PTL Pty Limited

@ 24 Tryon Road, Lindfield

Construction Issue

Revision	Date	Amendment	Approved by
A	23/11/12	Issued for Information	MA
B	03/12/12	Issued for Tender + CC	MA
0	21/05/13	Approved for Construction	MA

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1 GENERAL

1.1 GENERAL

General Information

General: All rates exclude GST. All Trade Item Rates allow for supply and installation (unless noted otherwise). The below schedule of general trade rates is provided for the purposes of the valuation of variations and are the specific rates or prices to be considered for additional work. Where relevant, the nominated rates allow for any proprietary specified products in the contract documents particular to that trade item.

Substitutions

Refer to part ***General requirements*** of the specification.

1.2 GENERAL TRADE RATES

Trade Description	Standard $/hr rate	Out of hours $/hr rate
1. General labourer	$45.00	$67.50
2. Tradesperson	$70.00	$105.00
3. Bricklayer	$70.00	$105.00
4. Plasterer and renderer	$70.00	$105.00
5. Carpenter and joiner	$70.00	$105.00
6. Painter	$55.00	$82.50
7. Metal worker	$75.00	$112.50
8. Electrical	*Refer to clause 1.4.*	
9. Hydraulic	*Refer to clause 1.3.*	
10. Plumber	$90.00	$135.00
11. Mechanical	*Refer to clause 1.5.*	
13. Foreperson or site supervisor	$110.00	$165.00
14. Project manager	$130.00	$195.00

Trade	Item	Unit	Rate
Masonry	Single skin brick wall.	m²	$115
Masonry	Single skin blockwork wall (hollow).	m²	$135
Masonry	Single skin blockwork wall (core filled).	m²	$225
Roofing	Stratco roof sheeting	m²	$80
Roofing	Stratco 90Ø Colorbond downpipes	Lm	$56
Roofing	Stratco flat back half round 150 Colorbond downpipes	Lm	$73
Windows	Skylights	no	$800
Windows	Aluminium windows	m²	$400
Windows	Extra over for white laminated glazing	m²	$147
Windows	Flyscreens (black aluminium mesh)	m²	$50

Doors	Aluminium glazed bi-folds	Lm	$1,145
Paint	Painting internal walls	m²	$14
Paint	Painting external walls	m²	$14
Paint	Painting ceilings and soffits	m²	$14
Cladding	Weathertex cladding	m²	$130
Cladding	Rendering	m²	$35
Tiling	Wall tiling.	m²	$85
Tiling	Floor tiling.	m²	$135
Tiling	Feature tiling.	m²	$390
Floors	Carpet with underlay	m²	$85
Floors	Timber boards with underlay	m²	$125
Floors	Skirting	Lm	$19
Ceiling	Ceiling lining	m²	$43
Ceiling	Access panel	no.	$250
Fixtures	Shower screens	m²	$450
Waterproofing	Retaining walls	m²	$55
Waterproofing	Roof terrace	m²	$50
Waterproofing	Amenities	m²	$38
Fencing	Type F-1	Lm	$428
Fencing	Type F-2	Lm	$100
Fencing	Type F-3	Lm	$150
Fencing	Type F-4	Lm	$85

1.3 HYDRAULIC TRADE RATES

General Information
General: All rates include all costs associated with the design, supply, installation, testing, commissioning, materials, workshop drawing alterations, cartage, freight, tools, plant scaffolding, painting and defects liability associated with such works. Please note **E & B = Excavation & backfill.**

Sewer

Size	Item	Rate per metre
100	**PVC-U** - Sewer as specified - 1m deep including **E & B**	$110
100	**PVC-U** - Sewer as specified - 1.5m deep including **E & B**	$145
150	**PVC-U** - Sewer as specified - 1m deep including **E & B**	$163
150	**PVC-U** - Sewer as specified - 1.5m deep including **E & B**	$189
100	**PVC-U** - 45° bend.	$40
100	**PVC-U** - Sewer as specified - Fixed from slab / Structure	$110
150	**PVC-U** - Sewer as specified - Fixed from slab / Structure	$135
100	**PVC-U** - 90° bend.	$40
100	**PVC-U** - 45° Y junction.	$40
150	**PVC-U** - 45° bend.	$50
150	**PVC-U** - 90° bend.	$50
150	**PVC-U** - 45° Y junction.	$50
100	Clearout Brass	$70
100	Tenancy Drainage Turn up.	$400

Stormwater

Size	Item	Rate per metre
100	**PVC-U** - Stormwater as specified - 1m deep including **E & B**	$110
100	**PVC-U** - Stormwater as specified - .5m deep including **E & B**	$145
150	**PVC-U** - Stormwater as specified - 1m deep including **E & B**	$163
150	**PVC-U** - Stormwater as specified -1.5m deep including **E & B**	$189
225	**PVC-U** - Stormwater as specified - 1m deep including **E & B**	$190
225	**PVC-U** - Stormwater as specified -1.5m deep including **E & B**	$210
	450mm x 450mm Stormwater pit with Grate	$600
	Riser for 450mm x 450mm Stormwater pit	$420
	600mm x 600mm Stormwater pit with Grate	$800
	Riser for 600mm x 600mm Stormwater pit	$500
	900mm x 900mm Stormwater pit with Grate	$1000
	Riser for 900mm x 900mm Stormwater pit	$550
	900mm x 600mm Stormwater pit with Grate	$1000
	Riser for 900mm x 600mm Stormwater pit	$550

Downpipe

Size	Item	Rate per metre
100	**PVC-U** - Downpipe as specified - Fixed from slab / Structure	$60
100	**PVC-U** - 45° bend - as specified - Fixed from slab / Structure	$40
100	**PVC-U** - 90° bend - as specified - Fixed from Slab / Structure	$40
150	**PVC-U** - Downpipe as specified - Fixed from Slab / Structure	$70
150	**PVC-U** - 45° bend - as specified - Fixed from Slab / Structure	$50
150	**PVC-U** - 90° bend - as specified - Fixed from Slab / Structure	$50
90	**Colourbond**	$75
100	**Colourbond**	$85

Cold Water (above ground)

Size	Item	Rate per metre
Cold Water (above ground)		
15	**Copper -** Type B as specified Fixed from Slab / Structure	$45
20	**Copper -** Type B as specified Fixed from Slab / Structure	$60
25	**Copper -** Type B as specified Fixed from Slab / Structure	$65
32	**Copper -** Type B as specified Fixed from Slab / Structure	$72
40	**Copper -** Type B as specified Fixed from Slab / Structure	$80
50	**Copper -** Type B as specified Fixed from Slab / Structure	$95

Cold Water (below ground)

Size	Item	Rate per metre
32	**Cromford -** Buried Below Ground	$63
40	**Cromford -** Buried Below Ground	$66
50	**Cromford -** Buried Below Ground	$70
63	**Cromford -** Buried Below Ground	$77
75	**Cromford -** Buried Below Ground	$83

Cold Water

Size	Item	Rate per metre
15	Stop valve - Supplied and installed	$57
20	Stop valve - Supplied and installed	$85
25	Stop valve - Supplied and installed	$230
32	Stop valve - Supplied and installed	$370
40	Stop valve - Supplied and installed	$430
50	Stop valve - Supplied and installed	$580

Hydrant

Size	Item	Rate per metre
100	Fire Hydrant (Internal) - Supplied and installed	$1200
100	Fire Hydrant double headed (External)- Supplied and installed.	$2400
100	Inground Hydrant Service as specified 1m deep including **E & B**	$180

Gas Service (above ground)

Size	Item	Rate per metre
15	**Copper -** Type B as specified Fixed from Slab / Structure	$45
20	**Copper -** Type B as specified Fixed from Slab / Structure	$60
25	**Copper -** Type B as specified Fixed from Slab / Structure	$65
32	**Copper -** Type B as specified Fixed from Slab / Structure	$72

Gas Service (below ground)

Size	Item	Rate per metre
32	**Cromford -** Buried Below Ground	$63
40	**Cromford -** Buried Below Ground	$66

Gas Service

Size	Item	Rate per metre
15	Stop valve - Supplied and installed	$57
20	Stop valve - Supplied and installed	$85
25	Stop valve - Supplied and installed	$230
32	Stop valve - Supplied and installed	$370

Rainwater Harvesting Pipe (above ground)

Size	Item	Rate per metre
15	**Rehau -** as specified Fixed from Slab / Structure	$35
20	**Rehau -** as specified Fixed from Slab / Structure	$40
25	**Rehau -** as specified Fixed from Slab / Structure	$35
32	**Rehau -** as specified Fixed from Slab / Structure	$45
40	**Rehau -** as specified Fixed from Slab / Structure	$55
50	**Rehau -** as specified Fixed from Slab / Structure	$68
63	**Rehau -** as specified Fixed from Slab / Structure	$80

Rainwater Harvesting Pipe (below ground)

Size	Item	Rate per metre

32	**Cromford** - Buried Below Ground	$95
40	**Cromford** - Buried Below Ground	$105
50	**Cromford** - Buried Below Ground	$118
63	**Cromford** - Buried Below Ground	$130

1.4 ELECTRICAL TRADE RATES

General Information

General: All rates include all costs associated with the design, supply, installation, testing, commissioning, materials, workshop drawing alterations, cartage, freight, tools, plant scaffolding, painting and defects liability associated with such works.

Schedule of manufacturers, suppliers and subcontractors

Item	Nominated
Main switchboard manufacturer	Relec
Distribution switchboard manufacturer	Relec
Typical luminaires manufacturer	Pierlite
MATV systems installer	New Edge
Telecommunications wiring installer	New Edge
Fire detection & alarm system installer	New Edge
Video intercom system and manufacturer	Airphone

Luminaries

General: Unit prices are per luminaire including lamps, control gear etc. Installation of luminaries includes up to 20m of TPS wiring in ceiling spaces.

List identification	Supply	Install
B1	$40.91	$100
B2	$45.45	$90.91
B3	$61.82	$90.91
B4	$77.27	$90.91
C2	$527.27	$90.91
D1	$54.55	$77.27
D2	$68.18	$77.27
P1	$95.45	$113.64
P2	$59.09	$113.64
S1	$43.64	$90.91
W1	$68.18	$100
W2	$45.45	$109.09
W3	$68.18	$100
U	$527.27	$163.64
Linear batten	$81.82	$77.27
Spitfire	$122.73	$100
Exit	$140.91	$109.09

Socket Outlets

General: Unit prices are per socket outlet including 20m route length of wiring in TPS within ceiling space.

List identification	Rate
Wall mounted	$90.91
Floor mounted	$136.36

Equipment

General: Unit price supply and installation of one additional single pole circuit breaker.

List identification	Rate
16A	$43.64
20A	$43.64
32A	$43.64
63A	$43.64

General: Unit price supply and installation of one additional triple pole circuit breaker.

List identification	Rate
16A	$138.18
20A	$138.18
32A	$138.18
63A	$138.18

Labour and Materials

General: For variations not covered by above items.

List identification	Rate
Normal time	$55.34
Time and a half	$67.19
Double time	$79.05
Percentage additional to trade prices of materials inclusive of handling and deliver costs.	10%

1.5 MECHANICAL TRADE RATES

General Information

General: All rates include all costs associated with the design, supply, installation, testing, commissioning, materials, workshop drawing alterations, cartage, freight, tools, plant scaffolding, painting and defects liability associated with such works.

Schedule of manufacturers, suppliers and subcontractors

Item	Nominated
Air conditioning units	Daikin
Ventilation fans	All Vent
CO monitoring system	Gastech Australia
Air diffusers and grilles	Holyoake
Ductwork and pipework insulation	Axiflow
Flexible ductwork	Axiflow

Ductwork

Air-conditioning ductwork externally insulated (75mm)

Duct size [mm]	Straight duct [$ per metre]	Bends with turning vanes [$]	Transition (largest size) [$]	Branch with splitter [$]
200x200	$30	$70	$65.45	$60
250x200	$30	$70	$65.45	$60
250x250	$36.36	$75.45	$70	$65.45
300x200	$36.36	$80	$70	$65.45
300x250	$40	$80	$75.55	$70
400x200	$40	$90	$75.55	$70
400x250	$45.45	$95.45	$80	$75.55

Air-conditioning ductwork internally insulated (75mm)

Duct size [mm]	Straight duct [$ per metre]	Bends with turning vanes [$]	Transition (largest size) [$]	Branch with splitter [$]
250x250	$38.18	$110	$90	$80
300x200	$38.18	$110	$90	$80
300x250	$39.09	$119.09	$110	$95.45
400x250	$50	$125.45	$110	$95.45
450x300	$55.45	$135.45	$120	$100
600x200	$60	$140	$130	$110
800x300	$75.45	$160	$145.45	$130

Ventilation ductwork internally insulated (25mm)

Duct size [mm]	Straight duct [$ per metre]	Bends with turning vanes [$]	Transition (largest size) [$]	Branch with splitter [$]
250x200	$30	$90	$80	$75.45
300x250	$35.45	$95.45	$80	$75.45
400x250	$45.45	$110	$95.45	$84.45
400x400	$50	$115.45	$105.45	$95.45
600x400	$65.45	$115.45	$115.45	$105.45
1800x400	$110	$281.82	$250	$230

Ventilation ductwork - uninsulated

Duct size [mm]	Straight duct [$ per metre]	Bends with turning vanes [$]	Transition (largest size) [$]	Branch with splitter [$]
250x200	$15.45	$55.45	$40	$35.45
300x250	$20	$65.45	$50	$45.45
400x250	$25.45	$65.45	$55.45	$50
400x400	$35.45	$170	$70	$54.55
600x400	$40	$140	$85.45	$75.45

Flexible ductwork – maximum length 5m

Duct size [Ø mm]	Uninsulated with spigot & butterfly damper [$]	25mm insulated with spigot and butterfly damper [$]	50mm insulated with spigot and butterfly damper [$]

150	$49.09	$79.09	$91.82
200	$53.64	$91.82	$108.18
250	$58.18	$111.82	$131.82
300	$80.91	$154.55	$153.64
350	$111.82	$165.45	$185.45
400	$134.55	$196.36	$216.36

Air Terminals

Air terminal size [mm]	Type	Unit rate (including internally insulated plenum box) [$]
300x300	Louvred face	$110.91
600x600	Louvred face	$159.09
250x250	Egg-crate	$64.55
300x300	Egg-crate	$85.45
450x450	Egg-crate	$110.91
600x600	Egg-crate	157.27

Refrigerant Pipework

Nominal pipe size [Ø mm]	Insulated pipe with bends & fittings [$ per metre]
15	$81.82
20	$92.73
25	$101.82
32	$131.82
40	$222.73

Labour and Materials

General: For variations not covered by above items.

