix B.

Moisture content of timber, plywood or particleboard substrate: Test substrate to AS/NZS 1080.1 (2012) for timber and particleboard or AS/NZS 2098.1 (2006) for plywood.

3.3 INSTALLATION - CARPET**General**

Requirement: To AS 2455.1 (2019) Section 3 and the manufacturer's recommendations.

Batching

Requirement: In a single area and for each documented type, quality, or colour, use carpet from one manufacturing batch and dye lot.

Setting out

Joints in underlay: Make sure joints in underlay do not coincide with carpet joints. Do not carry underlay over carpet grippers or edge strips.

Partition layout: Confirm that permanent partitions have been installed before starting carpet laying.

Seaming methods

Woven carpet: Machine or hand sew. Do not provide glued taped seams unless selvages are woven to suit and recommended by manufacturer.

Tufted carpet: Seam with hot-melt adhesive tape.

Seam sealing: Apply appropriate seam sealer to each cut edge.

Cutting laid carpet

Method: If penetrations through laid carpet are necessary for electrical, telephone or other outlets, cut the carpet either by cross cutting or by cutting rectangular or circular openings.

Cutting holes in concrete floors: Protect the carpet and remove concrete particles and dust on completion. Replace the cut carpet over the opening without any signs of fraying or other damage, and fix with a peel-up adhesive, or resew.

Edge strips and threshold strips

Installation: To the NCC cited AS 1428.1 (2009) and the manufacturer's recommendations.

Location: At exposed edges of the carpet, and at junctions with differing floor finishes or finishes of a different thickness. If edge strips occur at doorways, locate the junctions directly below the closed door.

3.4 INSTALLATION - CARPET TILES**General**

Installation: To AS 2455.2 (2019) and the manufacturer's recommendations.

3.5 CARPETED SKIRTINGS**General**

Laying: Fix skirting carpet to the wall, and neatly terminate the top edge.

3.6 STAIRS AND LANDINGS**Installation**

General: To AS 2455.1 (2019) clause 3.10.

Concrete stairs

Fixing: Adhesive method.

Laying method: Apply the floor covering continuously to the treads and risers.

Timber stairs

Closed risers:

- Fixing: Tackless method, with a gripper strip in each angle between treads and risers.
- Laying: Apply the floor covering continuously to the treads and risers.

Open risers:

- Fixing: Adhesive.
- Laying: Wrap the carpet around the tread and neatly butt join beneath the nosing if a separate nosing is required, or if not, in the centre of the underside of the tread.

Stair and landing nosing strips

Installation: To the manufacturer's recommendations.

3.7 COMPLETION

Spares

Spare material: Supply spare matching materials of each type, colour and design of carpet from the same batch for future replacement purposes. Store the spare materials on site where directed.

Offcuts: Retain carpet offcuts exceeding 0.5 m² in area and 450 mm in both length and width.

Labelling: Label spare and offcut material appropriately, including the location of the laid area corresponding to each batch. Securely and separately package each batch in a suitable wrapping.

Quantity of spare material: At least 1% of the quantity installed, in full or part length rolls.

Cleaning

Requirement: Progressively clean the work. Remove waste, excess materials and adhesive.

Final cleaning: When the installation is complete, clean the carpet as necessary to remove extraneous matter, marks and soiling and to lift the pile where appropriate.

Protection

Requirement: Provide fabric drop sheets. Do not use plastic sheeting. If wheeled traffic is to follow carpet installation, protect with hardboard sheets butted and fixed with adhesive tape.

Operation and maintenance manuals

Requirement: Prepare a manual that includes the following:

- A technical specification of the carpet installation.
- The manufacturer's recommendations for use, care and maintenance of the carpet to AS/NZS 3733 (2018).
- The names and address of the supplier and manufacturer of each component.

4 SELECTIONS

4.1 PRODUCTS

- CPT-01 - Carpet - Nolan UDA - Yutaka Plank "Shale" YU5211 250x1000mm Plank Tiles (Entry/Circulation)
- CPT-02 - Carpet - Nolan UDA - Dust Control "COAL" DC1104 500x500mm carpet tiles (Entry Airlock)
- CPT-03 - Carpet For sports hall bleachers - Nolan UDA - reef "tornado" 2.0m x 25m ROLL

0655 TIMBER FLOORING

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide timber strip and parquet flooring systems to subfloors, as documented.

Sports Hall – Timber Sports Floor

1.2 COMPANY CONTACTS

Australian Sports Floors (ASF) technical contacts

Website: <https://www.asfloors.com/products/performance-rated-systems/>

Performance

Requirements:

- Securely fixed.
- Smooth and flat, suitable for intended use.
- Pattern as documented.
- Structurally adequate.
- Able to accommodate expected shrinkage or expansion.
- Suitable for the applied finish.

1.3 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.
- 0656 Floor sanding and finishing.

1.4 STANDARD

General

Timber flooring: To the recommendations of Australasian Timber Flooring Association (ATFA) *Solid timber flooring industry standard (2022)*.

1.5 INTERPRETATION

Abbreviations

General: For the purposes of this worksection, the following abbreviation applies:

- MDF: Medium density fibreboard.
- RH: Relative humidity.

Definitions

General: For the purposes of this worksection the definitions in the AS 1684 series, the AS 1860 series and the following apply:

- Acoustic underlay: A resilient material laid between the subfloor and the flooring material to provide sound isolation.
- Butt joints (flooring): Floor boards cross cut square with plain ends for joining over battens or joists.
- End-matched joints (flooring and decking): Floor boards tongue and grooved at the ends to allow jointing between supports.
- Feature: The grade will determine the level of feature present. Natural characteristics of the wood including gum veins, past borer activity and knots present in the flooring.
- Flooring - continuously-supported: Flooring that is supported by, and directly fixed to, continuous structural supporting surfaces, including concrete slabs and sheet flooring subfloors.
- Flooring - fitted: Flooring fitted between the walls of each room i.e. not platform floors.
- Flooring - intermittently-supported: Flooring that is supported by, and spans across joists or battens.

- Flooring - strip flooring: Flooring made from machined timber with tongues and grooves along the length of the strips.
- Grade: The grade is an indication of the number and size of features in the flooring.
- Moisture content: The percentage by mass of water present in the material.
- Parquet: Timber mosaic parquet panels or wood block parquet bonded to a subfloor either directly or over an underlay, as follows:
 - . Mosaic parquet panels: Pre-assembled timber finger modules held together to form tiles or panels.
 - . Wood block parquet: Rectangular blocks of timber with length a multiple of width (e.g. 260 x 65 mm, 300 x 60 mm and 400 x 80 mm) laid individually to produce a pattern.
- Subfloor: The structure that supports the flooring.
- Underlay: A non-structural layer of rubber, cork, plywood or in situ levelling compound to provide a smooth and flat surface for flooring installation. Rubber and cork underlays have acoustic sound absorbing properties.

1.6 SUBMISSIONS

Certification

Requirement: Submit one of the following, as evidence of conformity to documented requirements for grading, species and board size:

- Supplier's certificate, which may be included on an invoice, delivery docket or packet label.
- Report by an independent inspecting authority.

Moisture content: Submit documentation noting manufactured moisture content of timber flooring products.

Fire performance

Fire hazard properties: Submit evidence of conformity to **FIRE PERFORMANCE, Fire hazard properties**.

Samples

Requirement: Submit samples to PRODUCTS, **GENERAL, Samples**.

Tests

Site tests: Submit results, as follows:

- Subfloor moisture content test.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties**.

1.7 INSPECTION

Notice

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

- Subfloor and any subfloor space before installation of flooring material.
- Trial set-out of parquet flooring before execution.
- Flooring material on site, before installation.
- Control and expansion joints, after installation.
- Perimeter expansion allowance, before concealing.
- Completed installation before sanding and application of finishing coatings.

2 PRODUCTS

2.1 GENERAL

Samples

Requirement: Provide samples representative of the timber flooring being supplied, illustrating the range of variation in colour, grade features and figure.

Storage and handling

General: Deliver timber flooring to site in unbroken plastic wrapping or packs. Store in dry conditions equivalent to those suitable for the installation of the floor, preferably in the installation location, a

minimum 100 mm above the subfloor, to the supplier or manufacturer's recommendations. Do not store in areas of wet plaster or paint.

Adhesive

Requirement: A flooring adhesive (polyurethane or polymer) to the flooring manufacturer's recommendations, compatible with the subfloor, underlay and documented flooring.

Adhesive fixed flooring acoustic underlay

General: Provide proprietary acoustic underlay, if required, compatible with the subfloor, any levelling compound and the documented flooring, fixed to subfloor with compatible adhesive.

Levelling compound

General: Self-smoothing levelling compound applied to subfloor, compatible with the subfloor, any underlay and the documented flooring, including any adhesive.

Slab moisture vapour barrier protection

Applied barrier: Provide a moisture vapour retarding barrier applied to the subfloor surface, compatible with the subfloor, adhesive, any levelling compound and the documented flooring.

Polyethylene barrier: 200 µm high-impact resistant polyethylene film.

2.2 FIRE PERFORMANCE

Fire hazard properties

Critical radiant flux: Tested to AS ISO 9239.1 (2003).

2.3 SHEET SUBFLOOR

Plywood

Standard: To AS/NZS 2269.0 (2012).

Formaldehyde emission class to AS/NZS 2269.0 (2012): Class E₁.

Surface grade: CD.

Bond: Type A to AS/NZS 2754.1 (2016).

Particleboard

Particleboard: To AS/NZS 1860.1 (2017), Class 1.

Formaldehyde emission class to AS/NZS 1860.1 (2017): Class E₁.

2.4 STRIP AND PARQUET FLOORING

New hardwood

Standard: To AS 2796.1 (1999).

Grading: To AS 2796.2 (2006).

**ASF HORNER – PR1 SYSTEM – TIMBER SPECIES = HEVEA
INCLUDE VENTILATED SKIRTING BOARD SYSTEM.**

New softwood

Standard:

- Seasoned cypress pine: To AS 1810 (1995).
 - . Grade: 1.
- Softwood – pinus ssp: To AS 4785.2 (2002).
 - . Grade: Appearance.
- Softwood – other: To AS 4785.2 (2002).
 - . Grade: Select.

Recycled timber

Standard: To FWPA PN06.1039 (2008).

- Product requirements: To Section 3.
- Grading: To Section 5.1.

2.5 OTHER MATERIALS

Cork and filler

Requirement: Provide cork and filler compatible with, and matching, the documented flooring.

3 EXECUTION

3.1 GENERAL

Floor sanding and finishing

Requirement: To 0656 *Floor sanding and finishing*.

3.2 PREPARATION

Clean subfloor

Requirement: Before installation remove loose material and dust and any deposits or existing finishes from the subfloor that may impair adhesive performance or floor performance.

Floors over enclosed subfloor spaces

Requirement: Make sure the ground beneath is dry and remains dry after floor installation. If dry conditions cannot be achieved and maintained, provide one or more of the following:

- Sealed drainage systems beneath and at the perimeter of the building.
- Soil membranes beneath the building, such as 200 µm builders plastic.

Subfloor flatness

Flatness of concrete subfloor:

- Floors laid on plywood or battens: Not greater than 3 mm deviation of the surface under a 1.5 m straightedge laid in any direction.
- Floors laid by direct adhesive fix: Not greater than 3 mm deviation of the surface under a 3 m straightedge laid in any direction.

Flatness of joist and sheet flooring subfloor:

- Not greater than 3 mm deviation of the surface under a 1.5 m straightedge laid in any direction.

Subfloor preparation

Concrete subfloors: Remove excessive projections by abrasion or grinding. Fill hollows and depressions with a levelling compound. Feather the levelling compound at all edges to make sure that any primer used beneath the levelling compound has been covered (or removed), before flooring installation.

Plywood and particleboard subfloors: Rough sand particleboard subfloors to remove the wax surface layer. Clean plywood subfloors may only need sheet joints sanded. Make sure that the subfloor is soundly fixed and free of squeaks.

Existing timber flooring subfloors: Sand to a flat and smooth surface. Make sure that the subfloor is sound, soundly fixed and free of squeaks.

Subfloor moisture content

Concrete subfloor: Test the in-slab relative humidity of the concrete slab to **TESTING, Subfloor moisture tests**. If 80 to 90% RH, provide slab moisture vapour barrier protection. If above 90% RH, the suitability of the slab needs further consideration and special precautions are required. Do not start installation of the flooring until testing is complete.

Timber, plywood or particleboard flooring subfloors: Do not start installation of the flooring until the moisture content of the subfloor, tested to **TESTING, Subfloor moisture tests**, is within 2% of the expected average in-service moisture content of the floor.

Timber flooring: Confirm that the moisture content of the timber flooring, as delivered, is within the range set by the manufacturer.

Acclimatisation

Requirement: If the moisture content of the supplied flooring differs significantly from its expected in-service moisture content, acclimatise or provide extra provision for expansion.

3.3 TESTING

Subfloor moisture tests

Moisture content of concrete subfloor - In-slab relative humidity test: Test subfloor in-slab relative humidity to ASTM F2170 (2019). Perform three tests for the first 100 m² of subfloor area and an additional test for each additional 100 m².

Moisture content of concrete subfloor - Impedance meter test: If in-slab relative humidity testing is not possible, test by impedance meter.

Moisture content of timber, plywood and particleboard subfloors: Test subfloors to AS/NZS 2098.1 (2006) for plywood and AS/NZS 1080.1 (2012) for timber and particleboard.

3.4 FIXING SHEET SUBFLOORS

Plywood subfloor adhesive fixed on concrete slabs

Vapour barrier: Provide a liquid applied moisture vapour barrier compatible with the adhesive system, as documented.

Subfloor sheet layout: Fix sheets in a stretcher bond or at 45° to the floor board direction.

Adhesive fix: Apply adhesive with a notched trowel to the adhesive manufacturer's recommendations. Provide downward pressure during curing.

Control joints: Provide joint widths as follows:

- Against vertical building elements: 10 mm.
- Between sheets: 6 mm.

Plywood subfloor mechanically fixed on concrete slabs

Vapour barrier: As documented.

Subfloor sheet layout: Fix sheets in a stretcher bond or at 45° to the floor board direction.

Mechanical fixing: Provide fixings as follows:

- 15 mm thick plywood: 4 rows of 5 fixings down the sheet length, minimum 75 mm from edges. Use spike fixings. Do not use nylon sleeve anchors.
- 12 mm thick plywood: 4 rows of 7 fixings down the sheet length, minimum 75 mm from edges. Use spike fixings. Do not use nylon sleeve anchors.

Control joints: Provide joint widths as follows:

- Against vertical building elements: 10 mm.
- Between sheets: Loosely butt sheets together.

Sheet subfloor fixed on joists

Installation: Lay the length of the sheets at right angles to the supports so that their top surfaces are aligned. Stagger the end joints and locate them centrally over joists. If sheets are not tongue and grooved, provide noggings or trimmer joists to support the edges.

Fixing centres: To the AS 1684 series or to the sheet manufacturer's recommendations.

Particleboard and plywood sheet flooring:

- Timber joists and battens: Adhesive and mechanically fix.
- Steel joists: Fix with adhesive and countersunk self-drilling winged screws.

3.5 FIXING TIMBER FLOORING

Battens for strip flooring on concrete slabs

General: Make sure support members align over the full width of the floor.

Framing fixed direct: Fix seasoned battens to the concrete slab so that their top surfaces are aligned.

- Battens: 70 x 35 mm (minimum) seasoned timber or 60 x 19 mm (minimum) seasoned high density hardwood.
- Spacing of fasteners: Less than 900 mm with spike fixings. Do not use nylon sleeve anchors.

Vapour barrier under battens: 200 µm high-impact resistant polyethylene film. Lap 300 mm, seal the laps with water resistant plastic tape and return up the vertical surfaces and trim at the level of the flooring.

Battens for strip flooring on steel joists

General: Fix seasoned battens along the steel joists with countersunk screws so that their top surfaces are aligned.

- Batten size: Minimum 35 mm thick.
- Spacing of fasteners: < 600 mm.

Span table for strip flooring on battens or joists

Strip flooring timber (average)	Standard	Grade	Flooring thickness (mm)	Acceptable batten/joist spacings (mm)	Maximum board span (mm)

species density)				Butt jointed	End matched	Butt jointed	End matched
Australian hardwood	AS 2796.1 (1999)	Select	19	450 or 600	450	630	500
		Medium feature - Standard	19	450	450	570	450
Cypress	AS 1810 (1995)	Grade 1	19	450	450	510	410
		Grade 2	20	450	450	510	410
Softwood: Slash pine	AS 4785.1 (2002)	Select and standard	19	450	450	510	410
Softwood: Other pinus species		Select and standard	19	450	350	470	350
Softwood: Araucaria (Hoop pine)		Manufacturer grade	20	450	450	510	410
Minimum board length: Equivalent length of two joist spacings. Angled board span: Not to exceed the maximum board span nominated. Decrease batten spacings to account for increased length of angled boards.							

Room environment

Requirement: Make sure the internal environment at the time of laying is to be suitable for installation to the manufacturer's recommendations, and as follows:

- Building enclosed and weathertight.
- Intense sunlight screened.
- Wet trades complete.
- Conditions close to the expected average in-service conditions.

Control joints

Requirement: To the manufacturer's recommendations or as follows if undocumented:

- Perimeters: Provide 10 mm wide expansion joints against vertical building elements.
- Strip flooring (and parquetry if block edges are parallel): For floors greater than 6000 mm (measured perpendicular to the run of the boards), provide for intermediate expansion using one of the following methods:
 - Regular spaced gaps: Provide a gap of 1.5 mm every 800 mm.
 - Intermediate expansion joints: Provide 12 mm wide cork filled expansion joints at maximum widths of 6000 mm. Install cork 2 mm proud of floor surface and sand flat with the floor.
- Fixing: Provide adhesive fixing in addition to mechanical fixing with staples, nails or cleats.

Parquet flooring: If joints are required, locate in inconspicuous locations. Cut a 12 mm wide full depth joint and fill with cork.

Strip flooring

General: Blend floor boards to make sure of a relatively even distribution of the colour range and grade features throughout the floor.

Set-out: Locate joints in boards so that they are evenly distributed as follows:

- General: Not stepped, clustered or aligned and at least 300 mm apart.
- Butt joints: Centrally on supports.
- End-matched joints: Not adjacent within the same span between joist/battens.
- Minimum number of spans across supports: 2.

Installation: Lay in straight and parallel lines with each board firmly butted to the next and firmly in contact with the subfloor. If laid over joists or battens cramp as required to bring the boards tight at edges.

Strip flooring mechanically fixed to sheet subfloor:

- To plywood or particleboard on joists or battens: Nail through sheeting to joists or battens or secret fix into sheeting only.
- To plywood or particleboard over concrete slab: Secret fix only, as follows:
 - Boards up to 85 mm wide: Mechanically fix at up to 450 mm spacing over either a full trowel bed of flooring adhesive or with beads of adhesive, 6 to 10 mm, in a zigzag pattern placed midway between and at fixing points.
 - Boards over 85 mm wide: Mechanically fix at up to 450 mm spacing over a full trowel bed of flooring adhesive and in compliance to flooring manufacturer's recommendations.

Strip flooring direct mechanically fixed to joists: To the AS 1684 series and as follows:

- Boards up to 135 mm wide: Top nail or secretly fix.
- Boards over 135 mm wide: Top nail to joists.
- Top nailing boards 80 to 135 mm wide: Fix with 2 nails at each joist crossing. Punch nails 3 mm below finished surfaces.
- Top nailing boards over 135 mm wide: Fix with 3 nails at each joist crossing. Punch nails 3 mm below finished surfaces.
- Plain end flooring: If nails are less than 12 mm from ends of boards, predrill nail holes 0.8 mm undersize.
- Secret fixing: Fix with one staple or cleat at each joist crossing, angled at 45° through the base of the tongue.
- Adhesive: Use a 6 to 10 mm bead of polyurethane adhesive along each joist for both secret fixing and top nailing.

Strip flooring direct mechanically fixed to battens:

- Boards up to 135 mm: Top nail or secretly fix.
- Boards over 135 mm wide: Top nail to minimum 35 mm thick seasoned battens.
- Top nailing boards 80 to 135 mm wide: Fix with 2 nails at each batten crossing. Punch nails 3 mm below finished surfaces.
- Top nailing boards over 135 mm wide: Fix with 3 nails at each batten crossing. Punch nails 3 mm below finished surfaces.
- Plain end flooring: If nails are less than 12 mm from ends of boards, predrill nail holes 0.8 mm undersize.
- Secret fixing: Fix with one staple or cleat at each batten crossing, angled at 45° through the base of the tongue.
- Adhesive: Use a 6 to 10 mm bead of polyurethane adhesive along each batten for both secret fixing and top nailing.

Parquet

Vapour barrier under adhesive fixed flooring: A liquid applied membrane compatible with the adhesive system.

Trial set-out: Prepare a trial block parquet or mosaic panel set-out to:

- Demonstrate arrangement for more complex patterns.
- Maximise the size of equal margins of cut parquet blocks or panels.
- Locate control joints. Provide control joints where all blocks run parallel to each other and for large or more complex floors.

Laying method: To the flooring manufacturer's recommendations.

Performance: Spread adhesive and lay blocks or panels to achieve the following:

- Lay in documented pattern.
- Blend blocks for colour and feature.
- Use a full trowel bed of flooring adhesive over the subfloor in conformance with the adhesive manufacturer's recommendations.
- Make sure contact between adhesive and subfloor to address possible hollow sounds.
- If laying over acoustic underlays, make sure the correct firmer underlay is used to prevent movement at board edges after completion.

- If laying over a less stable subfloor (e.g. solid timber direct to joists), provide a 6 mm plywood underlay. Fix with adhesive beads at 100 mm intervals, staples at 75 mm around sheet perimeter, 12 mm in from edges and at 100 mm intervals through the body of the sheets.

3.6 COMPLETION

Protection

General: Provide protection as follows:

- Floors: With MDF taped at all butt joints. Do not cover with sheet plastic.
- Stair treads: Full MDF or plywood casing.

Spare flooring products

General: Supply an extra 5% of flooring products, to be stored on site as spares.

0671P DULUX PAINTING

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide DuluxGroup/Dulux coating systems to substrates, as documented.

Performance

Requirement:

- Consistent in colour, gloss level, texture and dry film thickness.
- Free of runs, sags, blisters or other discontinuities.
- Opaque paint finishes that are fully opaque or at the documented level of opacity.
- 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 COMPANY CONTACTS

DuluxGroup/Dulux technical contacts

Architects and Specifiers' Hotline (Paint, Acratex, Protective Coatings): 13 23 77.

Powder Coatings Technical Advice Hotline: 13 24 99.

Website: www.dulux.com.au/contact-us

<https://files.duspecplus.com.au/public/pdf/specification/0a3fe313-33b0-ec11-983f-002248d3b22c?sv=2020-08-04&se=2025-07-02T04%3A04%3A19Z&sr=b&sp=r&sig=JA1tVJ59CsoqUNMtnY0WbONcr%2FtqBH3KKQJthdpRwWo%3D>

1.3 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

1.4 STANDARDS

Painting

General: To the recommendations of those parts of AS/NZS 2311 (2017) referenced in this worksection.

1.5 MANUFACTURER'S DOCUMENTS

Technical manuals

Product Guide: www.dulux.com.au/specifier/products

Duspec Product Data Sheets, SDS, paint system selection: www.duluxconstructionsolutions.com.au

1.6 INTERPRETATION

Abbreviations

General: For the purposes of this worksection, the following abbreviations apply:

- ASU: Acrylic sealer undercoat multipurpose combo product.
- DFT: Dry film thickness.
- OFC: Off form concrete.
- PDS: Product data sheet.
- PRN: Paint reference number.
- PSU: Primer sealer undercoat multipurpose combo product.