List identification	Rate
Normal time	$95.45
Time and a half	$136.36
Double time	$181.82
Percentage additional to trade prices of materials inclusive of handling and deliver costs.	10%

0142 PRELIMINARIES – ABIC SW-2008

1 GENERAL

1.1 GENERAL

General conditions
General: To ABIC SW-2008 Simple Works Contract, issued by the Australian Institute of Architects and Master Builders Australia.

Interpretation
Cross reference: The clause **INTERPRETATION**, in the *General requirements* worksection, also applies.

1.2 THE SITE

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

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

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

Control of run off stormwater: Control stormwater runoff as required by development consent and any other regulatory requirements.

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

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

Existing services
General: Attend to existing services as follows:

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

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

- Purpose of submission: For review.

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

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

Dilapidation Records: For properties described in the **Adjoining properties to be recorded schedule**:

- The owner will at their own cost, prepare dilapidation records for all properties noted in the schedule. The contractor can at its discretion prepare records for any other properties however any associated costs are to be borne by the contractor and a copy of the record must be submitted to the owner for acceptance prior to commencement of work on site.

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

- Purpose of submission: Information only.

Adjoining properties to be recorded schedule

Title	Owner	Description
26 Tryon Road, Lindfield	Cromehurst School	School buildings and playgrounds.
Tryon Road and surrounds	Ku-ring-gai Council	Public land.
Kochia Lane and surrounds	Ku-ring-gai Council	Public land.

1.3 CONSTRUCTION PLANT

Use of existing services

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

Existing services schedule

Service	Conditions of use
Power	Associated costs to be borne by contractor.
Water	Associated costs to be borne by contractor.

Protective clothing

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

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

Project signboards

General: Provide project-specific signboards and as follows:

- Locate in suitable position..
- Maintain in good condition for duration of the work.
- Remove on completion.

1.4 BUILDING THE WORKS

Surveys

Setting out: Set out the works as is required with the cost to be borne by the contractor.

Survey marks

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

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

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, cave-ins and fire risk.

Accident reports: Submit reports of accidents.

- Purpose of submission: Information only.

Contractor's representative

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

Subcontracting

General: Submit a complete list of proposed subcontractors and suppliers and fully inform them of relevant obligations.

Program of work

Construction program: Show the following:

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

Time scale: Working days.

Updated program: Identify changes since the previous issue, and show the estimated percentage of completion for each item of work.

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

Site meetings

General: Hold and attend site meetings throughout the contract and arrange for the attendance of appropriate subcontractors, the architect, and appropriate consultants.

Frequency: Not less than weekly from breaking of ground to practical completion of the project. Otherwise as required.

Minutes: Meeting minutes shall be kept and distributed by the architect.

- Purpose of submission: Review.

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

- Purpose of submission: Information only.

Items supplied by owner

General: Refer to the building contract.

1.5 COMPLETION OF THE WORKS

Final cleaning

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

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

Reinstatement

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

Adjoining property

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

Adjoining properties to be recorded schedule

Title	Owner	Description
20-22 Tryon Road, Lindfield	Unknown	Unit building.
26 Tryon Road, Lindfield	Cromehurst School	School buildings and playgrounds.
Tryon Road and surrounds	Ku-ring-gai Council	Public land.
Kochia Lane and surrounds	Ku-ring-gai Council	Public land.

Removal of plant

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

1.6 PAYMENT FOR THE WORKS

Import costs

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 listed in the Import cost adjustment schedule, add or deduct the amount of the difference to or from the contract sum, as applicable.

Anticipated progress payments

General: If requested, submit a schedule of anticipated progress claims for the contract period. Submit a revised schedule with each progress claim.

Purpose of submission: Information only.

Progress claims

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

Purpose of submission: Review.

Method of measurement

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

Other civil engineering work: To AS 1181.

0171B GENERAL REQUIREMENTS

1 GENERAL

1.1 RESPONSIBILITIES

Performance

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

- Fixed accessways: To AS 1657.
- Structural design actions: To AS/NZS 1170.0 and the **Structural design actions schedule**.

Design

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

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

Noise levels

General: Install systems in conformance with the documented equipment performance.

1.2 PRECEDENCE

General

Worksections and referenced documents:

- The requirements of other worksections of the specification override conflicting requirements of this worksection.
- The requirements of the worksections override conflicting requirements of their referenced documents.
- The requirements of the referenced documents are minimum requirements.

1.3 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *Demolition*.
- *Service trenching*.

Common requirements

Requirement: Conform to the following:

- *Adhesives, sealants and fasteners*.
- *Fire-stopping*.
- *Metals and prefinishes*.
- *Termite management*.
- *Timber products, finishes and treatment*.
- *Building IT components*.

Cross referencing styles

Within the text:

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

1.4 REFERENCED DOCUMENTS

Contractual relationships

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

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

1.5 INTERPRETATION

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

- AS: Australian Standard.
- BCA: National Construction Code Series Volume One: Building Code of Australia Class 2 to 9 Buildings.
- EMC: Electromagnetic compatibility.
- MSDS: Material safety data sheets.
- NATA: National Association of Testing Authorities.
- NCC: National Construction Code.
- NZS: New Zealand Standard.
- PCA: National Construction Code Series Volume 3: Plumbing Code of Australia.
- PVC: Polyvinyl Chloride.
- VOC: Volatile organic compound.

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

- Attendance: Attendance, provide attendance and similar expressions mean give assistance for examination and testing.
- Contractor: Contractor has the same meaning as builder and is the person or organisation bound to carry out and complete the work under the contract.
- Contract administrator: Contract administrator has the same meaning as architect' or superintendent' and is the person appointed by the owner' or principal under the contract.
- Default: Specified value, product or installation method which is to be provided unless otherwise documented.
- Design life: The period of time for which it is assumed, in the design, that an asset will be able to perform its intended purpose with only anticipated maintenance but no major repair or replacement being necessary.
- Documented: Documented, as documented and similar terms mean contained in the contract documents.
- Economic life: The period of time from the acquisition of an asset to when the asset, while still physically capable of fulfilling its function and with only anticipated maintenance, ceases to be the lowest cost alternative for satisfying that function.
- Electricity distributor: Any person or organisation that provides electricity from an electricity distribution system to one or more electrical installations. Includes distributor, supply authority, network operator, local network service provider, electricity retailer or electricity entity, as may be appropriate in the relevant jurisdiction.
- Geotechnical site investigation: The process of evaluating the geotechnical characteristics of the site in the context of existing or proposed construction.
- Give notice: Give notice, submit, advise, inform and similar expressions mean give notice (submit, advise, inform) in writing to the contract administrator.
- High level interface: Systems transfer information in a digital format using an open system interface.
- Hot-dip galvanized: Zinc coated to AS/NZS 4680 after fabrication with coating thickness and mass to AS/NZS 4680 Table 1.
- IP: IP, IP code, IP rating and similar expression have the same meaning as IP Code in AS 60529.
- Joints:
  . Construction joint: A joint with continuous reinforcement provided to suit construction sequence.

  - . Control joint: An unreinforced joint between or within discrete elements of construction which allows for relative movement of the elements.
  - . Contraction joint: An opening control joint with a bond breaking coating separating the joint surfaces to allow independent and controlled contraction of different parts or components, induced by shrinkage, temperature changes or other causes. It may include unbound dowels to assist vertical deflection control.
  - . Expansion joint: A closing control joint with the joint surfaces separated by a compressible filler to allow axial movement due to thermal expansion or contraction with changes in temperature or creep. It may include unbound dowels to assist vertical deflection control.
  - . Isolation joint: A joint between elements of a structure designed to isolate structural movement while permitting horizontal and/or vertical movement between abutting elements.
  - . Weakened plane joint: A contraction joint created by forming a groove, extending at least one quarter the depth of the section, either by using a grooving tool, by sawing, or by inserting a premoulded strip.
  - . Structural control joint: A control joints (contraction, expansion and isolation) in structural elements when used with applied material and finishes.
  - . Substrate joint: A joint in the substrate which includes construction joints and joints between different materials.
  - . Sealant joint: A joint filled with a flexible synthetic compound which adheres to surfaces within the joint to prevent the passage of dust, moisture and gases.
- Local government authority: A body established for the purposes of local government by or under a law applying in a state or territory.
- Low level interface: Systems transfer information via terminals and voltage free contacts.
- Manufacturer's recommendations: Recommendations, instructions, requirements, specifications (and similar expressions) provided in written or other form by the manufacturer and/or supplier relating to the suitability, use, installation, storage and/or handling of a product.
- Metallic-coated: Steel coated with zinc or aluminium-zinc alloy as follows:
  - . Metallic-coated steel sheet: To AS 1397. Metal thicknesses specified are base metal thicknesses.
  - . Ferrous open sections zinc coated by an in-line process: To AS/NZS 4791.
  - . Ferrous hollow sections zinc coated by a continuous or specialised process: To AS/NZS 4792.
- Network Utility Operator: A person who undertakes the piped distribution of drinking water or natural gas for supply or is the operator of a sewerage system or a stormwater system.
- Obtain: Obtain, seek and similar expressions mean obtain (seek) in writing from the contract administrator.
- Practical completion or Defects free completion: The requirements for these stages of completion are defined in the relevant building contract for the project.
- Pipe: Includes pipe and tube.
- Principal: Principal has the same meaning as owner, client and proprietor and is the party to whom the contractor is legally bound to construct the works.
- Professional engineer: As defined by the BCA.
- Proprietary: Proprietary means identifiable by naming manufacturer, supplier, installer, trade name, brand name, catalogue or reference number.
- Provide: Provide and similar expressions mean supply and install and include development of the design beyond that documented.
- Readily accessible: To AS/NZS 3000.
- Record drawings: Record drawings has the same meaning as as-installed drawings, as-built drawings and work-as-executed drawings.
- Registered testing authority:
  - . An organisation registered by the National Association of Testing Authorities (NATA) to test in the relevant field; or
  - . An organisation outside Australia registered by an authority recognised by NATA through a mutual recognition agreement; or

. An organisation recognised as being a Registered Testing Authority under legislation at the time the test was undertaken.

- Required: Means required by the documents, the local council or statutory authorities.
- If required: A conditional specification term for work which may be shown in the documents or is a legislative requirement.
- Samples: Includes samples, prototypes and sample panels.
- Statutory authority: A public sector entity created by a specific law of the Commonwealth State of Territory.
- Supply: Supply, furnish and similar expressions mean supply only.
- Tests:
  . Pre-completion tests: Tests carried out before completion tests.
    * Type tests: Tests carried out on an item identical with a production item, before delivery to the site.
    * Production tests: Tests carried out on a purchased item, before delivery to the site.
    * Progressive tests: Tests carried out during installation to demonstrate performance in according with this specification.
    * Site tests: Tests carried out on the site.
  . Completion tests: Tests carried out on completed installations or systems and fully resolved before the date for, to demonstrate that the installation or system, including components, controls and equipment, operates correctly, safely and efficiently, and meets performance and other requirements. The contract administrator may direct that completion tests be carried out after the date for practical completion.
- Tolerance: The permitted difference between the upper limit and the lower limit of dimension, value or quantity.
- Verification: Provision of evidence or proof that a performance requirement has been met or a default exists.

1.6 INSPECTION

Notice

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

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

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

Light level requirements: to AS/NZS 1680.2.4.

Attendance

General: Provide attendance for documented inspections and tests.

1.7 SUBMISSIONS

General

Submit to: Architect.

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

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

Shop drawings: 5 working days.

Samples and prototypes: 5 working days.

Manufacturers' or suppliers' recommendations: 5 working days.

Product data: 5 working days.

Product/design substitution or modification: 10 working days.

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

Identification

General: Identify the project, contractor, subcontractor or supplier, manufacturer, applicable product, model number and options, as appropriate and include pertinent contract document references. Include service connection requirements and product certification.

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

Errors

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

Authorities

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

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

Building penetrations

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

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

Certification

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

Execution details

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

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

Inspection and testing

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

Test reports: Submit written reports on nominated tests.

Materials and components

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

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

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

Substitutions

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

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

- Evidence that the performance is equal to or greater than that specified.
- Evidence of conformity to a cited standard.
- Samples.

- Essential technical information, in English.
- Reasons for the proposed substitutions.
- Statement of the extent of revisions to the contract documents.
- Statement of the extent of revisions to the construction program.
- Statement of cost implications including costs outside the contract.
- Statement of consequent alterations to other parts of the works.

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

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

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

Samples

Submission: Submit nominated samples.

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

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

Shop drawings

General: Include dimensioned drawings showing details of the fabrication and installation of structural elements, building components, services and equipment, including relationship to building structure and other services, cable type and size, and marking details.

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

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

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

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

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

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

2 PRODUCTS

2.1 GENERAL

Manufacturers' or suppliers' recommendations

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

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

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

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

Prohibited materials
Do not provide the following:

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

2.2 TESTS

Attendance
General: Provide attendance on tests.

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

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

2.3 MATERIALS AND COMPONENTS

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

Corrosion resistance
General: Conform to the following atmospheric corrosivity category as defined in AS/NZS 2312.

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

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

3 EXECUTION

3.1 OFF SITE DISPOSAL

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

3.2 WALL CHASING

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

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

Concrete blockwork chasing table

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

3.3 FIXING

General

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

Fasteners

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

3.4 SERVICES CONNECTIONS

Connections

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

Network distributors' requirements

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

3.5 SERVICES INSTALLATION

General

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

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

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

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

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

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

Dissimilar metals

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

Temporary capping

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

Piping

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

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

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

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

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

General: If pipes that operate under pressure are to be embedded in concrete or surfacing material conform to AS 2896 clause 4.3.3.3. Pressure test and rectify leaks before the concrete is poured.

Valve groupings: If possible, locate valves in groups.

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

Differential movement

- General: If the geotechnical site investigation report predicts differential movements between buildings and the ground in which pipes or conduits are buried, provide control joints in the pipes or conduits, as follows:
- Arrangement: Arrange pipes and conduits to minimise the number of control joints.
- Magnitude: Accommodate the predicted movements.