Definitions

General: For the purposes of this worksection, the definitions given in AS/NZS 2310 (2002) and the following apply:

- Gloss unit: Numerical value for the amount of specular reflection relative to that of a standard surface under the same geometric conditions.
- Levels of gloss finish: When the specular direction is 60 degrees, surfaces with the following specular gloss reading are defined as follows:
 - . Full gloss: > 85 gloss units.
 - . Gloss: > 50 and ≤ 85 gloss units.
 - . Semi-gloss (satin): > 20 and ≤ 50 gloss units.
 - . Low gloss (low sheen): > 5 and ≤ 20 gloss units.
- Matt: > 3 and ≤ 7 gloss units.
 - . Flat: ≤ 5 gloss units.
- Paint: A product in liquid form that, when applied to a surface, forms a dry film having protective, decorative or other specific technical properties.
- Primer, prime coat: The first coat of a coating system that helps bind subsequent coats to the substrate and which may inhibit its deterioration.
- Substrate: The surface to which a material or product is applied.
- Undercoat: An intermediate coat formulated to prepare a primed surface or other prepared surface for the finishing coat.

1.7 SUBMISSIONS**Products and materials**

General: Dulux coatings systems have been selected for this project. Submit the following at least 3 weeks before the paint is required:

- Paint brand name and product range quality statement.
- Safety data sheets (SDS) showing the health and safety precautions to be taken during application.
- The published recommendations for maintenance.

Samples

Requirement: Submit samples to PRODUCTS, **GENERAL, Samples**.

Subcontractors

Specialist applicators: Submit names and contact details of proposed specialist applicators.

Substrate acceptance

Requirement: Submit evidence of the applicator's acceptance of the substrate before starting application.

Warranties

Requirement: Before the application of the paint system, submit proposed warranties to PRODUCTS, **GENERAL, Warranties**.

1.8 INSPECTION**Notice**

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

- Opaque paint finishes:
 - . After surface preparation.
 - . After application of final coat.
- Clear finishes:
 - . Before surface preparation of timber.
 - . After surface preparation.
 - . After application of final coat.

2 PRODUCTS

2.1 GENERAL

Product substitution

Other products: Conform to **SUBSTITUTIONS** in 0171 *General requirements*.

Samples

Requirement: Provide samples, as follows:

- Clear finishes: Labelled samples of each clear finish on representative timber or timber veneer substrates, including putty, stain, seal and coat, showing surface preparation, gloss level and other physical properties.
- Opaque paint finishes: Labelled samples of each paint system on representative substrates, showing surface preparation, colour, gloss level, texture and other physical properties.

Storage and handling

General: Store materials not in use in tightly covered containers in well-ventilated areas with temperatures maintained at the manufacturer's recommendations.

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

Product identification

General: Marked to show the following:

- Manufacturer's identification.
- Product brand name.
- Product type.
- Quantity.
- Product reference code and batch number.
- Date of manufacture.

Warranties

Manufacturer's material warranty: Include the following:

- Extent: Paintwork generally.
- Terms: Paint systems are suitable for their intended use.
- Period: As defined by the manufacturer.

Alternative material performance warranty: Include the following:

- Terms: Provide the performance criteria as defined by the manufacturer.
- Measure: As defined by the manufacturer.
- Period: As defined by the manufacturer.

2.2 PAINTING MATERIALS

Combinations

General: Do not combine paints from different manufacturers in a paint system. Dulux paint products and coating systems have been selected and documented for this project. Any unauthorised product substitution will void the warranties.

Clear timber finish systems: Provide only the combinations of putty, stain and sealer recommended by the manufacturer of the topcoat.

Tinting

General: Provide only products that are colour tinted by the manufacturer or supplier.

Toxic ingredients

General: To the *Therapeutic Goods (Poisons Standard) Instrument (2024)* Part 2 Division 9.

Standards

Paint types: Conform to the Australian Standard referenced in the **DuluxGroup/Dulux paint type reference table**.

DuluxGroup/Dulux paint type reference table legend

Key:

ASU = Acrylic Sealer/Undercoat.

NE = No Equivalent.

PSU = Primer/Sealer/Undercoat.

Low VOC products are noted in the Table and the **Low VOC compliance reference table**.

^ Use is discouraged in favour of water based paints because of environmental concerns.

These paints have either limited availability or low requirement in the Building Industry.

DuluxGroup/Dulux paint type reference table

Paint type	DuluxGroup/Dulux material description	Dulux PDS No.	PRN AS/NZS 2311 (2017) (Table 4.2)	Standard
Semi-gloss solvent-borne: interior	Dulux Super Enamel Semi-Gloss	DU00098	B3	AS 3730.5 (2006)
Semi-gloss water-borne, interior /exterior trim (alt B8b)	Dulux Aquanamel Semi Gloss (low VOC)	DU00075	B41	AS 3730.2 (2006)
Gloss solvent-borne: aerosols	Dulux Spray Pak	DU00016	B4#	NE
Full gloss solvent-borne: exterior	Dulux Metalshield Premium UV Resistant High Gloss	PC00281	B5a	AS 3730.6 (2006)
Full gloss solvent-borne: interior	Dulux Super Enamel Full Gloss	DU00090	B5b	AS 3730.6 (2006)
Full gloss waterborne interior/exterior trim (alt B9b)	Dulux Aquanamel Gloss (low VOC)	DU00176	B42	AS 3730.2 (2006)
Flat latex: interior ceilings	Dulux White Ceiling Paint (low VOC)	DU00125	B6a	AS 3730.1 (2006)
Flat latex: interior ceilings (tinted colours)	Dulux EnvirO ₂ Ceiling Flat (low VOC)	DU00164	B6a	AS 3730.1 (2006)
Low gloss latex: exterior	Dulux Weathershield Low Sheen Acrylic	DU00073	B7b	AS 3730.8 (2006)
Low gloss latex: interior	Dulux Wash&Wear Low Sheen Acrylic (low VOC)	DU00110	B7a	AS 3730.3 (2006)
Low gloss latex: interior	Dulux Wash&Wear +Plus Kitchen & Bathroom Low Sheen (low VOC)	DU00114	B7a	AS 3730.3 (2006)
Low gloss latex: interior	Dulux Professional Steriguard Acrylic Low Sheen	PR00036	B7a	AS 3730.3 (2006)
Semi-gloss latex: exterior	Dulux Weathershield Semi Gloss Acrylic	DU00084	B8b	AS 3730.9 (2006)
Semi-gloss latex: interior	Dulux Wash&Wear Semi Gloss Acrylic (low VOC)	DU00111	B8a	AS 3730.2 (2006)
	Dulux Wash&Wear +Plus Kitchen & Bathroom Semi Gloss (low VOC)	DU00115		
Semi-gloss waterborne	Dulux Professional Steriguard Water Based Enamel Semi	PR00038	B42	AS 3730.2 (2006)

Paint type	DuluxGroup/Dulux material description	Dulux PDS No.	PRN AS/NZS 2311 (2017) (Table 4.2)	Standard
latex: interior	Gloss			
Gloss latex: exterior	Dulux Weathershield Gloss	DU00083	B9b	AS 3730.10 (2006)
Gloss latex: interior	Dulux Wash&Wear Gloss	DU00112	B9a	AS 3730.12 (2006)
Gloss waterborne interior/exterior trim (alt B9a/B9b)	Dulux Aquanamel Gloss (low VOC)	DU00176	B42	AS 3730.1 (2006)
Gloss waterborne latex: interior	Dulux Professional Steriguard Water Based Enamel Gloss	PR00037	B42	AS 3730.1 (2006)
Wood primer, solvent-borne	Dulux 1 Step Oil Based Primer Sealer Undercoat	DU00179	B10	AS 3730.13 (2006)
Wood primer, latex	Dulux 1 Step Acrylic Primer Sealer Undercoat	DU00148	B10a	AS 3730.17 (2006)
Metal primer for steel – solvent-borne	Dulux Metalshield All Surface Primer	DU03647	B11	AS 3730.21 (2006)
Metal primer, latex (domestic)	Dulux Precision All Metal Primer (water based, low VOC)	DU00123	B11a#	AS 3730.15 (2006)
Galvanised metal (Zincalume) undercoat (domestic)	Dulux Professional Galvanised Iron Primer (water based, low VOC)	PR00023	B12a	AS 3730.15 (2006)
Metal primer for non ferrous metals (domestic)	Dulux Precision All Metal Primer (water based, low VOC)	DU00123	B13	AS 3730.17 (2006)
Zinc-rich organic binder/primer for steel	Dulux Zinc Rich 1P Primer	PC00319	B14	AS 3730.9 (2006)
White Set Plaster and powdery surface sealer	Dulux Precision Sealer Binder	DU00124	B15	AS 3730.22 (2006)
Concrete and masonry sealer	Dulux Acratex Acraprime 501/2	AC00077	B15	AS 3730.22 (2006)
Concrete and masonry sealer	Berger Gold Label Acrylic Block Filler	BG00016	B15	AS 3730.22 (2006)
Clear low viscosity paint for concrete (domestic)	Dulux AquaTread Concrete Sealer (low VOC)	BE00035	B15a	NE
Clear low viscosity paint for concrete	Dulux Luxafloor WB Acrylic Dust Sealer Gloss	PC00021	B15a	NE

Paint type	DuluxGroup/Dulux material description	Dulux PDS No.	PRN AS/NZS 2311 (2017) (Table 4.2)	Standard
floors				
Moisture resistant plasterboard	Dulux 1 Step Acrylic Primer Sealer Undercoat (low VOC)	DU00148	B15a	AS 3730.18 (2006)
Concrete and masonry, latex wallboard sealer, sealer/undercoat,	Dulux Acrylic Sealer Undercoat (low VOC) Dulux 1 Step Acrylic Primer Sealer Undercoat (low VOC)	DU175 DU00148	B16	AS 3730.18 (2006)
Undercoat, solvent-borne	Dulux 1 Step Oil Based Primer Sealer Undercoat	DU00179	B17	AS 3730.14 (2006)
Undercoat, latex: exterior	Dulux 1 Step Acrylic Primer Sealer Undercoat (low VOC) Dulux Acratex Water Based 501/1	DU00148 AC00077	B17a	AS 3730.18 (2006)
Undercoat, latex: interior	Dulux 1 Step Acrylic Primer Sealer Undercoat (low VOC) Dulux Acrylic Sealer Undercoat (low VOC)	DU00148 DU175	B17a	AS 3730.18 (2006)
Wood Stain - spirit	Feast Watson Proofint	FW00069	B18	NE
Wood Stain - oil	Feast Watson Liming White Cabot's Interior Stain Oil Based	FW00103 CA00063	B18	
Wood Stain - latex	Intergrain UltraDeck® Timber Stain (interior/exterior) (low VOC) Cabot's Interior Stain Water Based	IN00039 CA00022	B18a	NE
Interior clear varnish, solvent-based, one-pack	Feast Watson - Clear varnish Gloss, Satin, Matt	FW00033 FW00028 FW00031	B19	AS 3730.25 (2006) or AS 3730.27 (2006) (for floors)
Interior clear latex varnish, water-based, one-pack	Cabot's Cabothane Clear Water Based Gloss, Satin or Matt (low VOC) Cabot's Stain & Varnish Water Based Gloss, Satin	CA00020 CA00021 CA00068 CA00007 CA00012	B19a	NE or AS 3730.27 (2006) (for floors)
Floor varnish, solvent based, one-pack clear	Feast Watson FLOORCLEAR Gloss, Satin	FW00065 FW00064	B20	AS 3730.27 (2006) (for floors)
Floor varnish, solvent based, clear (moisture cure)	Feast Watson Commercial Maxithane – Gloss, Satin	FW00074 FW00081	B20	AS 3730.27 (2006)
Floor Varnish, water-based,	Intergrain Enviropro Endure 1 Pack - Matt, Satin, Gloss (low	IE00028 IE00026	B20	AS 3730.27 (2006)

Paint type	DuluxGroup/Dulux material description	Dulux PDS No.	PRN AS/NZS 2311 (2017) (Table 4.2)	Standard
one-pack	VOC)			
Floor varnish, clear or tinted, two-pack	Intergrain Enviropro Endure 2 Pack - Gloss, Satin, Matt	IE00028 IE00026 IE00017	B20	AS 3730.27 (2006)
Exterior latex stain, semi-transparent	Intergrain UltraDeck® Timber Stain (low VOC)	IN00039	B22	AS 3730.16 (2006)
Fence stain, latex paints, opaque	Dulux Weathershield Garden Shades – Low Sheen Cabot's Timbercolour Deck & Exterior Paint	DU00097 CA00073	B22b	AS 3730.16 (2006)
Exterior stain, solvent-borne, opaque	Feast Watson Timber & Deck Stain	FW00097	B23#	AS 3730.28 (2006)
Exterior stain, solvent-borne, semi-transparent	Feast Watson Exterior Stain & Varnish Gloss	FW00106	B23a	NE
Paving paint for concrete, solvent	Berger Jet Dry Paving Paint range	BE00034	B24	AS 3730.29 (2006)
Paving paint for concrete, latex				Dulux Concrete & Paving
Roofing paint, latex (Solar reflectance)	Dulux AcraTex 962 COOLROOF with InfraCOOL Technology™	AC00084	B25	
Intumescent paints	Dulux Protective Coatings	Protective Coatings link	B28#	NE
Epoxy paint, two-pack, solvent-borne topcoats, interior only	Dulux Durebild STE 2 Pack Epoxy (high build & surface tolerant) Dulux Duremax GPE	PC00237 PC00349	B29	AS/NZS 3750.1 (2008)
Epoxy paint, two-pack, solvent-borne topcoats, exterior & pools		N/A	B29	AS/NZS 3750.1 (2008)
Epoxy paint, two-pack, water based, interior only	Dulux Luxafloor ECO2 (low VOC) Dulux Enviropoxy WBE	PC00392 PC00283	B29a	NE
High Build Recoatable two-pack, solvent-borne gloss polyurethane	Dulux Weathermax HBR Luxathane HPX	PC00382 PC00367	B29c B29c	NE

Paint type	DuluxGroup/Dulux material description	Dulux PDS No.	PRN AS/NZS 2311 (2017) (Table 4.2)	Standard
Stain sealer, solvent-borne for water soluble stains	Dulux Precision High Opacity Stain Blocker	DU00108	B30	NE
Stain sealer, water based for oil stains	Dulux Precision Maximum Strength Adhesion Primer	DU00119	B30	
Chalk sealer, surface conditioner	Dulux Sealer Binder Dulux Acraprime Solvent Based Primer	DU00124 AC00078	B31	NE
Anti-mould (treatment or wash for timber)	Intergrain Ultraprep Mould Killer	IN00042	B32	NE
Water-repellent for masonry	Dulux AquaBan	DU00055	B33	NE
Creosote stain	No longer used	Poly	B35	NE
Paint remover, solvent-borne	Selleys Polystrippa Paint Stripper	Poly	B36a	NE
Paint remover, chemical	Selleys Polystrippa Renovators' Choice	Poly	B36b	NE
High build membrane or texture coatings for masonry and concrete: exterior	Dulux Acratex Range	Acratex	B38b	AS/NZS 4548.1 (1999) AS/NZS 4548.2 (1999) AS/NZS 4548.3 (1999) AS/NZS 4548.4 (1999)
Texture finish latex coatings for masonry and plasterboard: interior only	Dulux Effects Range (interior)	Effects range link	B38a	NE
Clear or colourless coatings (waterborne) for timber, exterior	Intergrain UltraClear Exterior – Gloss, Satin Note: not suitable for decking.	IN00015 IN00006	B39	NE
Clear coatings (waterborne) for timber, interior	Cabot's Cabothane Clear Water Based Gloss, Satin & Matt (low VOC)	CA00020 CA00021 CA00068	B39	NE
Clear or colourless coatings (waterborne) for timber, interior floors	Intergrain Enviropro Endure 1 Pack - Matt, Satin, Gloss (low VOC) Intergrain Enviropro Endure 2 Pack - Matt, Satin, Gloss	IE00028 IE00026 IE00017 IE00025 IE00027 IE00018	B39	AS 3730.27 (2006)

Paint type	DuluxGroup/Dulux material description	Dulux PDS No.	PRN AS/NZS 2311 (2017) (Table 4.2)	Standard
Sanding sealer	Feast Watson Sanding Sealer	FW00021	B40	NE
Semi-gloss latex, interior trim (alt B8b)	Dulux Aquanamel Semi-Gloss (low VOC)	DU00075	B41	NE
Gloss or full gloss latex, interior trim	Dulux Aquanamel Gloss (low VOC)	DU00176	B42	NE
Penetrating tung oil type varnish or wax for timber floors: interior	Intergrain Enviropro Hard Wax Oil Feast Watson Tung Oil	IE00035 FW00058	B43	NE
Penetrating tung oil type varnish for timber decks: exterior	Intergrain Nature's Timber Oil Feast Watson Traditional Timber Oil	IN00012 FW00085	B43	NE
Gloss pigmented polyurethane	Dulux Luxathane R Dulux Luxathane HPX Dulux Weathermax HBR	PC00368 PC00367 PC00382	B44	AS/NZS 3750.6 (2009)
Powder coatings for non-ferrous metals	Dulux Powder Coat Range	duluxpowders.com.au	B45b	AS 3715 (2002)
Powder coatings for ferrous metals	Dulux Powder Coat Range	duluxpowders.com.au	B45b	AS 4506 (2024)

Low VOC emitting paints

General: Provide paints that conform to the documented VOC limits.

Low VOC compliance reference table

Green Star Interiors	VOC Limits MAX g/litre	DULUX Products compared to the GBCA specification	VOC g/litre Untinted
COMPLIANCE CRITERIA – GBCA specifications (obtain latest figures).			
Walls and ceilings - interior semi-gloss	16	Dulux EnviroO ₂ Interior Semi-Gloss	1
Walls and ceilings - interior semi-gloss	16	Dulux Wash&Wear Semi Gloss Dulux Wash&Wear +Plus Kitchen&Bathroom Semi Gloss	16 16
Walls and ceilings - interior low sheen	16	Dulux EnviroO ₂ Interior Low Sheen	1
Walls and ceilings - interior low sheen	16	Dulux Wash&Wear Low Sheen Dulux Wash&Wear +Plus Kitchen& Bathroom Low Sheen	16 16
Walls and ceilings - interior flat-washable	16	Dulux EnviroO ₂ Interior Matt	1
Ceilings - interior flat	14	Dulux EnviroO ₂ Interior Tintable ceiling Flat	1
Ceilings - interior flat	14	Dulux White Ceiling Paint	14

Green Star Interiors	VOC Limits MAX g/litre	DULUX Products compared to the GBCA specification	VOC g/litre Untinted
Trim - interior gloss	75	Dulux Aquanamel Gloss Dulux Professional Steriguard Water Based Enamel Gloss	60 74
Trim - interior semi-gloss	75	Dulux Aquanamel Semi Gloss Dulux Professional Steriguard Water Based Enamel Semi Gloss	53 74
Trim - interior semi-gloss	75	Dulux EnvirO ₂ Water Based Enamel Semi Gloss	1
Wall primer	65	Dulux Acrylic Sealer Undercoat	5
Latex primer for galvanized iron and zincalume NOT FOR HDG	65	Dulux Professional Total Prep	45
Latex primer for galvanized iron and zincalume NOT for HDG	65	Dulux Professional Galvanised Iron Primer	< 60
Interior latex undercoat	65	Dulux EnvirO ₂ Acrylic Sealer Undercoat (ASU)	1
Interior latex undercoat	65	Dulux Prepcoat Acrylic Sealer Undercoat	< 5
Exterior latex undercoat	65	Dulux 1 Step Acrylic Primer Sealer Undercoat (PSU) Dulux Professional Total Prep	<37 45
Interior sealer	65	Dulux EnvirO ₂ Acrylic Sealer Undercoat (ASU)	1
Interior concrete sealer	65	Dulux Luxafloor Eco2 (clear) + colours Dulux Luxafloor WB (Clear) + colours	10 10
One and two pack performance coatings for floors	140	Dulux Luxafloor Eco2 concrete Dulux Luxafloor WB concrete Intergrain Enviropro Timber Endure One Pack Intergrain Enviropro Timber Endure Two Pack	10 10 < 75 <140 (Part A & B)

3 EXECUTION

3.1 PREPARATION

Standard

General: To AS/NZS 2311 (2017) Section 3.

Order of work

Other trades: Complete the work of other trades as far as practicable within the area to be painted, except for the installation of fittings, floor sanding and laying flooring materials.

Clear finishes: Complete clear timber finishes before applying opaque paint finishes in the same area.

Protection

General: Clean the area and protect from dust contamination. Use drop sheets and masking agents to protect surfaces, including finished surfaces and adjacent finishes, during painting.

Fittings and furniture: Remove door furniture, switch plates, light fittings and other fittings. Attach labels or mark fittings using a non-permanent method, identifying location and refixing instructions, if required. Store and protect against damage.

Difficult to remove fittings and fixtures: If removal is impractical or difficult, apply surface protection before substrate preparation and painting.

Substrates

General: Prepare substrates to receive the documented paint systems to Dulux's recommendations and as follows:

- Generally: Clean the substrate surface without damaging the substrate or the surroundings.
- Timber surfaces where clear finishes will be applied: Prepare the surface so that its attributes will show through the clear finish without blemishes, including the following:
 - . Remove bruises.
 - . Remove discolourations, including staining by oil, grease and nailheads.
 - . Bleach if necessary to match the timber colour sample.
 - . Fine sanding, with the last abrasive no coarser than 220 grit, so that there are no scratches across the grain.
- Sound external surfaces other than timber: Prepare the surface as follows:
 - . Remove dirt, grease, loose and foreign matter, efflorescence and mould by water blasting or steam cleaning without damaging the surface.
 - . Remove remaining loose material with hand tools.
 - . Use sanding blocks to preserve the arrises of masonry and stone details.
- Iron and steel: Remove weld spatter, slag, burrs, or any other objectionable surface irregularities and radius all edges to a minimum of 2 mm. Degrease by solvent or alkaline cleaning.
- Iron and steel blast cleaning: To AS 1627.9 (2002) and to the class of surface preparation required for the documented protective treatment. Provide a surface roughness or profile appropriate for the documented treatment. If steelwork to be abrasive cleaned includes irregular shapes, allow for special equipment to achieve required abrasive cleaning.
- Structural steel: Paint exposed fixings, including bolts and screws, to match adjacent steelwork paint system.
- Concrete and masonry: Before application to very smooth concrete, brick or masonry, either acid etch, mechanically grind or abrasive track blast the surface as appropriate to provide a suitable key for the subsequently applied coating and to remove laitance. Remove loose friable matter before filling surface discontinuities.
- Set plaster surfaces: Do not apply solvent borne paint or other impervious coatings if the moisture content at the surface, tested with a moisture meter, exceeds 12%.

Efflorescence: Before cleaning, eliminate the source of salt and water. Before repainting, allow surface to dry for 15 to 30 days.

New masonry: Before painting, allow masonry to cure and pH level to stabilise for 30 days.

Treated surfaces: If surfaces have been treated with preservatives or fire retardants, make sure the coating system is compatible with the treatment and does not adversely affect its performance.

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.

Unpainted surfaces

Standard: To AS/NZS 2311 (2017) Section 3.

Previously painted surfaces

General: Prepare previously painted surfaces, as documented.

Preparation of a substrate in good condition: To AS/NZS 2311 (2017) clause 7.4.

Preparation of a substrate in poor condition: To AS/NZS 2311 (2017) clause 7.5.

Preparation of steel substrates with protective coatings: To AS 2312.1 (2014) Section 8 and AS 1627.1 (2003).

PVC-U: Clean with methylated spirit and a nylon scouring pad.

Wallcovering: Remove wallcovering and residual paste with clean water. Patch and repair substrate to a uniform surface before painting.

Lime wash paints: Remove by brushing with warm water or pressure washing.

Reconditioned damaged surfaces in galvanized steel: To AS/NZS 4680 (2006) Section 8.

3.2 PAINTING SYSTEMS

Dulux paint systems

Requirement: Apply the paint system nominated for each substrate to the **INTERIOR PAINTING SCHEDULES** and the **EXTERIOR PAINTING SCHEDULES**. Conform to the referenced manufacturer's Product Data Sheets (PDS) and Spec Sheets, including the following:

- The number and order of coats.
- The paint type for each coat.

Additional coats: Apply if necessary to:

- Prepare porous or reactive substrates with prime or seal coats consistent with the manufacturer's recommendations.
- Achieve the total film thickness or texture documented.
- Achieve the required opacity, in the documented or required colour.