3.6 BUILDING PENETRATIONS

Penetrations

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

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

Sleeves

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

- Movement: Arrange to permit normal pipe or conduit movement.
- Diameter (for non fire-rated building elements): Sufficient to provide an annular space around the pipe or pipe insulation of at least 12 mm.
- Prime paint ferrous surfaces.
- Terminations:
  - . If cover plates are fitted: Flush with the finished building surface.
  - . In fire-rated and acoustic-rated building elements: 50 mm beyond finished building surface.
  - . In floors draining to floor wastes: 50 mm above finished floor.
  - . Elsewhere: 5 mm beyond finished building surface.
  - . Termite management: To AS 3660.1.
- Thickness:
  - . Metal: ≥ 1 mm.
  - . PVC: ≥ 3 mm.

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

3.7 CONCRETE PLINTHS

Construction

General: Provide concrete plinths as documented.

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

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

3.8 SUPPORT AND STRUCTURE

General

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

3.9 PIPE SUPPORTS

Support systems

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

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

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

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

Uninsulated pipes: Clamp piping supports directly to pipes.

Insulated pipes:

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

Support spacing

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

Sanitary plumbing: To AS/NZS 3500.2 Table 9.1.

Fuel gas: To AS/NZS 5601.1 Table 5.5.

Other pipes: To AS/NZS 3500.1 Table 5.2.

Hangers

Conform to the **Hanger size table**.

Hanger size table

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

3.10 PLANT AND EQUIPMENT ACCESS

General

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

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

ceilings. Arrange services and plant locations to reduce the number of access panels. Coordinate with other trades to use common access panels where feasible.

- Modify manufacturer's standard equipment when necessary to provide the plant access in the contract documents.

3.11 VIBRATION SUPPRESSION

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

General

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

Speeds

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

Connections

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

Inertia bases

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

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

Vibration isolation mountings

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

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

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

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

Spring mountings: Provide freestanding laterally stable springs as follows:

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

3.12 SEISMIC RESTRAINT OF BUILDING SERVICES

Provisions

General: Arrange all components, other than service items exempted in AS 1170.4, to resist seismic loads determined in conformance with AS 1170.4. Securely fix all plant and equipment to the building structure. Do not rely on gravity and/or friction to resist seismic forces.

Anti-vibration mounts: Use horizontally restrained type.

Components: Do not use components that will be damaged by earthquake conditions. Protect systems against the adverse effects of components such as mercury switches that, although not damaged by earthquake, may malfunction.

3.13 FINISHES TO BUILDING SERVICES

General

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

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

Standard

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

Powder coating

Standard:

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

Painting systems

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

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

Paint application

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

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

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

Underground metal piping

Corrosion protection: Provide corrosion protection for the following:

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

Protection methods: Select from the following:

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

Low VOC emitting paints

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

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

3.14 MARKING AND LABELLING

General

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Labels and notices
Materials: Select from the following:

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

Emergency functions: To AS 1319.

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

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

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

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

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

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

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

Lettering heights:

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

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

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

Vapour barriers: Do not penetrate vapour barriers.

3.15 SOFTWARE

General

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

3.16 WARRANTIES

General

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

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

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

3.17 OPERATION AND MAINTENANCE MANUALS

General

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

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

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

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

Format – electronic copies

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

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

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

Format – hard copy

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

- Cover: Identify each binder with typed or printed title *OPERATION AND MAINTENANCE MANUAL*, to spine. Identify title of project, volume number, volume subject matter, and date of issue.
- Dividers: Durable divider for each separate element, with typed description of system and major equipment components. Clearly print short titles under laminated plastic tabs.
- Drawings: Fold drawings to A4 size with title visible, insert in plastic sleeves (one per drawing) and accommodate them in the binders.
- Pagination: Number pages.
- Ring size: 50 mm maximum, with compressor bars.
- Text: Manufacturers' printed data, including associated diagrams, or typewritten, single-sided on bond paper, in clear concise English.

Number of copies: 3.

Date for submission

Date for draft submission: The earlier of the following:

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

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

3.18 CLEANING

Final cleaning

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

Labels: Remove all labels not required for maintenance.

3.19 PERIODIC MAINTENANCE OF SERVICES

General

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

Emergencies: Attend emergency calls promptly.

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

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

Maintenance program

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

Maintenance records

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

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

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

Site control

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

3.20 POST-CONSTRUCTION MANDATORY INSPECTIONS AND MAINTENANCE

General

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

- The Building Code of Australia.
- AS 1851.
- Other statutory requirements applicable to the work.

Records: Provide mandatory records.

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

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

0181 ADHESIVES, SEALANTS AND FASTENERS

1 GENERAL

1.1 RESPONSIBILITIES

General

Fitness for purpose: Provide adhesives, sealants and fasteners capable of transmitting imposed loads, sufficient to make sure the rigidity of the assembly, or integrity of the joint.

Finished surface: Provide adhesives and sealants that will not cause discolouration.

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

Sealant replacement: Use sealants that can be safely removed without compromising the application of the replacement sealant for future refurbishment.

Selections: Conform to the **SELECTIONS**.

1.2 PRECEDENCE

General

Worksections and referenced documents:

- The requirements of other worksections of the specification override conflicting requirements of this worksection.
- The requirements of this worksection overrides conflicting requirements of its referenced documents.
- The requirements of the referenced documents are minimum requirements.

1.3 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.

1.4 PERFORMANCE

Adhesives and sealants

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

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

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

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

Fasteners

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

2 PRODUCTS

2.1 ADHESIVES

Standards

Mastic adhesive: To AS 2329.

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

High strength adhesive tape

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

Product classification: Make sure product suitability for the following substrates:

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

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

2.2 SEALANTS

Standards

General: To ISO 11600.

External masonry joints

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

Bond breaking backing:

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

Fire rated control joints

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

- Fire stopping: To AS 4072.1.

Light weight building element joints

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

Floor control joints

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

Bond breaking backing:

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

2.3 FASTENERS

General

Masonry anchors: Proprietary expansion or chemical type.

Plain washers: To AS 1237.1.

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

Plugs: Proprietary purpose-made plastic.

Powder-actuated fasteners: To AS/NZS 1873.4.

Stainless steel fasteners: To ASTM A240/A240M.

Steel nails: To AS 2334.

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

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

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

Bolts

Coach bolts: To AS/NZS 1390.

Hexagon bolts Grades A and B: To AS 1110.1.

Hexagon bolts Grade C: To AS 1111.1.

Corrosion resistance

Atmospheric corrosivity category: To the *General requirements* worksection.

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

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

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

Corrosion resistance table – Atmospheric corrosivity category C to AS/NZS 2312

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

Corrosion resistance table – Atmospheric corrosivity categories D and F to AS/NZS 2312

Situation	**Self drilling screws to AS 3566.2 Class**	**Threaded fasteners and anchors**		**Powder actuated fasteners**	
		Material	**Minimum local metallic-coating thickness (µm)**	**Material grade**	**Minimum local metallic-coating thickness (µm)**
Internal	3	Electroplated zinc or Hot-dip galvanized	30	Stainless steel 316	
External	Stainless steel 316 [1]	Stainless steel 316		Stainless steel 316	
[1] Avoid organic coating in Category F zones.					

Finishes

Electroplating:

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

Galvanizing:

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

Mild steel fasteners: Galvanize if:

- Embedded in masonry.
- In external timbers.

- In contact with chemically treated timber, other than CCA treated timber.

Epoxy coated:

- CCA Treated timber.

Nuts

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

Hexagon nuts Grade C: To AS 1112.3.

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

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

Screws

Coach screws: To AS/NZS 1393.

Hexagon screws Grades A and B: To AS 1110.2.

Hexagon screws Grade C: To AS 1111.2.

Hexagon socket screws: To AS 1420 and AS/NZS 1421.

Machine screws: To AS/NZS 1427.

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

Self-tapping screws:

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

Blind rivets

Description: Expanding end type with snap mandrel.

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

End material:

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

Size:

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

Performance

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

3 EXECUTION

3.1 ADHESIVES

Preparation

Substrates: Make sure substrates are:

- Clean and free of any deposit or finish which may impair adhesion.
- If framed or discontinuous, support members are in full lengths without splicing.
- If solid or continuous, excessive projections are removed.
- If previously painted, cracked or flaking paint is removed and the surface lightly sanded.

Contact adhesive
Precautions: Do not use if:

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

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

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

High strength adhesive tape
Preparation:

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

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

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

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

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

3.2 JOINT SEALING

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

Bond breaking: Install bond breaking backing material.

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

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

Sealant joint proportions
General weatherproofing joints (width:depth):

- 1:1 for joint widths < 12 mm.
- 2:1 for joint widths > 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: < 5°C or > 40°C.
- Humidity: To the manufacturer's recommendations.

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

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

0182B FIRE-STOPPING

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Provide fire stopping, as documented.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.

1.3 PRECEDENCE

General

Worksections and referenced documents:

- The requirements of other worksections of the specification override conflicting requirements of this worksection.
- The requirements of this worksection override conflicting requirements of its referenced documents.
- The requirements of the referenced documents are minimum requirements.

1.4 STANDARDS

General

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

Control joint fire-stopping systems: To AS 4072.1.

1.5 INSPECTION

Notice

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

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

2 PRODUCTS

2.1 MATERIALS

General

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

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

Toxicity in fire: Non-toxic.

Fire-stop mortars

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

Formulated compound of incombustible fibres

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

Fibre stuffing

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

Standard: AS/NZS 4859.1 Section 8.

Fire-stop sealants

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

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

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

2.2 COMPONENTS

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

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

Accessories
Permanent dam material: Non-combustible.

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

3 EXECUTION

3.1 EXECUTION GENERALLY

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

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

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

Density: Apply fire-stopping material to uniform density.

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

Cable separation: Maintain.

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

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

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

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

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

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

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

Primer: Clean and dry substrates for primers and sealants.

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

3.2 SYSTEMS

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

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

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

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

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

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

Fire-stop pillows
Ambient conditions: Do not install in conditions outside of the manufacturer's recommendations.

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

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

3.3 COMPLETION SUBMISSIONS

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

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

- Form: To AS 4072.1 Figure B2.

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

- Form: To AS 4072.1 Figure B1.

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

3.4 MAINTENANCE

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

0183B METALS AND PREFINISHES

1 GENERAL

1.1 RESPONSIBILITIES

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

1.2 PRECEDENCE

General
Worksections and referenced documents:
- The requirements of other worksections of the specification override conflicting requirements of this worksection.
- The requirements of this worksection override conflicting requirements of its referenced documents.
- The requirements of the referenced documents are minimum requirements.

1.3 CROSS REFERENCES

General
Requirement: Conform to the following worksection(s):
- *General requirements*.

1.4 SUBMISSIONS

Samples
General: Submit samples of the following:
- Stainless steel: One sample of every mill grade and finish process.
- Anodising: One sample of every colour and finishing option.

2 PRODUCTS

2.1 METALS

Coated steel
Electrogalvanized (zinc) coating on ferrous hollow and open sections: To AS 4750.
Hot-dip galvanizing (zinc):
- Ferrous open sections by an in-line process: To AS/NZS 4791.
- Ferrous hollow sections by a continuous or specialised process: To AS/NZS 4792.
- Metallic-coated steel sheet: To AS 1397. Metal thicknesses specified are base metal thicknesses.

Steel wire: To AS/NZS 4534.

Stainless steel
Bars: To ASTM A276.
Plate, sheet and strip: To ASTM A240/A240M.
Welded pipe (plumbing applications): To AS 1769.
Welded pipe (round, square, rectangular): To ASTM A554.

3 EXECUTION

3.1 GENERAL

Metal separation
Incompatible sheet metals: Provide separation by one of the following:
- Apply an anti-corrosion low moisture transmission coating such as alkyd zinc phosphate primer or aluminium pigmented bituminous paint to contact surfaces.

- Insert a concealed separation layer such as polyethylene film, adhesive tape, or bituminous felt.

Incompatible fixings: Do not use.

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

Brazing

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

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

Filler metal: To AS/NZS 1167.1.

Finishing

Visible joints: Finish visible joints made by welding, brazing or soldering using methods appropriate to the class of work (including grinding or buffing) before further treatment such as painting, galvanizing or electroplating. 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 AS 1627.

Priming steel surfaces: If site painting is specified 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.

Welding

Aluminium: To AS 1665.

Stainless steel: To AS/NZS 1554.6.

Steel: To AS/NZS 1554.1.

3.2 STAINLESS STEEL FINISHES

Preassembly

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

Bead blasted finish: Provide a uniform non-directional low reflective surface by bead blasting. Do not use sand, iron or carbon steel shot. Blast both sides of austenitic grades or stainless steel to eqalise induced stress.

Post assembly pre-treatment

Heat discolouration: Remove by pickling.

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

Post assembly finish

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

Brushed electropolish finish: Conform to the following:

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

Mirror electropolish finish:

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

Completion

Cleaning: Clean and rinse to an acid free condition and allow to dry. Do not use carbon steel abrasives or materials containing chloride.

Protection: Secure packaging or strippable plastic sheet.

3.3 ELECTROPLATING

Electroplated coatings

Chromium on metals: To AS 1192.

- Service condition number: At least 2.

Nickel on metals: To AS 1192.

- Service condition number: At least 2.

Zinc on iron or steel: To AS 1789.

3.4 ANODISING

General

Standard: To AS 1231.

Thickness grade: To AS 1231 Table H1.

3.5 PREPAINTING

Air-drying enamel

Application: Spray or brush.

Finish: Full gloss.

General use:

- Primer: Two-pack epoxy primer to AS/NZS 3750.13.
- Top coats: 2 coats to AS 3730.6.

Oil resistant use:

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

Equipment paint system

Description: Brush or spray application using paint as follows:

- Full gloss enamel finish coats, oil and petrol resistant: To AS/NZS 3750.22, two coats.
- Prime coat to metal surfaces generally: To AS/NZS 3750.19 or AS/NZS 3750.20.
- Prime coat to zinc-coated steel: To AS 3730.15 or AS/NZS 3750.16.
- Undercoat: To AS/NZS 3750.21.

Prepainted metal products

Standard: To AS/NZS 2728.

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

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.

Topcoat:

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

3.6 COMPLETION

Damage

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

Repair

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

0184 TERMITE MANAGEMENT

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Provide termite management materials and systems to the whole of the works described in the contract.

Objective: Achieve building protection.

Selections: As documented.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.

1.3 STANDARD

General

Termite barriers: To AS 3660.1.

1.4 INSPECTION

Notice

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

1.5 SUBMISSIONS

Tests

Woven stainless steel barriers: Provide certification that 725 Grade stainless steel has been used to the manufacturer's specification.

Chemical soil barriers: Submit a Registered testing authority laboratory analysis certificate to AS 3660.1 Appendix E.

2 PRODUCTS

2.1 NON-CHEMICAL BARRIERS

Concrete slab barrier

Standard: To AS 3660.1 Section 4.