Painting systems

Standards: The scheduled DuluxGroup/Dulux paint systems override AS/NZS 2311 (2017) as follows:

- New unpainted interior surfaces: To AS/NZS 2311 (2017) Table 5.1.
- New unpainted exterior surfaces: To AS/NZS 2311 (2017) Table 5.2.
- Standard: To AS/NZS 2311 (2017) clause 5.2. Provide the following final coats:
 - . High build textured or membrane finishes for concrete and masonry: B38 using products conforming to the AS/NZS 4548 series.
 - . Two-pack gloss pigmented polyurethane: B44.
 - . Two-pack epoxy: B29.
 - . Two-pack water-based epoxy: B29A.

Paint Reference Number (PRN): The number in brackets against the individual product refers to the Paint Ref. No. (PRN) listed in the **DuluxGroup/Dulux paint type reference table** and AS/NZS 2311 (2017) Table 4.2.

3.3 APPLICATION

General

Standard: To AS/NZS 2311 (2017) 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.

Light levels

General: During preparation of surfaces, painting and inspection, maintain light levels such that the luminance (photometric brightness) of the surface is equal to the documented permanent artificial illumination conditions or 400 lux, whichever is the greater.

Conditions

General: Unless the coating is recommended by Dulux for such conditions, do not apply under the following conditions:

- Rainy conditions.
- Dusty conditions.
- Relative humidity: > 85%.
- Surface temperature: < 10°C or > 35°C.
- Temperature: Within 3°C of the dew point.

Priming timber before fixing

General: Before fixing in position, apply 1 coat of wood primer and 2 coats to end grain to the back of the following:

- External fascia boards.
- Timber door and window frames.
- Tops and bottoms of external doors.
- Associated trim and glazing beads.
- Timber board cladding.

Spraying

General: If the application is by spraying, use conventional or airless equipment that conforms to the following:

- Satisfactorily atomises coating being applied.
- Does not require coating to be thinned beyond the maximum amount recommended by the manufacturer.
- Does not introduce oil, water or other contaminants into the applied coating.

Coatings with known health hazards: Not permitted on site.

Sanding

Clear finishes: Sand the sealer using abrasives no coarser than 320 grit without cutting through the colour. Take special care with round surfaces and edges.

Repair

Requirement: Clean off marks, paint spots and stains progressively and restore damaged surfaces to their original condition.

Repair of galvanizing

Cleaning: For galvanized surfaces that have been subsequently welded, power tool grind to remove all surface contaminants, including rust and weld splatter. Prime affected area immediately after cleaning.

Primer: Type 2 organic zinc-rich coating for the protection of steel to AS/NZS 3750.9 (2009).

Windows

Operation: Make sure opening windows function correctly before and after painting.

Doors

Drying: Maintain door leaf in the open position during drying. Do not allow door hardware or accessories to damage the door finish during the drying process.

Wet paint warning

Notices: Place notices in a conspicuous location and do not remove until the paint is dry.

Exclusions

General: Exclude the following surfaces from paint systems (unless specifically requested):

- Flexible duct connections, rubber hoses and mountings and other non-metallic flexible fittings.
- Wire rope and machined surfaces.
- Metals plated or specially finished for appearance, bronze, brass, copper and stainless steel (except as documented in the *Pipe identification* clause of the *Services* worksections).
- Aluminium frames.
- Prefinished aluminium frames to windows and doors, and trim.
- Metal floor duct covers.
- Raised access floors.
- Floors.
- Fair faced brickwork, blockwork, stonework, artificial stone and exposed aggregates.
- Sprayed vermiculite.
- Floors, paving and roads.
- Timber roof structure.
- Concealed timber roof structure.
- Timber ceiling and eaves lining.
- Exterior timber sheeting.
- Exterior timber stairs and decking.
- Plastic finishes generally
- Inside of service ducts, heat exchangers, pipes and valves.
- Shower seats, store shelving, work benches.
- Those parts of timber fixtures, such as insides of cupboards, not visible when doors are closed. Insides of bathroom cabinets are not excluded.
- Self-finished surface such as glass and plastic laminates.
- Door hardware, including hinges.

3.4 COMPLETION

General

Protection and masking: Remove masking and protection coverings before paint has dried.

Cleaning: Remove splatters by washing, scraping or other methods that do not scratch or damage the surface.

Reinstatement: Repair, replace or refinish any damage, including damage made by other trades.

Touch up new damaged paintwork or misses only with the paint batch used in the original application.

Fittings: Refix removed and undamaged fittings in the original locations. Make sure they are properly fitted and in proper working order.

Disposal of paint and waste materials

Requirement: Conform to requirements of the local authority.

Spares

Spare material: Supply clearly labelled sealed containers of each type, coat and colour of paint/coating from the same batch.

4 SELECTIONS

4.1 INTERIOR PAINTING SCHEDULES

Flat and matt latex - Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Plasterboard (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Wash&Wear Matt	Dulux Wash&Wear Matt	DU00290
Plasterboard (Ultra low VOC system)	Dulux Enviro ₂ Interior Acrylic Sealer Undercoat	Dulux Enviro ₂ Interior Matt	Dulux Enviro ₂ Interior Matt	DU00160
Plasterboard (ceilings) (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux White Ceiling Paint	Dulux White Ceiling Paint	DU02398
Plasterboard (ceilings) (Ultra low VOC system)	Dulux Enviro ₂ Interior Acrylic Sealer Undercoat	Dulux Enviro ₂ Interior Ceiling Flat	Dulux Enviro ₂ Interior Ceiling Flat	DU04471
Fibrous/set plaster	Dulux Sealer Binder (solvent based)	Dulux Wash&Wear Matt	Dulux Wash&Wear Matt	DU00338
Fibrous/set plaster (with glancing light issues)	Dulux Sealer Binder (solvent based)	Dulux Wash&Wear Matt	Dulux Wash&Wear Matt	DU00338
Fibre cement products (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Wash&Wear Matt	Dulux Wash&Wear Matt	DU00290
Timber and veneers	Dulux Professional Total Prep	Dulux Aquanamel Low-Gloss	Dulux Aquanamel Low-Gloss	DU01538
Cement render (low VOC system)	Dulux Prepcoat Acrylic Sealer Undercoat	Dulux Wash&Wear Matt	Dulux Wash&Wear Matt	DU00361
Acoustic ceiling tiles, vents & grids Vermiculite	Dulux Professional Acousticoat Flat			PR00396

Low-gloss latex - Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
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Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Plasterboard (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Wash&Wear Low Sheen	Dulux Wash&Wear Low Sheen	DU02391
Plasterboard (Ultra low VOC system)	Dulux Enviro ₂ Interior Acrylic Sealer Undercoat	Dulux Enviro ₂ Interior Low Sheen	Dulux Enviro ₂ Interior Low Sheen	DU02822
Plasterboard (Dark colours)	Dulux Enviro ₂ Interior Acrylic Sealer Undercoat	Porter's Aqua Enamel Satin	Porter's Aqua Enamel Satin	PP00319
Fibrous/set plaster	Dulux Precision Sealer Binder	Dulux Wash&Wear Low Sheen	Dulux Wash&Wear Low Sheen	DU04651
Fibre cement products (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Wash&Wear Low Sheen	Dulux Wash&Wear Low Sheen	DU02896
Timber and veneers	Dulux Professional Total Prep	Dulux Aquanamel Low Gloss	Dulux Aquanamel Low Gloss	DU01538
Timber and veneers (walls)	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux Wash&Wear Low Sheen	Dulux Wash&Wear Low Sheen	DU02618
Concrete (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Wash&Wear Low Sheen	Dulux Wash&Wear Low Sheen	DU02966
Cement render (low VOC system)	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux Wash&Wear Low Sheen	Dulux Wash&Wear Low Sheen	DU02560
MDF	Dulux Professional Total Prep	Dulux Aquanamel Low Gloss	Dulux Aquanamel Low Gloss	DU01538
MDF (walls)	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux Wash&Wear Low Sheen	Dulux Wash&Wear Low Sheen	DU02539
Brick and masonry (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Wash&Wear Low Sheen	Dulux Wash&Wear Low Sheen	DU02966
Concrete blockwork (low VOC system)	Berger Gold Label Acrylic Block Filler	Dulux Wash&Wear Low Sheen	Dulux Wash&Wear Low Sheen	DU00488

Low-gloss latex (mould resistant) – Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Plasterboard (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Wash&Wear +Plus Kitchen & Bathroom Low Sheen	Dulux Wash&Wear +Plus Kitchen & Bathroom Low Sheen	DU03227
Plasterboard (MR grade) (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Wash&Wear +Plus Kitchen & Bathroom Low Sheen	Dulux Wash&Wear +Plus Kitchen & Bathroom Low Sheen	DU03227
Fibrous/set plaster	Dulux Sealer Binder (solvent	Dulux Wash&Wear +Plus Kitchen &	Dulux Wash&Wear +Plus Kitchen &	DU03340

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
	based)	Bathroom Low Sheen	Bathroom Low Sheen	
Fibre cement products (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Wash&Wear +Plus Kitchen & Bathroom Low Sheen	Dulux Wash&Wear +Plus Kitchen & Bathroom Low Sheen	DU03242
Concrete	Dulux Acrylic Sealer Undercoat	Dulux Wash&Wear +Plus Kitchen & Bathroom Low Sheen	Dulux Wash&Wear +Plus Kitchen & Bathroom Low Sheen	DU03350
Cement render (low VOC system)	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux Wash&Wear +Plus Kitchen & Bathroom Low Sheen	Dulux Wash&Wear +Plus Kitchen & Bathroom Low Sheen	DU03350
MDF	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux Wash&Wear +Plus Kitchen & Bathroom Low Sheen	Dulux Wash&Wear +Plus Kitchen & Bathroom Low Sheen	DU03010
Brick and masonry (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Wash&Wear +Plus Kitchen & Bathroom Low Sheen	Dulux Wash&Wear +Plus Kitchen & Bathroom Low Sheen	DU03350
Concrete blockwork (low VOC system)	Berger Gold Label Acrylic Block Filler	Dulux Wash&Wear +Plus Kitchen & Bathroom Low Sheen	Dulux Wash&Wear +Plus Kitchen & Bathroom Low Sheen	DU02850

Low-gloss latex (mould and bacteria resistant) - Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Plasterboard (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Professional Steriguard Acrylic Low Sheen	Dulux Professional Steriguard Acrylic Low Sheen	PR00236
Plasterboard (MR grade) (low VOC system)	Dulux Professional Total Prep	Dulux Professional Steriguard Acrylic Low Sheen	Dulux Professional Steriguard Acrylic Low Sheen	PR00902
Fibrous/set plaster	Dulux Sealer Binder (solvent based)	Dulux Professional Steriguard Acrylic Low Sheen	Dulux Professional Steriguard Acrylic Low Sheen	PR00129
Timber and veneers	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux Professional Steriguard Acrylic Low Sheen	Dulux Professional Steriguard Acrylic Low Sheen	PR00237
Concrete	Dulux Acrylic Sealer Undercoat	Dulux Professional Steriguard Acrylic Low Sheen	Dulux Professional Steriguard Acrylic Low Sheen	PR00238
MDF	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux Professional Steriguard Acrylic Low Sheen	Dulux Professional Steriguard Acrylic Low Sheen	PR00237
Brick and masonry (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Professional Steriguard Acrylic Low Sheen	Dulux Professional Steriguard Acrylic Low Sheen	PR00238
Concrete blockwork (low VOC system)	Berger Gold Label Acrylic Block Filler	Dulux Professional Steriguard Acrylic Low Sheen	Dulux Professional Steriguard Acrylic Low Sheen	PR00169

Semi-gloss latex - Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Plasterboard (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Wash&Wear Semi Gloss	Dulux Wash&Wear Semi Gloss	DU2392
Fibrous/set plaster	Dulux Sealer Binder (solvent based)	Dulux Wash&Wear Semi Gloss	Dulux Wash&Wear Semi Gloss	DU02488
Fibre cement products (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Wash&Wear Semi Gloss	Dulux Wash&Wear Semi Gloss	DU02508
Timber and veneers	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux Wash&Wear Semi Gloss	Dulux Wash&Wear Semi Gloss	DU03000
Concrete (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Wash&Wear Semi Gloss	Dulux Wash&Wear Semi Gloss	DU02478
Cement render (low VOC system)	Dulux Total Prep	Dulux Wash&Wear Semi Gloss	Dulux Wash&Wear Semi Gloss	DU02544
MDF (low VOC system)	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux Wash&Wear Semi Gloss	Dulux Wash&Wear Semi Gloss	DU03000
Brick and masonry (low VOC system)	Dulux Acrylic Primer Sealer Undercoat	Dulux Wash&Wear Semi Gloss	Dulux Wash&Wear Semi Gloss	DU02478
Concrete blockwork (low VOC system)	Berger Gold Label Acrylic Block Filler	Dulux Wash&Wear Semi Gloss	Dulux Wash&Wear Semi Gloss	DU02860

Semi-gloss latex (mould resistant) - Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Plasterboard (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Wash&Wear +Plus Kitchen & Bathroom Semi Gloss	Dulux Wash&Wear +Plus Kitchen & Bathroom Semi Gloss	DU03235
Plasterboard (MR grade) (low VOC system)	Dulux EnvirO ₂ Interior Acrylic Sealer Undercoat	Dulux Wash&Wear +Plus Kitchen & Bathroom Semi Gloss	Dulux Wash&Wear +Plus Kitchen & Bathroom Semi Gloss	DU02457
Fibrous/set plaster	Dulux Sealer Binder (solvent based)	Dulux Wash&Wear +Plus Kitchen & Bathroom Semi Gloss	Dulux Wash&Wear +Plus Kitchen & Bathroom Semi Gloss	DU03346
Fibre cement products (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Wash&Wear +Plus Kitchen & Bathroom Semi Gloss	Dulux Wash&Wear +Plus Kitchen & Bathroom Semi Gloss	DU03228
Concrete (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Wash&Wear +Plus Kitchen & Bathroom Semi Gloss	Dulux Wash&Wear +Plus Kitchen & Bathroom Semi Gloss	DU03349

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Cement render (low VOC system)	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux Wash&Wear +Plus Kitchen & Bathroom Semi Gloss	Dulux Wash&Wear +Plus Kitchen & Bathroom Semi Gloss	DU03347
MDF	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux Wash&Wear +Plus Kitchen & Bathroom Semi Gloss	Dulux Wash&Wear +Plus Kitchen & Bathroom Semi Gloss	DU03348
Brick and masonry (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Wash&Wear +Plus Kitchen & Bathroom Semi Gloss	Dulux Wash&Wear +Plus Kitchen & Bathroom Semi Gloss	DU03349
Concrete blockwork (low VOC system)	Berger Gold Label Acrylic Block Filler	Dulux Wash&Wear +Plus Kitchen & Bathroom Semi Gloss	Dulux Wash&Wear +Plus Kitchen & Bathroom Semi Gloss	DU02989

Semi-gloss water based enamel - Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Plasterboard	Dulux Acrylic Sealer Undercoat	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU02831
Plasterboard (MR grade)	Dulux Acrylic Sealer Undercoat	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU02831
Plasterboard (MR grade) (Ultra low VOC system)	Dulux EnvirO2 Interior Acrylic Sealer Undercoat	Dulux EnvirO2 Interior Enamel Semi Gloss	Dulux EnvirO2 Interior Enamel Semi Gloss	DU04533
Fibrous/set plaster	Dulux Sealer Binder (solvent based)	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU02922
Fibre cement products	Dulux Acrylic Sealer Undercoat	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU03558
Timber and veneers (low VOC system)	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU04571
Timber and veneers (ultra low VOC system)	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux EnvirO2 Interior Enamel Semi Gloss	Dulux EnvirO2 Interior Enamel Semi Gloss	DU04339
Concrete	Dulux Acrylic Sealer Undercoat	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU01004
Cement render	Dulux Professional Acrylic Primer	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU00414
MDF (low VOC system)	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU04571
Brick and masonry	Dulux Acrylic Sealer Undercoat	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU03356
Concrete blockwork	Berger Gold Label	Dulux	Dulux	DU03370

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
	Acrylic Block Filler	Aquanamel Semi Gloss	Aquanamel Semi Gloss	
Zinc-coated metals (zincalume, Galvabond, zincanneal, zincseal) (low VOC system)	Dulux Galvanised Iron Primer (water based)	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU01005
Shop primed or red oxide primed (ROZP) ferrous metal	Dulux Metalshield All Surface Primer	Dulux Aquanamel Semi Gloss Acrylic	Dulux Aquanamel Semi Gloss Acrylic	DU05329
Non-ferrous metals (incl. aluminium, brass, copper, tin plate) (low VOC system)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU00715
Plastics (solvent resistant types e.g. FRP, PVC-U) (low VOC system)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU05239

Semi-gloss water based enamel (mould and bacteria resistant) - Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Plasterboard	Dulux Acrylic Sealer Undercoat	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	PR00062
Fibrous/set plaster	Dulux Sealer Binder (solvent based)	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	PR00147
Fibre cement products	Dulux Acrylic Sealer Undercoat	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	PR00240
Timber and veneers (low VOC system)	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	PR00241
Concrete	Dulux Acrylic Sealer Undercoat	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	PR00242
MDF (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	PR00243
Concrete blockwork	Berger Gold Label Acrylic Block Filler	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	PR00245
Zinc-coated metals (zincalume, Galvabond, zincanneal, zincseal,	Dulux Galvanised Iron Primer (water based)	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	PR00246

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
zinc-primed steel) (low VOC system)				
Shop primed or red oxide primed (ROZP) ferrous metal (low VOC system)	Dulux Metalshield All Surface Primer (water based)	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	PR00247
Non-ferrous metals (incl. aluminium, brass, copper, tin plate) (low VOC system)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	PR00248
Plastics (solvent resistant types e.g. FRP, PVC-U) (low VOC system)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	PR00249

Semi-gloss, solvent-borne - Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Timber and primed hardboard veneers	Dulux 1 Step Oil Based Primer Sealer Undercoat (solvent based)	Dulux Super Enamel Semi Gloss	Dulux Super Enamel Semi Gloss	DU02412
MDF	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux Super Enamel Semi Gloss	Dulux Super Enamel Semi Gloss	DU02569
Zinc-coated metals (zincalume, Galvabond, zincanneal, zincseal, zinc-primed steel)	Dulux Galvanised Iron Primer	Dulux Super Enamel Semi Gloss	Dulux Super Enamel Semi Gloss	DU00599
Shop primed or red oxide primed (ROZP) ferrous metal.	Dulux Metalshield All Surface Primer (water based)	Dulux Super Enamel Semi Gloss	Dulux Super Enamel Semi Gloss	DU00544
Non-ferrous metals (incl. aluminium, brass, copper, tin plate)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Super Enamel Semi Gloss	Dulux Super Enamel Semi Gloss	DU03013
Plastics (solvent resistant types e.g. FRP, PVC-U)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Super Enamel Semi Gloss	Dulux Super Enamel Semi Gloss	DU02993
Plastics (solvent sensitive types e.g. polystyrene)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Super Enamel Semi Gloss	Dulux Super Enamel Semi Gloss	DU02993

Full gloss water based enamel - Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Plasterboard	Dulux Acrylic Sealer Undercoat	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU02514
Plasterboard (MR grade)	Dulux Precision Sealer Binder	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU05334
Fibrous/set plaster	Dulux Sealer	Dulux	Dulux	DU03097

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
	Binder (solvent based)	Aquanamel Gloss	Aquanamel Gloss	
Fibre cement products	Dulux Acrylic Sealer Undercoat	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU03357
Timber and veneers (low VOC system)	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU02436
Concrete	Dulux Acrylic Sealer Undercoat	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU03375
Cement render	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU02747
MDF (low VOC system)	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU02972
Brick and masonry	Dulux Acrylic Sealer Undercoat	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU03375
Concrete blockwork	Berger Gold Label Acrylic Block Filler	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU03375
Zinc-coated metals (zincalume, Galvabond, zincanneal, zincseal, zinc-primed steel) (low VOC system)	Dulux Galvanised Iron Primer (water based)	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU04438
Shop primed or red oxide primed (ROZP) ferrous metal	Dulux Metalshield All Surface Primer	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU05336
Non-ferrous metals (incl. aluminium, brass, copper, tin plate) (low VOC system)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU03014
Plastics (solvent resistant types e.g. FRP, PVC-U) (low VOC system)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU01011

Full gloss water based enamel (mould and bacteria resistant) - Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Plasterboard	Dulux Acrylic Sealer Undercoat	Dulux Professional SteriGuard Water Based Enamel Gloss	Dulux Professional SteriGuard Water Based Enamel Gloss	PR00250
Fibrous/set plaster	Dulux Sealer Binder (solvent based)	Dulux Professional SteriGuard Water Based Enamel Gloss	Dulux Professional SteriGuard Water Based Enamel Gloss	PR00154
Fibre cement products	Dulux Acrylic Sealer Undercoat	Dulux Professional SteriGuard Water Based Enamel Gloss	Dulux Professional SteriGuard Water Based Enamel Gloss	PR00251

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Timber and veneers (low VOC system)	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux Professional SteriGuard Water Based Enamel Gloss	Dulux Professional SteriGuard Water Based Enamel Gloss	PR00252
Concrete	Dulux Acrylic Sealer Undercoat	Dulux Professional SteriGuard Water Based Enamel Gloss	Dulux Professional SteriGuard Water Based Enamel Gloss	PR00253
MDF (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Professional SteriGuard Water Based Enamel Gloss	Dulux Professional SteriGuard Water Based Enamel Gloss	PR00254
Concrete blockwork	Berger Gold Label Acrylic Block Filler	Dulux Professional SteriGuard Water Based Enamel Gloss	Dulux Professional SteriGuard Water Based Enamel Gloss	PR00255
Zinc-coated metals (zincalume, Galvabond, zincanneal, zincseal, zinc-primed steel) (low VOC system)	Dulux Galvanised Iron Primer (water based)	Dulux Professional SteriGuard Water Based Enamel Gloss	Dulux Professional SteriGuard Water Based Enamel Gloss	PR00256
Shop primed or red oxide primed (ROZP) ferrous metal (low VOC system)	Dulux Metalshield All Surface Primer (water based)	Dulux Professional SteriGuard Water Based Enamel Gloss	Dulux Professional SteriGuard Water Based Enamel Gloss	PR00259
Non-ferrous metals (incl. aluminium, brass, copper, tin plate) (low VOC system)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Professional SteriGuard Water Based Enamel Gloss	Dulux Professional SteriGuard Water Based Enamel Gloss	PR00257
Plastics (solvent resistant types e.g. FRP, PVC-U) (low VOC system)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Professional SteriGuard Water Based Enamel Gloss	Dulux Professional SteriGuard Water Based Enamel Gloss	PR00258

Full gloss solvent-borne – Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Timber and primed hardboard veneers	Dulux 1 Step Oil Based Primer Sealer Undercoat	Dulux Super Enamel High Gloss	Dulux Super Enamel High Gloss	DU02410
MDF	Dulux 1 Step Acrylic Primer Undercoat	Dulux Super Enamel High Gloss	Dulux Super Enamel High Gloss	DU02568
Zinc-coated metals (zincalume, Galvabond, zincanneal, zincseal, zinc-primed steel)	Dulux Galvanised Iron Primer (water based)	Dulux Super Enamel High Gloss	Dulux Super Enamel High Gloss	DU00599
Shop primed or red oxide primed (ROZP) ferrous metal.	Dulux Metalshield All Surface Primer	Dulux Super Enamel High Gloss	Dulux Super Enamel High Gloss	PR05342
Non-ferrous metals (incl. aluminium, brass, copper, tin plate)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Super Enamel High Gloss	Dulux Super Enamel High Gloss	DU03012

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Plastics (solvent resistant types e.g. FRP, PVC-U)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Super Enamel High Gloss	Dulux Super Enamel High Gloss	DU02428
Plastics (solvent sensitive types e.g. polystyrene)	Dulux Precision Maximum Strength Adhesion Primer	Use water based paints, not solvent based.	Use water based paints, not solvent based.	N/A

Full gloss, epoxy primed enamel - Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Zinc-coated metals (zincalume, Galvabond, zincanneal, zincseal, zinc-primed steel)	Dulux Durebild STE to 100 µm DFT	Dulux Metalshield Prem UV Resistant Enamel Topcoat Gloss	Dulux Metalshield Prem UV Resistant Enamel Topcoat Gloss	DU00248