Termite cap and strip shields

Standard: To AS 3660.1 Section 5.

Woven stainless steel mesh barriers

Standard: To AS 3660.1 Section 6.

Grade: 725 stainless steel.

Graded stone particles barriers

Standard: To AS 3660.1 Section 7.

2.2 CHEMICAL SOIL BARRIERS

General

Standard: To AS 3660.1 Section 8.

Type testing: To AS 3660.1 Appendix E.

2.3 NON-SOIL MATRIX BARRIERS

Concrete slab barrier

Description: Composite membrane incorporating a termiticide.

Brickwork
Description: Bedding mortar incorporating a termiticide.
Application: Brick bed and perpends as follows:
- Cavity walls built off a concrete slab on ground.
- Buildings with typical raft infill (footing) or formed void slab construction.
- Permanent barrier in sub-floor brickwork and brick piers.

Assessment criteria
Standard: To AS 3660.3.

3 EXECUTION

3.1 NON-CHEMICAL BARRIERS

Concrete slab barrier
Standard: To AS 3660.1 Section 4.

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

Woven stainless steel mesh barriers
Standard: To AS 3660.1 Section 6.

Graded stone particles barriers
Standard: To AS 3660.1 Section 7.

3.2 CHEMICAL SOIL BARRIERS

General
Standard: To AS 3660.1 Section 8.

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

3.3 COMPLETION

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

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

Warranty
Type: Renewable.
Minimum period: 10 years.

Certificate of installation
General: To AS 3660.1 Appendix A.

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

0185 TIMBER PRODUCTS, FINISHES AND TREATMENT

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Provide timber products with finishes and treatments including for durability and fire rating and carrying appropriate certification for the finishing applications.

Selections: As documented.

1.2 PRECEDENCE

General

Worksections and referenced documents:

- The requirements of other worksections of the specification override conflicting requirements of this worksection.
- The requirements of this worksection overrides conflicting requirements of its referenced documents.
- The requirements of the referenced documents are minimum requirements.

1.3 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

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

1.4 STANDARDS

General

Preservative treatment: To the AS 1604 series.

1.5 INTERPRETATION

Definitions

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

- Designated bushfire prone area (BCA definition): Land which has been designated under power of legislation being subject, or likely to be subject, to bushfires.
- Dry processed fibreboard (MDF): A 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/or pressure, the bond of which is derived from a synthetic adhesive added to the fibres and the panels are manufactured with a moisture content less than 20%.
- Groups of timbers: Terms employed for that purpose in relevant Australian standards.
- High pressure decorative laminates (HPDL):
- Panels consisting of core layers impregnated with phenolic and/or aminoplastic resins and a surface layer(s) impregnated with aminoplastic resins (mainly melamine resins).
- Sheets consisting of layers of fibrous sheet material (e.g. paper) impregnated with thermosetting resins and bonded together under heat and pressure (< 5 MPa), with decorative face(s).
- National code: National code of practice for the safe handling of timber preservatives and treated timber.
- Particleboard: Panel material manufactured under pressure and heat from particles of wood (wood flakes, chips, shavings, sawdust and similar) and/or lignocellulosic material in particle form (flax, shives, hemp hurds, bagasse fragments, rice hulls, wheat straw, and similar), with the addition of an adhesive.

- Plywood types: To AS/NZS 4491.
- Softboard (Insulation board): Also known as Canite™, insulating board is available with a fine textured finish on one side or finished with 2 coats of matt white casein-kaolin paint. The reverse side is natural finish with a heavier texture.
- Standard trade common names: To AS/NZS 1148.
- Wet processed fibreboard (hardboard): A panel material with a minimum nominal thickness of 1.5 mm manufactured from lignocellulosic fibres (derived from wood or other materials) with application of heat and/or pressure, the bond of which is derived from felting of the fibres and the panels are manufactured with forming moisture content greater than 20%.

1.6 SUBMISSIONS

Products

Rainforest species: Submit source certification.

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

Technical data

Treated timber: Submit Material safety data sheets for preservative treated timber to the National code.

2 PRODUCTS

2.1 CERTIFICATION

Preservative treatment branding

Requirement: Branding details of preservative treatment as follows:

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

Timber certification

Recognised product certification programs:

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

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

Timber panel products

Certification program: Brand panels under the authority of a recognised certification program applicable to the product. Locate the brand on faces or edges which will be concealed in the works.

Certification programs:

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

2.2 FIRE RESISTANCE

General

Standard: To AS 1720.4.

2.3 DURABILITY

General

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

Natural durability class: To AS 5604.

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

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

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

Preservative treatment

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

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

Plywood: To AS/NZS 1604.3 Table A1.

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

Sawn and round timber: To AS 1604.1 Table D1.

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

Moisture content

Test: To AS/NZS 1080.1.

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

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

Termite treatment

Requirement: To the *Termite management* worksection.

2.4 FINISHING

Surface finish

Hardwood: To AS 2796.1 Table B1.

Softwood: To AS 4785.1 Table B1.

Surface coating

Painting: To the *Painting* worksection and as follows:

Application: To the manufacturer's specification.

2.5 RECYCLED TIMBER

General

Type of species: To be confirmed.

Source: To be confirmed.

Application: Internal feature wall.

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

Classification: Visually graded.

3 EXECUTION

3.1 JOINTS

General

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

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

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

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

Fastener selection

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

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

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

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

3.2 SHRINKAGE RESTRAINT

General

Minimise moisture content changes: Use finishes and end-grain sealants.

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

Connections: Use connections that allow for movement.

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

Drill holes: 10% oversize in unseasoned timber.

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

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

3.3 FINISHING

Ploughing

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

Painting

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

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

Working with treated timber

Safety: Handle preservative treated timber to the National code.

0186 BUILDING IT COMPONENTS

1 GENERAL

1.1 RESPONSIBILITIES

General
General: Refer to electrical engineer's specification.

0193 ROOF ACCESS SAFETY SYSTEMS

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Provide the fall protection system in conformance with **SELECTIONS**.

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

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.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.

1.3 DESIGN BY CONTRACTOR

Requirements

Performance requirements: To AS/NZS 1891.2 Section 4 System acceptance criteria.

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.

1.4 STANDARDS

General

Standard: To AS/NZS 1891.

1.5 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.

1.6 SUBMISSIONS

Design

Documentation: Submit design documentation.

Product data sheets

Installation: Submit the manufacture’s Installation Data Sheets/Specification Manual.

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.

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.

0194 RAVEN DOOR SEALS AND WINDOW SEALS

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Provide RAVEN door seals and window seals as documented.

Handing: Before supply, verify on site, the correct handing 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 where appropriate.

1.2 COMPANY CONTACTS

RAVEN technical contacts

Website: www.raven.com.au

Technical advice: Email: tech.advice@raven.com.au

1.3 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.

1.4 MANUFACTURER'S DOCUMENTS

Technical manual

Published product catalogue: Visit: www.raven.com.au and click on the Raven Architectural door and window sealing systems link for product catalogue #112, CAD File downloads and product fitting instructions, Ecospecifier certificate (energy credits) and Company AS/NZS ISO 9001 certificate.

1.5 INTERPRETATION

Abbreviations and definitions

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

Ordering abbreviations:

- C/A: Clear anodised (15 µm for perimeter seals. 25 µm for threshold plates).
- B/A: Bronze anodised. (15 µm for perimeter seals. 25 µm for threshold plates).
- PE: Painted Polyester Enamel finish (special order and extra cost).
- EPDM: Ethylene Propylene Diene Monomer.
- TPE: Thermo Plastic Elastomer.

1.6 STANDARDS

Seals general

Quality management for manufacture: To AS/NZS ISO 9001 or equivalent certified standard.

Acoustic applications: To AS 1191 or AS/NZS ISO 717.1.

Fire door assemblies: To AS 1530.4 and AS 1905.1.

Smoke door assemblies: To BCA Spec C3.4, AS 1530.7 and AS 3959 for silicon flame retardant PVC and TPE weather seals with a Flammability Index < 5 to AS 1530.2 providing BAL 40.

Combined fire and smoke door assemblies: To BCA Spec C3.4, AS 1530.4, AS 1905.1, AS 1530.7 and AS 3959 for weather seals providing BAL FZ.

Weather and energy saving seals for proprietary windows and door assemblies: To AS 4420.4, AS 4420.5 and AS 2047.

Door bottom and perimeter seals for external doors: To AS 2047.

Threshold plates: To AS/NZS 1428.1.

2 PRODUCTS

2.1 GENERAL

Product substitution
Other door seals and window seals: Conform to **Substitutions** in the *General requirements* worksection.

2.2 MATERIALS

Aluminium extrusions
Material: Commercial grade alloy B6060 T5 or T6 hardness.

Finish to visible extrusions:

- Satin clear or medium bronze anodised unless otherwise specified.
- Anodising thickness:
  . Perimeter seal extrusions: ≥ 15 µm.
  . Threshold plates and threshold plate seals: ≥ 25 µm.

PVC
RAVEN proprietary grade PVC extrusions:

- Highest quality available.
- Added UV inhibitors where exposed to sunlight.
- Self extinguishing grade.
- Service temperature - 5^{o}C to + 70^{o}C.

Silicon rubber
RAVEN proprietary grade silicon rubber extrusions:

- Are unique and where designated (SE) are self extinguishing.
- Added UV inhibitors.
- Service temperature - 60^{o}C to + 230^{o}C.

TPE
RAVEN proprietary grade TPE extrusions:

- Highest quality available.
- Added UV inhibitors.
- Flammability Index < 5 to AS 1530.2 where indicated for Bushfire prone areas.

Service temperature - 40^{o}C to + 100^{o}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, ISO 3795.
- Service temperature - 40^{o}C to + 70^{o}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 polythene 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.

Labelling: Clearly identify the manufacturer and product content.

Door assemblies

Modification: Allow for rebates and grooves to suit the dimensions nominated in the RAVEN catalogue.

Fabricator or installer to conform to product and fitting instructions supplied before machining and assembly.

Fitting instructions: Conform to the manufacturer's fitting instructions supplied with each product. If a replacement copy of instructions is required contact tech.advice@raven.com.au.

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 options to suit door stop style Raven perimeter/frame seals.

4 SELECTIONS

Refer to architectural drawings.

0201B DEMOLITION

1 GENERAL

1.1 RESPONSIBILITIES

General
General: Carry out demolition, as documented.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following worksection(s):
- *General requirements*.

1.3 STANDARD

General
Demolition: To AS 2601.

1.4 INTERPRETATION

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

1.5 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of the following:
- Services before disconnection or diversion.
- Trees as documented to be retained, before commencement of demolition.
- Contents of building before commencement of demolition.
- Structure after stripping and removal of roof coverings and other external cladding.
- Underground structures after demolition above them.
- Excavations remaining after removal of underground work.
- Site after removal of demolished materials.
- Services after reconnection or diversion.

1.6 SUBMISSIONS

Hazardous materials
Audit: Prepare a Hazardous substances management plan to AS 2601 clause 1.6. Include the following:
- Asbestos or material containing asbestos.
- Flammable or explosive liquids or gases.
- Toxic, infective or contaminated materials.
- Radiation or radioactive materials.
- Noxious or explosive chemicals.
- Tanks or other containers which have been used for storage of explosive, toxic, infective or contaminated substances.

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

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

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

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

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

2 PRODUCTS

2.1 DEMOLISHED MATERIALS

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

Demolished material classes table

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

3 EXECUTION

3.1 SUPPORT

Temporary support

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

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

Ground support: Support excavations for demolition of underground structures.

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

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

Permanent supports

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

3.2 PROTECTION

Encroachment

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

Weather protection

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

Dust protection

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

Security

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

Temporary screens

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

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

Temporary access

General: If required, provide a substantial temporary doorset fitted with a rim deadlock, and remove on completion of demolition.

Exposed surfaces

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

Existing services

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

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

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

Recovered items

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

3.3 DEMOLITION – BUILDING WORKS

Dilapidation record

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

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

Encroachment

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

Concrete slabs

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

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

Explosives

General: Do not use explosives.

3.4 DEMOLITION – BUILDING SERVICES

General

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

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

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

Refrigeration systems

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

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

Re-used components

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

3.5 HAZARDOUS MATERIALS

Identified hazardous materials

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

Hazardous materials removal

Standard: To AS 2601 clause 1.6.2.

3.6 COMPLETION

Notice of completion

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

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

Temporary support

General: Clear away at completion of demolition.

4 SELECTIONS

4.1 DEMOLITION

Recovered items for re-use in the works schedule

Item	Location for re-use
Nil	N/A

Recovered items for delivery to the principal schedule

Item	Deliver to
Front door knob. 	Architect.

Demolished material for recycling in the works schedule

Material
Nil

Demolished material for recycling off-site schedule

Material
Refer to demolition plan.

Dismantle for relocation schedule

Item	Location for storage	Location for re-assembly
Nil.	N/A	N/A

Demolish for removal schedule

Item
Refer to demolition plan.

0221B SITE MANAGEMENT

1 GENERAL

1.1 RESPONSIBILITIES

General

Designated areas for protection: Existing front wall and associated hedging.

Incidental works

Generally: Undertake the following:

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

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.

1.3 INTERPRETATION

Definitions

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

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

1.4 SUBMISSIONS

Emergency response

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

Weed management personnel

Requirement: Submit details of the following:

- Subcontractors who will treat weed infestations.
- Chemical handlers, qualifications, date, and spray type.

1.5 INSPECTION

Notice

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

- Enclosures to trees to be retained.

2 EXECUTION

2.1 GENERAL

Community liaison

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

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

Notification content:

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

Legislative requirements

Conditions of Development Approval relevant to environment controls: DA0274-11

Complaints

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

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

Cultural heritage

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

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

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

2.2 CONTROL AND PROTECTION

Air quality control

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

Lighting of fires

Prohibition: Do not light fires.

Noise control and vibration

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

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

Vegetation and fauna

Wild life protected: All native.

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

Pruning: To AS 4373.

Water quality

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

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

Dewatering

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

Disposal: Dispose of water off-site.

2.3 TRUCK CONTAMINATION

Truck contamination precautions

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

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

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

2.4 MANAGEMENT AND CONTROL PLAN IMPLEMENTATION

Implementation

General: Implement the following approved management and control plans:

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

Reporting

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

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

2.5 TEMPORARY LANDSCAPE FENCING

Fence dimensions

Height: 1200 mm.

Maximum post spacing: 5000 mm.

Components sizes

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

Intermediate posts: Star picket.

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

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

Removal

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

2.6 TREE PROTECTION

Standard

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

General

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

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

Protection measures program: Before commencement of earthworks.

Trees to be retained

Extent: All trees NOT marked for removal.

Tree protection

Tree protection zone: To AS 4970 Section 3.

Tree protective measures: To AS 4970 Section 4.

Monitoring and certification: To AS 4970 Section 5.

Work near trees

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

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

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

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

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

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

Backfilling: Backfill to excavations around tree roots with a mixture consisting of three parts by volume of topsoil and one part of well rotted compost with a neutral pH value, free from weed growth and harmful materials. Place the backfill layers, each of 300 mm maximum depth, compacted to a dry density similar to that of the original or surrounding soil. Do not backfill around tree trunks to a height greater than 200 mm above the original ground surface. Immediately after backfilling, thoroughly water the root zone surrounding the tree.

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

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

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

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

2.7 EXISTING SERVICES

Location

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

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

Excavation

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

2.8 TREES TO BE REMOVED

Designation

Extent: Refer to demolition plan.

2.9 SITE CLEARING

Extent

General: Clear only the following site areas:

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

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

Clearing and grubbing

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

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

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

2.10 SEDIMENT FILTERS

General

Inspection: For displacement, undercutting, over-topping and soil buildup, after each rain event. Effect repairs immediately.

Removal: When the upslope areas have been permanently stabilised.

Straw bale filters

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

Location: As required.

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

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

Installation:

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

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

Silt fence

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

Location: As required.

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

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

Installation:

- Trench: 100 mm wide x 200 mm deep along line of posts and upslope from barrier.

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

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

Fence height: 600 mm average.

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

Straw bale - geotextile filters

Description: Sediment filter comprising straw bales and geotextile.

Location: As required.

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

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

Bale installation:

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

Geotextile installation:

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

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

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

2.11 DISPOSAL OF MATERIALS

Disposal

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

Burial: Bury concrete and other inorganic fragments as follows:

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

Mulch

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

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

2.12 COMPLETION

Joining up

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

Clean up

Progressive cleaning: Keep the work under the contract clean and tidy as it proceeds and regularly remove from the site rubbish and surplus material arising from the execution of the work including any work performed during the defects liability period or the plant establishment period.

Removal of plant: Within fourteen days of the date of practical completion, remove temporary works, construction plant, buildings, workshops and equipment not forming part of the works, except what is required for work during the defects liability period or the plant establishment period which shall be removed on completion of that work.

2.13 VERMIN

Vermin management

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

0222 EARTHWORK

1 GENERAL

1.1 RESPONSIBILITIES

General

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

Performance

Selections: As documented.

Design

Geotechnical reports provided: Refer documents for information only.

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

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

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

1.3 STANDARDS

General

Earthworks: To AS 3798.

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

1.4 INTERPRETATION

Abbreviations

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

GITA: Geotechnical inspection and testing authority.

GTA: Geotechnical testing authority.

Definitions

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

- Description and classification of soils: To AS 1726.
- Site classification: To BCA 3.2.4.
- Bad ground: Ground unsuitable for the purposes of the works, including fill liable to subsidence, ground containing cavities, faults or fissures, ground contaminated by harmful substances and ground which is or becomes soft, wet or unstable.
- Base: Layer(s) of material forming the uppermost structural element of a pavement and on which the surfacing may be placed.
- Discrepancy: A difference between contract information about the site and conditions encountered on the site, including but not limited to discrepancies concerning the following:
  - . The nature or quantity of the material to be excavated or placed.
  - . Existing site levels.
  - . Services or other obstructions beneath the site surface.
- Rock: Monolithic material with volume greater than 0.5 m^3 which cannot be removed until broken up by rippers or percussion tools.
- Site topsoil: Soil excavated from the site which contains organic matter, supports plant life, conforms generally to the fine to medium texture classification to AS 4419 (loam, silt, clay loam) and is free from:
  - . Stones > 25 mm diameter.

. Clay lumps > 75 mm diameter.
. Weeds and tree roots.
. Sticks and rubbish.
. Material toxic to plants.

- Subbase: The material laid on the subgrade below the base either for the purpose of making up additional pavement thickness required, to prevent intrusion of the subgrade into the base, or to provide a working platform.
- Subgrade: The trimmed or prepared portion of the formation on which the pavement or slab is constructed. Generally taken to relate to the upper line of the formation.
- Zone of influence: A foundation zone bounded by planes extending downward and outward from the bottom edge of a footing, slab or pavement and defining the extent of foundation material having influence on the stability or support of the footings, slab or pavement.

1.5 INSPECTION

Notice

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

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

1.6 TOLERANCES

General

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

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

1.7 SUBMISSIONS

Design

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

Tests

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

Materials

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

Execution details

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

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

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

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

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

Proof rolling: Submit method and equipment for proof rolling.

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

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

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

2 PRODUCTS

2.1 FILL MATERIALS

General

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

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

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

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

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

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

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

2.2 BORROW OR IMPORTED FILL

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

- Suitable material: To AS 3798 clause 4.4.

Borrow pits:

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

3 EXECUTION

3.1 SITE PREPARATION

Erosion and sedimentation control

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

3.2 GEOTECHNICAL

As found site conditions

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

- Bad ground.
- Discrepancies.

- Rock.
- Springs, seepages.
- Topsoil > 100 mm deep.

Inspection and testing
Inspection and testing: Conform to the following:
- Level 1 GITA required to AS 3798 clause 8.2.
- Level 2 GTA required to AS 3798 clause 8.3.

3.3 RECORDS OF MEASUREMENT

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

Method of measurement: By registered surveyor unless otherwise agreed.

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

3.4 REMOVAL OF TOPSOIL

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

Maximum depth: 200 mm.

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

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

Mark: Identify stockpiles of different soil types.

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

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

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

3.5 EXCAVATION

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

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

Rock
General: Do not use explosives.

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

Existing services

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

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

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

Proof rolling

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

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

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

Disposal of excess excavated material

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

- Standard: To AS 3798 clause 6.1.8.

3.6 SUBGRADES AFFECTED BY MOISTURE

General

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

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

3.7 BEARING SURFACES

General

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

Deterioration

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

3.8 REINSTATEMENT OF EXCAVATION

General

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

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

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

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

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

3.9 SUPPORTING EXCAVATIONS

Removal of supports

General: Remove temporary supports progressively as backfilling proceeds.

Voids

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

3.10 ADJACENT STRUCTURES

Temporary supports

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

Lateral supports: Provide lateral support using shoring.

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

Permanent supports

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

Encroachments

General: If encroachments from adjacent structures are encountered and are not shown on the drawings, give notice and obtain instructions.

3.11 ROCK BOLTING

General

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

Standard: To AS 4678.

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.

3.12 PREPARATION FOR FILLING

Preparation

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

Foundation preparation: To AS 3798 clause 6.1.7.

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

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

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

Slope preparation: If fill is placed on a surface which slopes steeper than 4 H:1 V, 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 > 1 m in width and > 100 mm deep. Recompact the excavated material as part of the filling. Shape to provide free drainage.

Under earth mounds

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

Under slabs, paving and embankments

General: Compact the ground to achieve the densities specified in the **Compaction schedule**. If necessary loosen the ground to a depth of > 200 mm and adjust the moisture content before compaction to a density consistent with subsequent filling.

Rock ledges

General: Remove overhanging rock ledges.

3.13 GEOTEXTILE

General

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

Identification and marking: To AS 3705.

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

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

3.14 PLACING FILL

General

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

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

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

Mix: Place fill in a uniform mixture.

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

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

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

Placing at structures

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

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

3.15 PLACING TOPSOIL

Stockpiled topsoil

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

Herbicide: Apply before placing topsoil.

Placing: Spread and grade evenly.

Disposal of excess topsoil

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

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

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

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

3.16 FILL MOISTURE CONTROL

General

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

3.17 COMPACTION REQUIREMENTS FOR FILL AND SUBGRADE

Density

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

Compaction table

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

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

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

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

Compaction control tests

Compaction control tests: To AS 1289.5.4.1 or AS 1289.5.7.1.

Compaction control test frequency

Standard: To AS 3798 Table 8.1.

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

3.18 COMPLETION

Grading

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

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

Temporary works

Tree enclosures: Remove temporary tree enclosures at completion.

Tree marking: Remove temporary marks and tags at completion.

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

Site restoration

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

0223 SERVICE TRENCHING

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Provide trenching for underground services.

Design

Steel shoring and trench lining systems: To AS 4744.1.

Hydraulic shoring and trench lining equipment: To AS 5047.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.
- *Earthwork.*
- *Pavement base and subbase.*
- *Asphaltic concrete.*
- *Sprayed bituminous surfacing.*
- *Segmental pavers – mortar bed.*
- *Segmental pavers – sand bed.*

1.3 STANDARDS

General

Earthworks: To AS 3798.

1.4 INTERPRETATION

Abbreviations

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

- CBR value: California Bearing Ratio value.

1.5 INSPECTION

Notice

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

- Service trenches excavated before laying the service.
- Services laid in trenches and ready for backfilling.

1.6 TOLERANCES

General

Earthworks: To **Tolerances** in the *Earthwork* worksection.

1.7 SUBMISSIONS

General

Extent: Submit a plan of trench works noting the location and type of service.

Notice: Advise proposed duration of open excavation.

Construction: Submit details of proposed equipment and method of excavation.

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

Geotechnical data: Provide a geotechnical report supporting the procedures proposed for trenching and/or boring.

Hazards: Identify OH&S hazards that may be encountered with deep trenches including toxic gases and liquids.

Boring: Submit proposals for the following:

- Limits on length.
- Existence of other services and method of protection.
- Pressure grouting to voids.
- The effect of pressure grouting on other services, ground heave and proposals for minimising such effects.
- Access to properties outside the site.
- Council permits.
- Service interruptions including a plan for minimising unintended interruptions.

Off site disposal

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

2 PRODUCTS

2.1 FILL MATERIALS

General

Requirement: Provide fill materials including borrow or imported fill to **Fill materials** and **Borrow or imported fill** in the *Earthwork* worksection.

3 EXECUTION

3.1 EXISTING SERVICES

Location

Requirement: Before commencing service trenching, locate and mark existing underground services in the areas which will be affected by the service trenching operations.

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

Excavation

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

3.2 EXISTING SURFACES

Concrete and asphalt pavements

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

Removal of concrete and asphalt: Break out concrete or asphalt pavement material between the trench set out lines, remove and dispose of off-site.

Segmental paving units

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

Concrete edging: Break out, remove and dispose of off-site.

Concrete subbase: If present, sawcut along the trench set out lines.

Grass

Method: Neatly cut grass turf between trench set out lines into 300 mm squares. If the grass is suitable for re-use, take up and store the turf and water during the storage period, otherwise remove and dispose of it off-site.

Small plants, shrubs and trees

Storage: If required for re-planting, take up small plants and store. Wrap the root ball in a hessian or plastic bag with drain holes and water during the storage period.

Unsuitable vegetation: Remove and dispose of off-site.

3.3 EXCAVATING

Site preparation

As found site conditions: To **Geotechnical** in the *Earthwork* worksection.

Records of measurement: If Records of measurement are required, to **Records of measurement** in the *Earthwork* worksection.

Remove topsoil: To **Removal of topsoil** in the *Earthwork* worksection.

Excavation

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

- To required lines and levels, with uniform grades.
- Straight between access chambers, inspection points and junctions.
- With stable sides.
- To a width tolerance of ± 50 mm unless constrained by adjacent structures.
- Excavation: To the *Earthwork* worksection **Excavation** and **Adjacent structures**.

Trench widths

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

Trench depths

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

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

Obstructions

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

Tree protection: To AS 4970.

Dewatering

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

Pumping: Provide pump-out from adjacent sumps or install well points.

Adjacent subsidence: Provide recharge points to isolate the dewatering zone.

Excess excavation

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

Stockpiles

Excavated material for backfill: If required, segregate the earth and rock material and stockpile, for re-use in backfilling operations.

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

Disposal: If stockpiling is not permitted, dispose of excavated material off-site.

Unsuitable material

Disposal: Remove unsuitable material from the bottom of the trench or at foundation level and dispose of off-site. Replace with backfill material to **Backfill material.**

Boring

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

3.4 TRENCH BACKFILL

General

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

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

Place fill: To **Placing fill** in the *Earthwork* worksection.

Bedding, haunch, side and overlay zones

Installation and material: To the particular utility authority or utility service requirements. Secure pipes against floatation.

Overlay zone thickness: Maximum of 300 mm immediately over the utility service.

Topsoil areas: Complete the backfilling with at least 100 mm of topsoil.

Material in reactive clay areas: In sites classified M, M-D, H1, H1-D, H2, H2-D, E or E-D to AS 2870, re-use excavated site material at a moisture content within ± 1% of that of the adjoining in situ clay.

Selected material zone

Extent: The section of trench within the zone, if applicable.

Backfill material: Selected material free from stones larger than 100 mm maximum dimension and the fraction passing a 19 mm Australian Standard sieve to have a 4 day soaked CBR value, in conformance with AS 1289.6.1.2, and not less than that of the adjacent selected material zone.

Trees

General: Backfill at trees, for a minimum 300 mm thickness, around tree roots with a topsoil mixture, placed and compacted in layers of 150 mm minimum depth to a dry density equal to that of the surrounding soil.

Backfill level: Do not place backfill material above the original ground surface around tree trunks or over the root zone.

Watering: Thoroughly water immediately after backfilling the tree root zone.

Compaction

Control moisture within backfill: To **Fill moisture control** in the *Earthwork* worksection.

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

Compaction: To **Compaction requirements for fill and subgrade** in the *Earthwork* worksection and AS 3798 Section 5.

Frequency of testing: To AS 3798 clause 8.7.

Precautions: If compacting adjacent to utility services, use compaction methods which do not cause damage or misalignment.

Density tests

Testing authority: Have density tests of pipe bedding and backfilling carried out by a Registered testing authority.

Test methods:

- Compaction control tests: To AS 1289.5.4.1 or AS 1289.5.7.1.
- Field dry density: AS 1289.5.3.2 or AS 1289.5.3.5.
- Standard maximum dry density: AS 1289.5.1.1.
- Dry density ratio: AS 1289.5.4.1.
- Density index: AS 1289.5.6.1.

3.5 SURFACE RESTORATION

Subbase and base

Material: Provide crushed rock, DGS20 or DGB20 material and configure in layers and depths to match existing and adjacent work.

Supply and installation: To the *Pavement base and subbase* worksection.