Full gloss, epoxy primed two-pack polyurethane - Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Zinc-coated metals (incl. HD Galvanized steel, zincalume, Galvabond, zincanneal, zincseal, zinc-primed steel)	Dulux Duremax GPE Zinc Phosphate to 125 µm DFT	Dulux Duremax GPE to 100 µm DFT	Dulux Weathermax HBR to 75 µm DFT	DU03559

Clear over stain on timber or veneers - Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Timber and timber veneer (solvent based system)	Cabot's Cabothane (solvent based) Gloss or Satin	Cabot's Cabothane (solvent based) Gloss or Satin	Cabot's Cabothane (solvent based) Gloss or Satin	CA00114 CA00162
Timber and timber veneer (low VOC water based system)	Cabot's Cabothane Clear Water Based Gloss or Satin Apply 10.8 m ² /litre	Cabot's Cabothane Clear Water Based Gloss or Satin Apply 10.8 m ² /litre		CA00216 CA00218

Clear coat two-pack polyurethane - Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Timber (low VOC water based system)	Intergrain Enviropro Timberseal	Intergrain Enviropro Endure 2 Pack Matt	Intergrain Enviropro Endure 2 Pack Matt	IE00110
Timber (low VOC water based system)	Intergrain Enviropro Timberseal	Intergrain Enviropro Endure 2 Pack Satin	Intergrain Enviropro Endure 2 Pack Satin	IE00050
Timber (low VOC water based system)	Intergrain Enviropro Timberseal	Intergrain Enviropro Endure 2 Pack Gloss	Intergrain Enviropro Endure 2 Pack Gloss	IE00047

Clear coat single pack polyurethane - Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Timber and timber veneer (low VOC water based system)	Cabot's Cabothane Clear Water Based Gloss or Satin Apply 12 m ² /litre	Cabot's Cabothane Clear Water Based Gloss or Satin Apply 12 m ² /litre		CA00216 CA00218

Two pack gloss pigmented polyurethane - Interior joinery

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Timber (Factory applied)	Dulux Luxepoxy 4 White Primer to 50 µm DFT.	Dulux Luxathane SPX Satin		PC00046

Clear finishing oils for timber - Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Timber	Feast Watson Scandinavian Oil Apply at 16 m ² /litre	Feast Watson Scandinavian Oil Apply at 16 m ² /litre		FW00181
Timber	Feast Watson Tung Oil Apply 12-14 m ² /litre	Feast Watson Tung Oil Apply 12-14 m ² /litre		FW00182

Tung oil (Semi-gloss finish) - Interior (timber floors)

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Timber (soft wood)	Feast Watson Proofseal	Feast Watson Tung Oil (Commercial)	Feast Watson Tung Oil (Commercial)	FW00194
Timber (hardwood)	Feast Watson Proofseal	Feast Watson Tung Oil (Commercial)	Feast Watson Tung Oil (Commercial)	FW00194

Clear single pack polyurethane - Interior (timber floors)

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Timber (floors) (low VOC water based system)	Intergrain Enviropro Endure 1 Gloss, Satin or Matt	Intergrain Enviropro Endure 1 Gloss, Satin or Matt	Intergrain Enviropro Endure 1 Gloss, Satin or Matt	IE00104 IE00115 IE00106
Timber (floors)	Feast Watson Floorclear (solvent based) Gloss or Satin	Feast Watson Floorclear (solvent based) Gloss or Satin	Feast Watson Floorclear (solvent based) Gloss or Satin	FW00153 FW00154

Paving paint for concrete – Interior or exterior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Concrete (solvent based system)	Berger Jet Dry Non-Slip Paving Paint	Berger Jet Dry Non-Slip Paving Paint	Berger Jet Dry Non-Slip Paving Paint	Concrete & Paving
Concrete (low VOC, water based system)				Concrete & Paving

Clear sealer for concrete – Interior or exterior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Concrete (Domestic) (low VOC, water based system)				Concrete & Paving
Concrete (commercial) (low VOC, water based system)	Dulux Luxafloor WB	Dulux Luxafloor WB	Dulux Luxafloor WB	PC00214
Concrete (commercial) (water based system)	Dulux Protective Coatings Luxafloor WB Sealer Gloss	Dulux Protective Coatings Luxafloor WB Sealer Gloss	Dulux Protective Coatings Luxafloor WB Sealer Gloss	PC00214
Concrete (commercial) (solvent based system)				PC00136

Previously painted surfaces - Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
e.g. Painted Plasterboard	Dulux ASU	Dulux Wash&Wear Low Sheen	Dulux Wash&Wear Low Sheen	DU02391

4.2 EXTERIOR PAINTING SCHEDULES

Low-gloss latex – Exterior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Weatherboard - hardboard cladding (Weathertex) Restricted application	Dulux Professional Acrylic Primer	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen	DU05348
Weatherboard -fibre cement board cladding (Hardiboard) Restricted application	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen	DU02593
Fibre cement products (soffits) Commercial	Dulux Acratex AcraGuard	Dulux Acratex AcraGuard		AC02705
Fibre cement products (soffits) Restricted applications	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen		DU04504
Timber and veneers	Dulux Professional Acrylic Primer	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen	DU00611
Concrete (OFC, tilt slab or precast) Restricted application	Dulux Acratex Green Render Sealer	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen	DU04491
Concrete (OFC, tilt slab or precast) (High-build performance coating system)	Dulux Acratex Green Render Sealer	Dulux AcraTex AcraShield Roller Finish	Dulux AcraTex AcraShield Roller Finish	AC02778
Cement render (High-build performance coating system)	Dulux Acratex Green Render Sealer	Dulux AcraTex AcraShield Roller Finish	Dulux AcraTex AcraShield Roller Finish	AC00860
Clay brick and masonry	Dulux Professional	Dulux	Dulux	DU00421

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Restricted application	Acrylic Primer	Weathershield Low Sheen	Weathershield Low Sheen	
Concrete blockwork Restricted application	Berger Gold Label Acrylic Blockfiller	Dulux Weathershield Low Sheen Acrylic	Dulux Weathershield Low Sheen Acrylic	DU02631
Concrete blockwork (High-build performance coating system)	Dulux AcraTex Green Render Sealer	Dulux AcraTex AcraShield Roller Finish	Dulux AcraTex AcraShield Roller Finish	DU04938
Zinc coated metals (incl. Zinalume, Galvabond, Zincaneal, zincseal, zinc-primed steel)	Dulux 1 Step Prep	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen	DU04608
HD Galvanized steel or zinc-primed steel (Domestic)	Dulux Durebuild STE Two Pack Epoxy	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen	DU05261
Shop primed or red oxide primed (ROZP) ferrous metal.	Dulux Luxaprima Zinc Phosphate Primer	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen	DU00478
Plastics (solvent resistant types e.g. FRP, PVC-U) (low VOC)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen	DU04610

Semi-gloss latex – Exterior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Weatherboard - hardboard cladding Non rebated Jointed (Weathertex) Restricted application	Dulux Professional Acrylic Primer	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen	DU05348
Weatherboard -fibre cement board cladding Non rebated Jointed (Hardiboard) Restricted application	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen	DU02593
Fibre cement products Soffits Restricted application	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen		DU04504
Timber and veneers	Dulux Professional Acrylic Primer	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen	DU00611
Concrete (OFC, tilt slab or precast) Restricted application	Dulux Acratex Green Render Sealer	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen	DU04491
Concrete (OFC, tilt slab or precast) (High-build performance coating system)	Dulux Acratex Green Render Sealer	Dulux AcraTex AcraShield Roller Finish	Dulux AcraTex AcraShield Roller Finish	AC02778
Cement render (High-build performance coating system)	Dulux Acratex Green Render Sealer	Dulux AcraTex AcraShield Roller Finish	Dulux AcraTex AcraShield Roller Finish	AC00860

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Clay brick and masonry Restricted application	Dulux Professional Acrylic Primer	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen	DU00421
Concrete blockwork Restricted application	Berger Gold Label Acrylic Blockfiller	Dulux Weathershield Low Sheen Acrylic	Dulux Weathershield Low Sheen Acrylic	DU02631
Concrete blockwork (High-build performance coating system)	Dulux AcraTex Green Render Sealer	Dulux AcraTex AcraShield Roller Finish	Dulux AcraTex AcraShield Roller Finish	DU04938
Zinc coated metals (incl. Zinalume, Galvabond, Zincaneal, zincseal, zinc-primed steel)	Dulux 1 Step Prep	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen	DU04608
HD Galvanized steel or zinc-primed steel (Domestic)	Dulux Durebuild TE Two Pack Epoxy	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen	DU05261
Shop primed or red oxide primed (ROZP) ferrous metal.	Dulux Luxaprime Zinc Phosphate Primer	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen	DU00478
Plastics (solvent resistant types e.g. FRP, PVC-U) (low VOC)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen	DU04610

Gloss latex – Exterior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Fibre cement products Restricted application	Dulux Weathershield Gloss	Dulux Weathershield Gloss	Dulux Weathershield Gloss	DU05350
Timber and veneers	Dulux Professional Acrylic Primer	Dulux Weathershield Gloss	Dulux Weathershield Gloss	DU00623
Concrete (OFC, tilt slab or precast) Restricted application	Dulux AcraPrime 501/1 Water Based Primer	Dulux Weathershield Gloss	Dulux Weathershield Gloss	DU02639
Concrete (OFC, tilt slab or precast) (High-build performance coating system)	Dulux Acratex Green Render Sealer	Dulux AcraTex AcraShield Roller Finish	Dulux AcraTex AcraShield Roller Finish	AC02778
Cement render (High-build performance coating system)	Dulux Acratex Green Render Sealer	Dulux AcraTex AcraShield Roller Finish	Dulux AcraTex AcraShield Roller Finish	AC01415
Clay brick and masonry	Dulux Professional Acrylic Primer	Dulux Weathershield Gloss	Dulux Weathershield Gloss	DU05353
Concrete blockwork	Berger Gold Label Acrylic Blockfiller	Dulux Weathershield Gloss	Dulux Weathershield Gloss	DU03378
Concrete blockwork	Dulux Acratex Green	Dulux AcraTex	Dulux AcraTex	DU04938

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
(High-build performance coating system)	Render Sealer	AcraShield Roller Finish	AcraShield Roller Finish	
Zinc coated metals (incl. Zinalume, Galvabond, Zincaneal, zincseal, zinc-primed steel)	Dulux Professional Galvanised Iron Primer	Dulux Weathershield Gloss	Dulux Weathershield Gloss	DU05354
HD galvanized steel or zinc-primed steel (Domestic)	Dulux Durebuild STE Two Pack Epoxy	Dulux Weathershield Gloss	Dulux Weathershield Gloss	DU05355
Shop primed or red oxide primed (ROZP) ferrous metal.	Dulux Luxaprime Zinc Phosphate Primer (solvent based)	Dulux Weathershield Gloss	Dulux Weathershield Gloss	DU00480
Plastics (solvent resistant types e.g. FRP, PVC-U) (low VOC system)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Weathershield Gloss	Dulux Weathershield Gloss	DU05299

Acrylic paint system for bagged masonry – Exterior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Brickwork and concrete Restricted application	Berger Gold Label Block Filler	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen	DU02631
Brickwork and concrete – bagged slight texture finish	Dulux AcraPrime 501/1 Water Based Primer	Dulux Acratex Contempo Advance Coarse Bagged Look (2nd coat Optional)	Dulux Acratex Contempo Advance Coarse Bagged Look	AC01825
Brickwork and concrete – flush finish – medium texture	Dulux AcraTex Mediterranean Classique	Dulux AcraTex Mediterranean Classique	Dulux AcraTex AcraShield	AC02669

Textured acrylic paint system – Exterior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Concrete, blockwork and cement render	Dulux Acraprime 501/1 Water Based Primer	Dulux Acratex Contempo 959 Advance Base Coat	Dulux Acratex Contempo 959 Advance Finish Coat	AC01825
Concrete, blockwork and cement render	Dulux Acraprime 501/1 Water Based Primer (B15)	Dulux Acratex Roll On 00 Low Profile Texture	Dulux Acratex Acrashield Finish	AC01629
Concrete, masonry, blockwork and cement render	Dulux Acraprime 501/1 Water Based Primer	Dulux Acratex Acrashield 955 Low Gloss Rolana Finish	Dulux Acratex Acrashield 955 Low Gloss Rolana Finish	AC01958

Semi-gloss water based enamel – Exterior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Fibre cement products Restricted application	Dulux Professional Acrylic Primer	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU00432
Timber and veneers	Dulux Professional Acrylic Primer	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU04571
Concrete Restricted application	Dulux Professional Acrylic Primer	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU01004
Cement render Restricted application	Dulux Professional Acrylic Primer	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU00414
Brick and masonry Restricted application	Berger Gold Label Acrylic Block Filler	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU03370
Concrete blockwork Restricted application	Berger Gold Label Acrylic Block Filler	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU03370
Zinc coated metals Zincalume, Galvabond, Zincanneal, zincseal, zinc- primed steel) (low VOC system)	Dulux Professional Galvanised Iron Primer	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU01005
Shop primed or red oxide primed (ROZP) ferrous metal	Dulux Metalshield All Surface Primer	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU04575
Non-ferrous metals (incl. aluminium, brass, copper, tin plate) (low VOC system)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU00715
Plastics (solvent resistant types e.g. FRP, PVC-U) (low VOC system)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU00413

Full gloss water based enamel – Exterior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Fibre cement products Restricted application	Dulux Professional Acrylic Primer	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU00431
Timber and veneers	Dulux Professional Acrylic Primer	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU00548
Concrete Restricted application	Dulux Professional Acrylic Primer	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU01006
Cement render Restricted application	Dulux Professional Acrylic Primer	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU00415
Brick and masonry Restricted application	Berger Gold Label Acrylic Blockfiller	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU01008
Concrete	Berger Gold Label	Dulux Aquanamel	Dulux Aquanamel	DU01008

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
blockwork Restricted application	Acrylic Blockfiller	Gloss	Gloss	
Zinc-coated metals (Zincalume, Galvabond, Zincanneal, zincseal, & zinc-primed steel)	Dulux Professional Galvanised Iron Primer	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU04438
Shop primed or red oxide primed (ROZP) ferrous metal.	Dulux Luxaprime Zinc Phosphate Primer (solvent based)	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU00436
Non-ferrous metals (incl. aluminium, brass, copper, tin plate)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU01010
Plastics (solvent resistant types e.g. FRP, PVC-U)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU01011

Full gloss, solvent borne – Exterior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Timber and primed hardboard veneers	Dulux 1 Step Oil Based PSU (solvent based)	Dulux Super Enamel High Gloss	Dulux Super Enamel High Gloss	DU02410
Zinc-coated metals (zincalume, Galvabond, zincanneal, zincseal, zinc-primed steel)	Dulux Professional Galvanised Iron Primer	Dulux Super Enamel High Gloss	Dulux Super Enamel High Gloss	DU05331
Shop primed or red oxide primed (ROZP) ferrous metal.	Dulux Luxaprime Zinc Phosphate Primer (solvent based)	Dulux Super Enamel High Gloss	Dulux Super Enamel High Gloss	DU00481
Non-ferrous metals (incl. aluminium, brass, copper, tin plate)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Super Enamel High Gloss	Dulux Super Enamel High Gloss	DU03012
Plastics (solvent resistant types e.g. FRP, PVC-U)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Super Enamel High Gloss	Dulux Super Enamel High Gloss	DU02428
Plastics (solvent sensitive types, e.g. polystyrene)	Dulux Precision Maximum Strength Adhesion Primer	Don't use Solvent Based, Use Water Based Paints	Don't use Solvent Based, Use Water Based Paints	N/A

Car parking line marking

Requirement:

- Apply nominally 70 mm wide line marking for car parking spaces nominated on drawings.
- Materials:
- Paint System: Dulux Roadmaster WB2, spray applied to manufacturers written recommendations.
- Colour: White. Make sure line marking is not subject to discolouration by the bitumen from the road surface.

Application: Unless approved, apply all paint using a mechanical line marking sprayer. Make sure the road surface is clean and dry at the time of painting. Apply paint with a wet thickness in the range of 0.35 to 0.40 mm. Make sure bitumen is at least 30 days old before coating.

Standard: To AS/NZS 2890.1 (2004).

0673 POWDER COATINGS

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide powder coating systems to substrates, as documented.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

1.3 STANDARDS

General

Application to aluminium and aluminium alloy substrates for architectural applications: To AAMA 2603 (2022), AAMA 2604 (2022) and AAMA 2605 (2022), as appropriate, and AS 3715 (2002).

Application to metal substrates other than aluminium for architectural applications: To AS 4506 (2024).

1.4 INTERPRETATION

Definitions

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

- Powder coating: The process of preparing, applying, fusing and curing a thermoset powder coating material to a substrate:
 - . Thermoset powder coating: A mixture of finely ground particles of pigment and resin sprayed on to a prepared substrate. Charged powder particles adhere to electrically grounded surfaces until heated and fused into a smooth coating in a curing oven.
 - . Polyester powder coating: Uses an enhanced polyester resin.
 - . Fluoropolymer powder coating: Uses PTFE (poly tetra fluoro ethylene) for aluminium substrates.
- Substrate: The surface to which a material or product is applied.

1.5 SUBMISSIONS

Products and materials

Coating manufacturer: Submit the following details at least 3 weeks before fabrication:

- Recommended coating system for the nominated service condition.
- Brand name.
- Storage and handling recommendations.
- Product data sheets.
- Maintenance recommendations.

Samples

Requirement: Submit samples to PRODUCTS, **GENERAL**, **Samples**.

Subcontractors

Specialist applicators: Submit name and contact details of proposed specialist applicators as registered by the coating manufacturer.

Warranties

Requirement: Submit warranties to **COMPLETION**, **Warranties**.

2 PRODUCTS

2.1 GENERAL

Samples

Requirement: Provide labelled samples of each coating system on representative substrates, showing surface preparation, colour, gloss level, texture and physical properties.

Storage and handling

General: To AS 3715 (2002) Appendix D for powder coated aluminium and AS 4506 (2024) Appendix D for all other powder coated materials.

2.2 MATERIALS

Performance requirements

Powder coating to aluminium and aluminium alloy: To AS 3715 (2002) Section 2.

Powder coating to metals, other than aluminium: To AS 4506 (2024) Section 2.

3 EXECUTION

3.1 PREPARATION

Substrate pre-treatment

Powder coating to aluminium: To AS 3715 (2002) Appendix G.

Powder coating to metals, other than aluminium: To AS 4506 (2024) Appendix I.

3.2 COMPLETION

Cleaning

Aluminium architectural applications: Clean completed assembly to AS 3715 (2002) Appendix C.

Metal, other than aluminium, architectural applications: Clean completed assembly to AS 4506 (2024) Appendix E.

0811S SANITARY FIXTURES

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide sanitary fixtures, as documented.

1.2 STANDARDS

General

Design for access and mobility: To the NCC cited AS 1428.1 (2009) and AS 1428.2 (1992).

2 PRODUCTS

2.1 GENERAL

Authorised products

Requirement: Listed in the WaterMark Product Database, unless otherwise required by the Network Utility Operator.

Labelling

Water efficiency labelling: Provide products conforming to and labelled to the Water Efficiency Labelling Scheme (WELS).

3 EXECUTION

3.1 SANITARY FIXTURES

General

Requirement: Install to manufacturer's recommendations.

4 SELECTIONS

4.1 SANITARY FIXTURES

Basins schedule

	A	B	C
Brand	CAROMA	FIENZA DELTA CARE	
Catalogue number or model	RIGHT HAND - 878710W LEFT HAND 878810W	LEFT HAND - RB2275L RIGHT HAND - RB2275L	
Material	Ceramic	Ceramic	
Colour	White	White	
Number of tap holes	1	1	
Location	As documented	As documented	
Rim height from floor (mm)	810mm max	810mm max	

Cisterns schedule

	A	B	C
Brand	CAROMA	CAROMA	
Catalogue number or model	743500W	982910BSB	
Type	URBANE	CAROMA CARE 200	
Material	CERAMIC	CERAMIC	
Colour	WHITE	WHITE	
Nominal flush (litres)			
WELS rating to AS/NZS 6400 (2016) (stars)			

Cleaners sinks schedule

	A	B	C
Brand	CAROMA		
Catalogue number or model	811592W		
Trap material			

Laundry tub schedule

	A	B	C
Brand	EVERHARD		
Catalogue number or model	71X4000		

Stainless steel sinks schedule

	A	B	C
Type	CLARK		
Catalogue number or model	4162		
Bowls	1		
Number of tap holes	1		

Urinal assemblies schedule

	A	B	C
Type	BRITEX		
Catalogue number or model	USAN		
Outlet connector			
Foot grating	STAINLESS STEEL		
Material	STAINLESS STEEL		
Supports			

WC pans schedule

	A	B	C
Type	CAROMA	CAROMA	
Brand	743500W	982910BSB	
Catalogue number or model	URBANE II	CAROMA CARE 200	
Material	CERAMIC	CERAMIC	
Colour	WHITE	WHITE	
Seat form			
Trap	P	P	
WELS rating to AS/NZS 6400 (2016) (stars)			

0812S TAPWARE

1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide tapware, as documented.

1.2 STANDARDS**General**

Design for access and mobility: To the NCC cited AS 1428.1 (2009) and AS 1428.2 (1992).

2 PRODUCTS**2.1 GENERAL****Authorised products**

Requirement: Listed in the WaterMark Product Database, unless otherwise required by the Network Utility Operator.

Labelling

Water efficiency labelling: Provide products conforming to and labelled to the Water Efficiency Labelling Scheme (WELS).

3 EXECUTION**3.1 TAPWARE****General**

Requirement: Install to manufacturer's recommendations.

4 SELECTIONS**4.1 TAPWARE****Basin tapware schedule**

	A	B	C
Brand	CAROMA	ENWARE	
Catalogue number or model	90989C5A	TFC745	
Finish	CHROME	CHROME	
Outlet type			
Plug			
Spindle			
Vandal resistant construction			
Miniature stop valves			
WELS rating to AS/NZS 6400 (2016) (stars)			

Laundry trough and tub tapware schedule

	A	B	C
Brand	CAROMA		
Catalogue number or model	90331BL4A		
WELS rating to AS/NZS 6400 (2016)			

	A	B	C
(stars)			

Shower tapware schedule

	A	B	C
Brand	ENWARE	CAROMA	
Catalogue number or model	TFC749128 TF recess shower control 30 Sec	LH- 782740A, RH- 782741A Caroma Plus Starsafe II inverted T Accessible Shower Set; 91107C care plus shower mixer standard handle HC	
Finish	CHROME	CHROME	
Hand shower			
Shower head	Rada VR2	PART OF SHOWER SETCAROMA	
Spindles			
Vandal resistant construction	yes		
WELS rating to AS/NZS 6400 (2016) (stars)			

Sink tapware schedule

	A	B	C
Brand	CAROMA		
Catalogue number or model	98056C4A, CIRRUS SINK MIXER		
Finish	CHROME		
Miniature stop valves			
WELS rating to AS/NZS 6400 (2016) (stars)			

Other tapware schedule

	A	B	C
Brand	BY BSE ENGINEERS		
Catalogue number or model			
Finish			
Spindle			
Vandal resistant construction			
Miniature stop valves			
WELS rating to AS/NZS 6400 (2016) (stars)			

Proprietary fittings and fixtures schedule

	A	B	C
Brand			
Catalogue number or model			
Dimensions			
Material and finish			

0702 MECHANICAL DESIGN AND INSTALL

1 MECHANICAL SYSTEMS

1.1 RESPONSIBILITIES

General

Refer to engineer's documentation.

0802 HYDRAULIC DESIGN AND INSTALL
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1 HYDRAULIC SYSTEMS

1.1 RESPONSIBILITIES

General

Refer to engineer's documentation.

0902 ELECTRICAL DESIGN AND INSTALL

1 ELECTRICAL SYSTEMS

1.1 RESPONSIBILITIES

General

Refer to engineer's documentation.

APPENDIX 1 – DOOR HARDWARE

1 DORMAKABA DOOR HARDWARE SCHEDULE
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