Compaction: Uniformly compact each layer of the subbase and base courses over the full area and depth within the trench to a relative compaction of 100 per cent when tested in conformance with AS 1289.5.4.1.

Tests: Test for compaction at a minimum frequency of 1/ every second layer/50 m² of restoration surface area.

Pathways and paved areas generally

Materials: Provide material consistent with the surface existing before commencement of the works.

Subbase: 150 mm crushed stone DGB20 compacted to 100 percent relative compaction in conformance with AS 1289.5.4.1.

Lippage at patches: Match the surface level at any point along the patch's edge with the adjoining footpath surface within ± 5 mm.

Concrete surfaces

Construction: Conform to the following:

- Prime coat the cut edges of the existing surfaces with cement slurry. Lay and compact concrete so that the edges are flush and the centre is cambered 10 mm above the adjoining existing surfaces.
- Material: 25 MPa concrete
- Surface finish and pattern: Match existing adjoining work.
- Minimum thickness: 75 mm or the adjacent pavement thickness, whichever is thicker.
- Reinforcement and dowels: If required, provide steel reinforcement with dowels into the adjacent concrete.
- Expansion joints: 15 mm thick preformed jointing material of bituminous fibreboard placed where new concrete abuts existing concrete and in line with joints in existing concrete.
- Control joints:
  . Form control joints strictly in line with the control joints in existing concrete.
  . Around electricity supply poles: Terminate the concrete paving 200 mm from the pole and fill the resulting space with cold mix asphalt.

Curing: Cure by keeping continuously wet for 7 days.

Asphalt footpaths

Materials and installation: To the *Asphaltic concrete* or *Sprayed bituminous surfacing* worksections as appropriate.

Thickness: Match the adjoining footpath.

Finish: Compact to a smooth even surface.

Segmental paving units

Materials and installation: To *Segmental pavers – sand bed* or *Segmental pavers – mortar bed* as appropriate and as follows:

- Laying: Re-lay to match the pattern and surface levels of the existing paving.
- Damaged paving units: Replace paving units which are unsuitable for relaying with new units of the same material, type, size and colour as the existing.

Landscaped areas

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

Lawn: Re-lay stockpiled turf. If existing turf is no longer viable, re-sow the lawn over the trench and other disturbed areas.

Planted areas: Overfill to allow for settlement.

0224B STORMWATER – SITE

1 GENERAL

1.1 RESPONSIBILITIES

General
General: Refer to hydraulic engineering specification.

0241 LANDSCAPE – WALLING AND EDGING

1 GENERAL

1.1 RESPONSIBILITIES

General
General: Provide walling and edging as documented.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following worksection(s):
- *General requirements*.

1.3 INSPECTION

Notice
Inspection: Give notice so inspection may be made of the following:
- Setting out before commencement of construction.
- Geotextiles and subsurface drainage in place before backfilling.

2 PRODUCTS

2.1 TIMBER

Hazard class
General: As defined in AS 1604.1.

Hardwood
General: To AS 2796.1 Section 2.

For structural purposes: To AS 2082.

Durability class: To AS 1720.2.

Softwood
General: To AS 4785.1 Section 2.

Seasoned cypress pine: To AS 1810 Section 2.

For structural purposes: To AS 2858.

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

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

CCA treated timber: If proposed, provide details.

2.2 STEEL

Steel tubes
Posts, rails, stays: To AS/NZS 1163.
- Grade: C 350 L0.

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

2.3 CONCRETE

General
Standard: To AS 1379.

Exposure classification: To AS 3600 Table 4.3.

Grade: Where there are cast in metal items:
- Exposure classification:
  . A1, A2: N25.

. B1: N32.
. B2, C: N40.
. Otherwise: N20.

2.4 SLEEPER WALLS

Sleepers
General: To AS 3818.2.

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

Softwood: Sound preservative treated softwood sleepers.

2.5 EARTH REINFORCEMENT

General
Type: Proprietary system of galvanized steel strips or steel mesh strips placed in layers with compacted selected fill and connected to precast concrete facing panels to form vertical retaining walls. Provide the necessary accessories including levelling pad, bearing pads, and joint fillers or covers to keep the selected fill material out of the panel joints.

2.6 GEOTEXTILES

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

Identification and marking: To AS 3705.

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

3 EXECUTION

3.1 GENERAL

Set out
General: Set out the positions of walls and edging and mark the positions of furniture.

Clearing
Extent: Except for trees or shrubs to be retained, clear vegetation within 1 m of the landscape walls. Grub out stumps and roots of removed trees or shrubs and trim the grass to ground level, but do not remove the topsoil.

Excavation
Extent: Excavate for foundations and footings.

3.2 SLEEPER WALLS

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

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

3.3 EARTH REINFORCEMENT

Construction
Construction: Construct walls in conformance with the manufacturer's written requirements.

3.4 EDGING

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

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

Sawn timber

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

Curving: Space the pegs to hold edging to a uniform curve. Reduce edging thickness to 15 mm if required to enable it to be bent.

Sleeper

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

Concrete

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

Concrete kerb

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

Spade work

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

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

Brick

Setting: On a 1:1:6 mortar haunch.

Joints: 3 mm struck flush.

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

Cleaning: Wash off mortar progressively.

0242B LANDSCAPE – FENCES AND BARRIERS

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Provide fences and barrier systems:

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

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.

1.3 INSPECTION

Notice

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

- Boundary survey location if applicable.
- Setout before construction.
- Foundation conditions before placing concrete in footings.

2 PRODUCTS

2.1 TIMBER

Hazard class

General: As defined in AS 1604.1.

Posts and rails

Hardwood

- Standard: To AS 2082.
- Durability class: To AS 1720.2.

Softwood

- Standard: To AS 2858.

Pickets and palings

Hardwood: To AS 2796.1, Section 8.

- Grade to AS 2796.2: Select.

Softwood: To AS 4785.1, Section 7.

Seasoned cypress pine: To AS 1810, Section 5.

Preservative treatment

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

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

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

2.2 STEEL

Steel tubes

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

- Grade: C 350 L0.

Wire

Cable wire, tie wire and barbed wire: To AS 2423.

2.3 CONCRETE

General

Standard: To AS 1379.

Exposure classification: To AS 3600 Table 4.3.

3 EXECUTION

3.1 CONSTRUCTION GENERALLY

Set out

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

Property boundaries: Confirm by survey.

Clearing

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

Excavation

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

Erection

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

Earth footings

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

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

Concrete footings

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

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

3.2 GATES

Hardware

Provide the following:

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

Hand access

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

3.3 FENCING

Pine paling fence

Maximum post spacing:

- General: 2400 mm.
- For lap and cap: 2700 mm.

Footing type: Earth.

Footing size: 250 mm diameter x 600 mm depth.

Hardwood paling fence

Maximum post spacing: 2700 mm.

Footing type: Earth.

Footing size: 250 mm diameter x 600 mm depth.

Installation

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

Picket fence: Nail twice to each rail.

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

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

Gates

Ledges and braces: Match fence rails.

Pickets or palings: Match fence.

Fencing for swimming pools

Design, construction and performance: To AS 1926.1.

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

3.4 CHAIN LINK FABRIC SECURITY FENCING AND GATES

General

Standard: To AS 1725.1.

Installation

Standard: To AS 1725.1.

3.5 WELDED FENCING

Fence dimensions

Maximum post spacing: 2440 mm.

Installation

General: Fit tightly fittings caps to steel posts. Attach panels to posts with fixing clips and M8 x 75 mm hexagon head bolts before concreting footing.

Footing type: Concrete.

0250B LANDSCAPE – GARDENING

1 GENERAL

1.1 RESPONSIBILITIES

General
General: Refer to landscape designer's specification.

0255B LANDSCAPE – PLANT PROCUREMENT

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Refer to landscape designer's specification.

0256B LANDSCAPE – ESTABLISHMENT

1 GENERAL

1.1 RESPONSIBILITIES

General
General: Refer to landscape designer's specification.

LANDSCAPE – FURNITURE AND FIXTURES

1 GENERAL

1.1 RESPONSIBILITIES

General
General: Provide landscape furniture and fixtures as documented.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following worksection(s):
- *General requirements*.

1.3 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of the following:
- Site locations or substrates prepared to receive furniture or fixtures before installation.

1.4 SUBMISSIONS

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

Installation
General: Submit the manufacturer's standard drawings and details showing methods of construction, assembly and installation; with dimensions and tolerances.

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

2 EXECUTION

2.1 FIXING

Erection
Line and level: Erect posts or poles vertically. Erect furniture items level. Provide a level area around benches and seats where installed on slopes.

2.2 COMPLETION

Maintenance manual
General: Submit the manufacturers' data as follows:
- Recommendations for service use, care and maintenance.
- List of manufacturers and suppliers of replacement parts.

3 SELECTIONS

3.1 FURNITURE

Benches
Type: Refer to finishes schedule.

Planter boxes
Type: Refer to finishes schedule.

0271 PAVEMENT BASE AND SUBBASE

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Provide base and subbase courses in conformance with the following documented requirements:

- Tolerances.
- Material properties, tested by a geotechnical testing authority.
- Minimum relative compaction.
- Moisture content.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.
- *Earthwork*.

1.3 INTERPRETATION

Abbreviations

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

- CBR: California bearing ratio.
- CRB: Crushed rock base.
- CRS: Crushed rock subbase.
- NGB: Natural gravel base.
- NGS: Natural gravel subbase.
- RCCB: Recycled crushed concrete base.
- RCCS: Recycled crushed concrete subbase.

Definitions

General: For the purposes of this worksection the definitions given in AS 1348 and the following apply:

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

2 PRODUCTS

2.1 BASE AND SUBBASE MATERIAL

Granular material

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

Crushed rock and recycled material class

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

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

Crushed rock

Designation: Unbound crushed rock materials are designated as follows:

- CRB20-1: 20 mm nominal sized class 1 crushed rock base.
- CRB20-2: 20 mm nominal sized class 2 crushed rock base.
- CRS20: 20 mm nominal sized crushed rock subbase.
- CRS40: 40 mm nominal sized crushed rock subbase.

Recycled crushed concrete

Designation: Recycled crushed concrete materials are designated as follows:

- RCCB20-1: 20 mm nominal sized class 1 recycled crushed concrete base.
- RCCB20-2: 20 mm nominal sized class 2 recycled crushed concrete base.
- RCCS20: 20 mm nominal sized recycled crushed concrete subbase.

Natural gravel

Designation: Unbound natural gravel materials are designated as follows:

- NGB20: 20 mm nominal sized natural gravel base.
- NGS20: 20 mm nominal sized natural gravel subbase.
- NGS40: 40 mm nominal sized natural gravel subbase.

Base material properties

Base materials: Conform to the **Base material properties table**.

Base material properties table

Test method	Description	CRB20-1	CRB20-2	RCCB20-1	RCCB20-2	NGB20
AS 1289.3.6.1	Particle size distribution					
AS 1289.3.6.1	% passing 26.5 mm sieve	100	100	100	100	100
AS 1289.3.6.1	% passing 19.0 mm sieve	95-100	95-100	95-100	95-100	93-100
AS 1289.3.6.1	% passing 13.2 mm sieve	77-93	77-93	78-92	78-92	-
AS 1289.3.6.1	% passing 9.5 mm sieve	63-83	63-83	63-83	63-83	71-87
AS 1289.3.6.1	% passing 4.75 mm sieve	44-64	44-64	44-64	44-64	47-70
AS 1289.3.6.1	% passing 2.36 mm sieve	29-49	29-49	30-48	30-48	35-56
AS 1289.3.6.1	% passing 0.425 mm sieve	13-23	13-23	13-21	13-21	14-32
AS 1289.3.6.1	% passing 0.075 mm sieve	5-11	5-11	5-9	5-9	6-20
AS 1289.3.1.1	Liquid limit	max 30	max 30	max 35	max 35	max 25
AS 1289.3.3.1	Plasticity index:					
	All areas	min 2	-	min 2	-	-
	Areas with annual rainfall > 500 mm	max 6	max 6	max 6	max 6	max 6
	Areas with annual	max 10	max 10	max 10	max 10	max 10

Test method	Description	CRB20-1	CRB20-2	RCCB20-1	RCCB20-2	NGB20
	rainfall < 500 mm					
AS 1289.3.4.1	Linear shrinkage:					
	All areas:	min 0.7	-	min 0.7	-	-
	Areas with annual rainfall > 500 mm	max 2.0	max 2.0	max 2.0	max 2.0	max 2.0
	Areas with annual rainfall < 500 mm	max 4.0	max 4.0	max 4.0	max 4.0	max 4.0
Direct measurement	Foreign materials in that fraction of RCCB retained on 4.75 mm sieve - % by mass:					
	High density (brick, etc)	—	—	max 2.0	max 2.0	—
	Low density (plaster, etc)	—	—	max 0.5	max 0.5	—
	Organic matter (wood, etc)	—	—	max 0.1	max 0.1	—
	Asbestos and hazardous	—	—	0	0	—
AS 1141.52	Maximum dry compressive strength on fraction passing 19 mm sieve (only applies if plasticity index is less than 1)	min 1.7 MPa	min 1.7 MPa	min 1.7 MPa	min 1.7 MPa	min 1.7 MPa
AS 1141.14	Particle shape by proportional calliper - % misshapen (2:1)	max 35%	max 35%	max 35%	max 35%	—
AS 1141.22	Aggregate wet strength*	min 100 kN	min 80 kN	min 100 kN	min 80 kN	—
AS 1141.22	Wet/dry strength variation* (dry - wet)/dry	max 35%	max 35%	max 35%	max 35%	—
AS 1141.23	Los Angeles value	max 35%	max 35%	max 40%	max 40%	—
AS 1289.6.1.1	4 day soaked CBR (98% modified compaction)	min 80%	min 80%	min 80%	min 80%	min 80%
NOTES: * All fractions of the proposed mix must satisfy this requirement. Use the fraction with the highest wet/dry strength variation as the value for determining conformance. Test the fraction 19.0 mm to 9.5 mm. In the case of blended materials, also test the fraction 9.5 mm to 4.75 mm. Test any other fraction which is at risk of failing in the opinion of the Engineer.						

Subbase material properties

Subbase materials: Conform to the **Subbase material properties table**.

Subbase material properties table

Test method	Description	CRS20	CRS40	RCCS20	NGS20	NGS40
AS 1289.3.6.1	Particle size distribution					
AS 1289.3.6.1	% passing 53.0 mm sieve	-	100	-	-	100

Test method	Description	CRS20	CRS40	RCCS20	NGS20	NGS40
AS 1289.3.6.1	% passing 37.5 mm sieve	-	90-100	-	-	95-100
AS 1289.3.6.1	% passing 26.5 mm sieve	100	74-97	100	100	80-97
AS 1289.3.6.1	% passing 19.0 mm sieve	90-100	62-86	95-100	96-100	-
AS 1289.3.6.1	% passing 13.2 mm sieve	74-96	-	74-95	-	-
AS 1289.3.6.1	% passing 9.5 mm sieve	61-85	42-66	60-90	65-90	48-85
AS 1289.3.6.1	% passing 4.75 mm sieve	42-66	28-50	42-76	47-80	35-73
AS 1289.3.6.1	% passing 2.36 mm sieve	28-50	20-39	28-60	32-67	25-58
AS 1289.3.6.1	% passing 0.425 mm sieve	11-27	8-21	10-28	14-42	10-33
AS 1289.3.6.1	% passing 0.075 mm sieve	4-14	3-11	2-10	6-26	3-21
AS 1289.3.1.1	Liquid limit	max 35	max 35	max 40	max 35	max 35
AS 1289.3.3.1	Plasticity index:					
	Areas with annual rainfall > 500 mm	max 12	max 12	max 12	max 12	max 12
	Areas with annual rainfall < 500 mm	max 15	max 15	max 15	max 15	max 15
AS 1289.3.4.1	Linear shrinkage:					
	Areas with annual rainfall > 500 mm	max 4.5	max 4.5	max 4.5	max 4.5	max 4.5
	Areas with annual rainfall < 500 mm	max 6.0	max 6.0	max 6.0	max 6.0	max 6.0
Direct measurement	Foreign materials in that fraction of RCCB retained on 4.75 mm sieve - % by mass:					
	High density (brick, etc)	—	—	max 3.0	—	—
	Low density (plaster, etc)	—	—	max 1.0	—	—
	Organic matter (wood, etc)	—	—	max 0.2	—	—
	Asbestos and hazardous	—	—	0	0	—
AS 1141.52	Maximum dry compressive strength on fraction passing 19 mm sieve (only applies if plasticity index is less than 1)	min 1.0 MPa	min 1.0 MPa	min 1.0 MPa	min 1.0 MPa	min 1.0 MPa
AS 1141.14	Particle shape by proportional calliper - % misshapen (2:1)	max 35%	max 35%	max 35%	—	—
AS 1141.22	Aggregate wet	min 50 kN	min 50 kN	min 50 kN	—	—

Test method	Description	CRS20	CRS40	RCCS20	NGS20	NGS40
	strength*					
AS 1141.22	Wet/dry strength variation* (dry - wet)/dry	max 40%	max 40%	max 40%	—	—
AS 1141.23	Los Angeles value	max 40%	max 40%	max 40%	—	—
AS 1289.6.1.1	4 day soaked CBR (94% modified compaction)	min 30%	min 30%	min 30%	min 30%	min 30%
NOTES: * All fractions of the proposed mix must satisfy this requirement. Use the fraction with the highest wet/dry strength variation as the value for determining conformance. Test the fraction 19.0 mm to 9.5 mm. In the case of blended materials, also test the fraction 9.5 mm to 4.75 mm. Test any other fraction which is at risk of failing in the opinion of the Engineer.						

3 EXECUTION

3.1 SUBGRADE PREPARATION

General

Requirement: Prepare the subgrade in conformance with the *Earthwork* worksection.

3.2 PLACING BASE AND SUBBASE

General

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

Spreading: Spread material in uniform layers without segregation.

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

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

Joints

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

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

Final trimming

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

3.3 TOLERANCES

Surface level

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

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

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

Surface level tolerances table

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

3.4 SUBBASE AND BASE COMPACTION

General

Construction operation: Compact each layer of fill to the required depth and density, as a systematic construction operation and to conform to the **Minimum relative compaction table**.

Minimum relative compaction table

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

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

Compaction requirements

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

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

Moisture content

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

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

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

Rectification

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

Level corrections

General: Rectify incorrect levels as follows:

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

3.5 TESTING

Compaction control tests

Standard: To AS 1289.5.4.1 and AS 1289.5.4.2.

Frequency of compaction control tests

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

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

0272S ASPHALTIC CONCRETE

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Provide a finished surface which is as follows:

- Free draining and evenly graded between level points.
- Even and smooth riding.

Standards

Hot mix asphalt: Comply with the recommendations of AS 2150.

0274B CONCRETE PAVEMENT

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Provide finished surfaces that are:

- Free draining and evenly graded between level points.
- Even and smooth riding.

Performance

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

Selections: As documented.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.
- *Site management*.
- *Earthwork*.
- *Stormwater – site*.
- *Pavement base and subbase*.
- *Pavement ancillaries*.
- *Concrete finishes*.

1.3 STANDARDS

Concrete

Specification and supply: To AS 1379.

Materials and construction: To AS 3600.

1.4 INTERPRETATION

Definitions

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

- Levelness: Absolute level tolerance - maximum deviation from design levels.
- Ambient temperature: The air temperature at the time of mixing and placing of concrete.
- Average ambient temperature: Average value of the maximum and minimum ambient temperatures over the relevant period at a site.
- Concrete class:
  - . Normal: Concrete which is specified primarily by a standard compressive strength grade and otherwise in conformance with AS 1379 clause 1.5.3.
  - . Special: Concrete which is specified to have certain properties or characteristics different from, or additional to, those of normal-class concrete and otherwise in conformance with AS 1379 clause 1.5.4.

If special class concrete is nominated for the project, specify the relevant parameters.

- Early age: A mean compressive strength at 7 days exceeding the values shown in AS 1379 Table 1.2.
- Green concrete: Concrete which has set but not appreciably hardened.
- Flatness: Relative level tolerance - maximum deviation from a 3 m straightedge laid on the surface.
- Weather:

. Cold: Ambient shade temperature < 10°C.
. Hot: Ambient shade temperature > 32°C.

1.5 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of the following:
- Base or subgrade before covering.
- Membrane or film underlay installed on the base or subgrade.
- Concrete formwork, reinforcement and dowels in position.
- Commencement of concrete placing.
- Completion of concrete placing.
- Evaluation of surface finish.

1.6 TOLERANCES

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

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

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

1.7 SUBMISSIONS

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

Aggregates: Nominate the source for all aggregates proposed.

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

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

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

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

Concrete: Submit the concrete supply delivery dockets.

Subcontractors: Submit names and contact details of proposed pre-mixed concrete suppliers, and alternative source of supply in the event of breakdown of pre-mixed or site mixed supply.

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

2 PRODUCTS

2.1 REINFORCEMENT

General
Steel reinforcement: Steel bars or mesh to AS/NZS 4671.
- Ductility class: L or N.

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

Reinforcement and joint requirements: Refer to structural engineer.

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

Accessories
Bar chairs: Use plastic tipped wire bar chairs.

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

Dowels

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

Standard: To AS/NZS 4671.

Grade: 250R steel bars 450 mm long.

End tolerances: Ensure that deformation of an end from its true circular shape does not exceed 1 mm nor extend more than 1 mm from the end.

Tie bars

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

2.2 AGGREGATE

Characteristics

Standards: AS 2758.1.

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

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

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

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

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

2.3 CEMENT

General

Standard: To AS 3972.

- Type: Refer to structural engineer.

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

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

2.4 FLY ASH

General

Standard: Fine grade fly ash to AS 3582.1.

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

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

2.5 WATER

General

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

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

Limits: Not containing more than:

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

2.6 ADMIXTURES

General

Standard: Chemical admixtures to AS 1478.1.

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

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

Air entraining agent: Adjust mix for workability allowing up to 5% air entrainment.

2.7 CURING COMPOUNDS

General

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

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

2.8 OTHER MATERIALS

Tactile ground surface indicators

Standard: To AS 1428.4.

3 EXECUTION

3.1 SUBGRADE

Preparation

Conformance: Prepare subgrade in conformance with the *Earthwork* worksection.

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

Reinstatement: Ensure uniformity for backfilling of any utility trenches.

3.2 SUBBASE

Width

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

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

Unbound subbase materials and installation: Conform to *Pavement base and subbase* worksection.

Tolerance and friction reduction

Tolerance: Subbase finished surface level + 0 mm to -10 mm to ensure full base layer is cast.

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

3.3 CONCRETE MIX

Standard

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

Properties

Concrete pavement thickness: Refer to structural engineer.

Concrete pavement strength: Refer to structural engineer.

Workability: Slump values to conform with the following:

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

Elapsed delivery time

General: Ensure that the elapsed time between the wetting of the mix and the discharge of the mix at the site is in conformance with the Elapsed delivery time table. Do not discharge at ambient temperature below 10°C or above 30°C.

Elapsed delivery time table

Concrete temperature at time of discharge (°C)	Maximum elapsed time (hours)

Concrete temperature at time of discharge (°C)	Maximum elapsed time (hours)
10 – 24	2.00
24 – 27	1.50
27 – 30	1.00
30 – 32	0.75

Site mixed supply

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

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

Pre-mixed supply

Addition of water: Do not add water.

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

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

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

3.4 INSTALLATION

Junctions with existing pavements

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

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

Fixed formwork

Description:

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

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

Tolerances on position:

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

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

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

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

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

Reinforcement

Tolerances in fabrication and fixing: To AS 3600.

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

Minimum cover to reinforcement: 30 mm.

Splicing mesh: Overlap a minimum of 2 crosswires.

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

- To withstand construction and traffic loads and maintain the concrete cover, as documented.
- With a protective coating if they are ferrous metal extending to the surface of the concrete, or are used with galvanized or zinc-coated reinforcement.
- Minimum spacing:
  . Bars: ≤ 60 diameters.
  . Fabric: ≤ 800 mm.
- Supports over membranes: Prevent damage to waterproofing membranes or vapour barriers. If appropriate, place a metal or plastic plate under each support.
- Projecting reinforcement: If starter or other bars project beyond reinforcement mats or cages, through formwork or from cast concrete, provide a plastic protective cap to each bar until it is incorporated into subsequent work.
- Tying: Secure the reinforcement against displacement by tying at intersections with either wire ties, or clips. Bend the ends of wire ties away from nearby faces of forms so that the ties do not project into the concrete cover.
- Mats: For bar reinforcement in the form of a mat, secure each bar at alternate intersections.

Cores, fixings and embedded items

Position: Fix cores and embedded items to prevent movement during concrete placing. In locating cores, fixings and embedded items, reposition but do not cut reinforcement, and maintain cover to reinforcement.

Isolation: Isolate embedded items so that water cannot track to concrete providing minimum cover to reinforcement.

3.5 CONCRETE PLACING AND COMPACTION

Concrete placing

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

Remove: Any water ponding on the ground.

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

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

Compaction

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

Thickness > 100 mm and downturns: Use an immersion vibrator.

Placing records

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

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

Rain

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

Protection: Protect surface from damage by covering until hardened.

3.6 CONCRETE PRIMARY FINISH

General

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

Commence: Immediately after placement and spreading and compaction of the plastic concrete, start finishing operations to achieve the documented finish.

Finish: Refer to finishes schedule.

Unformed surfaces

General: Strike off, screed and level slab surfaces to finished levels, to the tolerance class and finish noted in the Unformed surface finishes schedule.

Formed surfaces

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

Curing: If forms are stripped when concrete is at an age less than the minimum curing period, commence curing exposed faces as soon as the stripping is completed.

3.7 CONCRETE CURING

General

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

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

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

Curing methods

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

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

Self levelling toppings: If used also for curing, confirm compliance with AS 3799.

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

Curing compound

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

3.8 JOINTS

General

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

Joint layout: Install joints as required.

Contraction joints

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

Construction joints

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

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

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

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

Preparing joints
Stripping time: At least 12 hours.

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

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

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

3.9 SURFACE SEALERS

General
Sealer: Refer to finishes schedule.

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

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

Concrete finishes
Conform to: *Concrete finishes* worksection.

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

3.10 COMPLETION

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

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

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

0275B SEGMENTAL PAVERS – MORTAR BED

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Provide external paving:

- Consistent in colour and finish.
- Firmly bonded to substrates for the expected life of the installation.
- Resistant to expected impacts in use.
- Set out with joints accurately aligned in both directions.
- To direct all water flowing from supply points to drainage outlets without leakage to the substrate or adjacent areas.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.
- *Stormwater – site*.
- *Pavement base and subbase*.

1.3 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.

1.4 STANDARDS

Slip resistance

Classification: To AS/NZS 4586 for the classifications as documented.

Slip resistance measurement of existing installations: To AS/NZS 4663.

Testing authority

General: Independent third party Registered testing authority.

1.5 SUBMISSIONS

Samples

General: Submit labelled samples of pavers, grout and sealants, illustrating the range of variation in colour and finish.

1.6 TOLERANCES

Completed paving

General: Conform to the **Surface level tolerances table.**

Surface level tolerances table

Item	**Level tolerance**	
	Absolute	**Relative**
Vehicular pavements	± 5 mm	5 mm
Pedestrian pavements	± 10 mm	10 mm

Level discontinuity: Between adjacent pavers and other surface features for footpath areas 1.5 mm and roadway areas 2.0 mm.

Lippage:
- Unpolished pavers: < 2 mm.
- Polished pavers 300 x 300 mm or less: < 1 mm, with 5% not exceeding 1.5%.
- Polished pavers over 300 x 300 mm: < 1.5 mm, with 5 %not exceeding 2%.

2 PRODUCTS

2.1 ADHESIVES

General
Standard: To AS 2358 or AS 4992.1.

Type
General: Provide adhesives compatible with the materials and surfaces to be adhered.

Prohibited uses: Do not provide the following combinations:
- 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.

2.2 MORTAR

Materials
Cement: To AS 3972.
- Type: GP, GL or GB.
- White cement: Iron salts content ≤ 1%.
- Off-white cement: Iron salts content ≤ 2.5%.

Lime: To AS 1672.1.

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

Water: To the recommendations of AS 3958.1.

Measurement of volume: Measure binders and sand by volume using buckets or boxes. Do not allow sand to bulk by absorption of water.

Bedding mortar
Proportioning: Select proportions from the range 1 cement:3 sand – 1 cement:4 sand: to obtain satisfactory adhesion. Provide minimum water.

Mixing: To AS 3958.1.

Gauging: Site gauged by volume.

2.3 GROUT

Type
Cement based proprietary grout: Mix with water. Fine sand may be added as a filler in wider joints.

Portland cement based grout: Mix with fine sand. Provide minimum water to achieve workability.
- For joints < 3 mm: 1 cement:2 sand.
- For joints ≥ 3 mm: 1 cement:3 sand.

Pigments
Pigments for coloured grout: Provide colourfast pigments compatible with the grout material. For cement-based grouts, provide inorganic mineral pigments or lime-proof synthetic metallic oxides compatible with cement.

Water
General: Clean and free from any deleterious matter.

Grout to resin terrazzo tiles: Resinous material supplied by the tile supplier.

2.4 PAVERS

Standard
Masonry units, pavers and flags: To AS/NZS 4455.2

Sandstone flagging
Description: Provide sound stone flags of uniform quality. Reject flags with the following defects liable to affect strength and durability: vents, cracks, fissures, seams, porous inclusions, foreign material, loose surface material, and discolouration.

Matching: Select for optimum matching of colour and pattern.

Split flagging thickness: Minimum 50 mm, maximum 75 mm.

Face size: Utilise smaller sizes for pathways and larger sizes for open areas and maintain traditional stone flagging appearance.

Stone setts
Description: Igneous stone cubed cobble style setts.

2.5 OTHER MATERIALS

Tactile ground surface indicators
Standard: To AS/NZS 1428.4.1.

3 EXECUTION

3.1 SUBSTRATES

Drying and shrinkage
General: Before paving, allow at least the following times to elapse (for curing and initial shrinkage) for these substrates:

- Concrete slabs: 28 days.
- Toppings on slabs: A further 21 days.

3.2 PREPARATION

Trial set-out
General: Prepare a trial paving set-out to each area as follows to:

- Maximise the size of equal margins of cut pavers.
- Locate control joints.
- Note minor variations in joint widths to eliminate cut tiles at margins.

Ambient temperature
General: It the ambient temperature is < 5 or > 35°C, do not lay pavers.

Substrates
General: Ensure substrates are as follows:

- Clean and free of any deposit or finish which may impair adhesion or location of pavers.
- Excessive projections are hacked off and voids and hollows are filled with a cement:sand mix not stronger than the substrate nor weaker than the bedding.

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.

Concrete: If not sufficiently rough to provide a mechanical key, roughen by scabbling or the like to remove 3 mm of the surface and expose the aggregate; then apply a bonding treatment.

If there are particular requirements for substrate preparation, specify them here or schedule them later. Consider providing a positive fall in the substrate to alleviate efflorescence.

Fixtures
General: Before paving ensure that fixtures interrupting the surface are accurately positioned in their designed or optimum locations relative to the paving layout.

3.3 PAVING GENERALLY

Variations
General: If necessary, distribute variations in hue, colour, or pattern uniformly, by mixing pavers or paving batches before laying.

Paving joints
Joint widths: Set out pavers to give uniform joint widths of 6 to 12 mm.

Margins
General: Provide whole or purpose-made pavers at margins where practicable, otherwise set out to give equal margins of cut pavers. If margins less than half paver width are unavoidable, locate the cut pavers where they are least conspicuous.

Protection
Traffic: Keep pedestrian and vehicular traffic off paving until the bedding has set and attained its working strength.

Cleaning: Keep the work clean as it proceeds and protect finished work from damage.

3.4 MORTAR BEDDING

Preparation of pavers
Suction: Soak porous pavers in water for half an hour and then drain until the surface water has disappeared.

Bedding
General: Use bedding methods and materials which are appropriate to the paver, the substrate, the conditions of service, and which leave the paver firmly and solidly bedded in the bedding material and adhered to the substrate. Form falls integral with the substrate.

Mortar beds
Substrate preparation: Either lightly dust the screeded bed surface with dry cement and trowel level until the cement is damp, or spread a thin slurry of neat cement, or cement-based thin bed adhesive, on to the tile back. Do not provide mortar after initial set has occurred.

Sandstone flagging
Sub grade: Compact to 95% of the maximum dry density when tested to AS 1289.

Mortar bed thickness: Minimum 50 mm to maximum 60 mm.

Laying pattern: Random, with smaller stones filling the gaps to produce roughly uniform joint widths. Lay flags and fill joints in one operation.

Stone setts dry bed
Description: Lay and tamp setts on to a dry sand and cement mix, compact and moisten as follows:

- Bed: 1 cement to 3 sand, screeded to the level required to allow setts to be firmly tamped.
- Select the top side of the sett for surface uniformity and tap into the mix to the pre compaction position.
- Compact with a hand ram or mechanical compactor.
- Water spray the surface and allow the bedding to harden.
- Grout joints.

3.5 ADHESIVE BEDDING

Preparation of pavers
Adhesive bedding: Fix pavers dry.

Bedding
General: Use bedding methods and materials which are appropriate to the paver, the substrate, the conditions of service, and which leave the paver firmly and solidly bedded in the bedding material and adhered to the substrate. Form falls integral with the substrate.

Thick adhesive beds
General: Provide on substrates with deviations up to 6 mm when tested with a 2 m straight edge, and with tiles having deep keys or frogs.

Nominal thickness: 6 mm.

Adhesive bedding application
General: Apply adhesive by notched trowel to walls and floors and direct to pavers if required, to provide evenly distributed coverage of > 90% after laying.

Pattern of distribution of adhesive: As illustrated in AS 3958.1 Verify by examining one paver in ten as work proceeds.

3.6 CONTROL OF MOVEMENT

General

General: Provide control joints as follows:

- Location:
  - . Over structural control joints.
  - . At internal corners.
  - . Close to external corners in large paved areas.
  - . Around the perimeter at abutments.
  - . At junctions between different substrates.
  - . To divide large paved areas into bays, maximum 5 m wide, maximum area 16 m^2.
  - . At abutments with the building structural frame and over supporting walls or beams where flexing of the substrate is anticipated.
- Depth of joint: Right through to the substrate.
- Sealant width: 6 – 25 mm.
- Depth of elastomeric sealant: One half the joint width, or 6 mm, whichever is the greater.

Control joint types

Divider strip: A proprietary expansion joint consisting of a neoprene filler sandwiched between plates with lugs or ribs for mechanical keying. Set flush with the finished surface.

Proprietary slide plate divider strip: An arrangement of interlocking metal plates grouted into pockets formed in the concrete joint edges.

Sealant: Two-pack self-levelling flexible mould resistant, one-part silicone or polyurethane sealant applied over a backing rod. Finish flush with the tile surface.

- Floors: Trafficable, shore hardness > 35.

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

3.7 GROUTED AND SEALANT JOINTS

Grouted joints

General: Commence grouting as soon as practicable after bedding has set and hardened sufficiently. Clean out joints as necessary before grouting.

Face grouting: Fill the joints solid and tool flush. Clean off surplus grout. Wash down when the grout has set. When grout is dry, polish the surface with a clean cloth.

3.8 COMPLETION

Cleaning

Completion: Clean progressively and leave pavements clean on completion.

0276 SEGMENTAL PAVERS – SAND BED

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Provide segmental paving surfaces for pavement, footpath and landscape works that are as follows:

- In conformance with the level tolerances specified.
- Consistent in colour and finish.
- Firmly bonded to substrates for the expected life of the installation.
- Able to direct all water flowing from supply points to drainage outlets without leakage to the substrate or adjacent areas.

Performance

Conformance: Conform to any local authority requirements in respect of the levels, grades and paving details (including shape, colour and laying pattern) for paving to footpaths, driveways or the like covered under local council planning.

Selections: As documented.

Design

Coordination: Determine local authority requirements initially as they may affect levels including transition zones for the remainder of the works. Considerations include:

- Drainage.
- Adjacent structures.
- Trees.
- BCA regulations.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.
- *Earthwork*.
- *Stormwater – site*.
- *Pavement base and subbase*.
- *Concrete – combined*.

1.3 INTERPRETATION

Abbreviations

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

- AGPT: Austroads Guide to Pavement Technology.
- CBR: California Bearing Ratio.
- CMAA: Concrete Masonry Association of Australia.
- CBPI: Clay Brick and Paver Institute, also known as Think Brick Australia.
  . Manual 1: Clay paving design and construction.

Definitions

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

- Base: One or more layers of material usually constituting the uppermost structural element of a pavement and on which the surfacing may be placed, which may be composed of fine crushed rock, natural gravel, broken stone, stabilised material, asphalt or concrete.

- Clay pavers: Manufactured from clay, shale or argillaceous materials which may be mixed with additives. Clay pavers may have square, bevelled (chamfered), rounded or rumbled edges. They are generally rectangular in shape, with the length twice the width, plus 2 mm.
- Concrete segmental pavers: Units of not more than 0.10 m^2 in gross plan area, manufactured from concrete, with top and bottom faces parallel, with or without chamfered edges and identified by the following shape types:
  . Shape Type A: Dentated chamfered units which key into each other on four sides, are capable of being laid in herringbone bond, and by plan geometry, when interlocked, resist the spread of joints parallel to both the longitudinal and transverse axes of the units.
  . Shape Type B: Dentated units which key into each other on two sides, are not (usually) laid in herringbone bond, and by plan geometry, when keyed together, resist the spread of joints parallel to the longitudinal axes of the units and rely on dimensional accuracy and accuracy of laying to interlock on the other faces.
  . Shape Type C: Units which do not key together rely on dimensional accuracy and accuracy of laying to develop interlock.
- Density ratio: Percentage of the maximum density at optimum moisture content as determined by AS 1289.5.2.1.
- Flatness: Relative level tolerance - maximum deviation from a 3 m straightedge laid on the surface.
- Levelness: Absolute level tolerance - maximum deviation from design levels.
- Lippage: Height deviation between adjacent pavers.
- Soldier course: A course of whole or trimmed rectangular pavers at the pavement restraint edge.
- Testing authority: Independent third party Registered testing authority.

1.4 STANDARDS

General

Concrete and clay segmental pavers: To AS/NZS 4455.2.

Slip resistance

Classification: To AS/NZS 4586 for the classifications as documented.

Slip resistance measurement of completed pedestrian pavements: To AS/NZS 4663.

1.5 TOLERANCES

Tolerances

General: Conform to the following:

- Levelness: ± 8 mm.
- Flatness: 8 mm.
- Abutments and lippage: < 2 mm.

1.6 SUBMISSIONS

Authority approvals

Local authority: Submit authority approvals for any paving products, laying patterns, alignment and drainage for footpaths or crossovers occurring on property covered under local authority planning.

Execution

Base material: Submit test results on quality, grading and compaction.

Segmental pattern: If it appears that minor variations to joint widths will obviate cutting, submit proposals.

Segmental paving pattern: Prepare a trial set-out for each area.

Products

Compliance certificate: Submit compliance certificates for the pavers, as documented.

Type tests:

- Slip resistance to AS/NZS 4586 for the wet pendulum test.
- Slip resistance: Verification of completed pavement to AS/NZS 4663.

2 PRODUCTS

2.1 SAND

Bedding sand

Quality: Free of deleterious material, such as soluble salts which may cause efflorescence.

Grading: To the **Bedding sand grading table** when tested in conformance with AS 1141.11.1.

Fines: Do not use single-sized, gap-graded or excessive fine material.

Cement: Do not use cement bound material.

Moisture content: Ensure uniform moisture content between 4 – 8 %.

Bedding sand grading table

Sieve aperture	Percentage passing (by mass)
9.52 mm	100
4.75 mm	95 – 100
2.36 mm	80 – 100
1.18 mm	50 – 85
600 µm	25 – 60
300 µm	10 – 30
150 µm	5 – 15
75 µm	0 – 10

Joint filling sand

General: Well-graded sand and free of deleterious material such as soluble salts which may cause efflorescence.

Grading: To the **Joint filling sand grading table** when tested in conformance with AS 1141.11.1.

Joint filling sand grading table

Sieve aperture	Percentage passing
2.36 mm	100
1.18 mm	90 – 100
600 µm	60 – 90
300 µm	30 – 60
150 µm	15 – 30
75 µm	5 – 10

Moisture content: Use dry sand.

Materials: Do not use cement.

2.2 GEOTEXTILE MATERIALS

General

Standard: To AS 3705.

Type: [complete/delete]

Quality: Free of any flaws, stabilised against UV radiation, rot proof, chemically stable, low water absorbency. Filaments must resist delamination and maintain their relative dimensional stability.

2.3 CONCRETE SEGMENTAL PAVERS

Properties

Classification: To CMAA MA57, CMAA T45 and CMAA T46.

Permeable interlocking concrete pavers: To CMAA MA56.

Material requirements: To AS/NZS 4455.2 Tables 2.2(A) and Table 2.2(B) when tested as follows:

- Characteristic breaking load and flexural strength: To AS/NZS 4456.5.
- Dimensional deviations: To AS/NZS 4456.3.

- Abrasion resistance: To AS/NZS 4456.9.

Proprietary product: Conform to the **Selections** schedule.

2.4 CLAY SEGMENTAL PAVERS

Properties

Specification: To the AS/NZS 4455.2 or CMAA MA57.

- Characteristic breaking load and flexural strength: To AS/NZS 4456.5.
- Dimensional deviations: To AS/NZS 4456.3.
- Abrasion resistance: To AS/NZS 4456.9.

Proprietary product: Conform to the **Selections** schedule.

2.5 OTHER MATERIALS

Tactile ground surface indicators

Standard: To AS/NZS 1428.4.1.

2.6 EDGE RESTRAINT

Concrete

Properties: To the *Concrete – combined* worksection.

Compressive strength: 32 MPa.

Sleepers

Hardwood: Sound hardwood railway sleepers to AS 3818.2.

Softwood: Sound preservative-treated softwood sleepers.

Preservative treatment

General: Hazard class 4 to AS 1604.1.

3 EXECUTION

3.1 SUBGRADE

Preparation

Extent: Prepare the subgrade to the required profile and extend to the rear face of the proposed edge restraints or to the face of existing abutting structures.

Subgrade preparation: To the *Earthwork* worksection.

Drainage of subgrade

Subgrade drainage: Prepare piped or channelled stormwater and subsoil drainage to the *Stormwater – site* worksection.

Service trenches: Backfill all drainage trenches to perform similar to the undisturbed ground.

3.2 BASE COURSE

Preparation

Base course extent: Extend base course below the edge restraint for its full width except at walls or pits.

Base course: Conform to the *Pavement base and subbase* worksection.

3.3 EDGE RESTRAINT

Lateral restraint to segmental paving

Perimeter: Provide edge restraints to bedding and units, where not provided by other structures.

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

Edge restraint shape: Ensure the edge restraint has a vertical or near vertical side abutting the pavers.

Sleeper edging

General: Fix sleepers in position by spiking with two 13 mm diameter galvanized mild steel rods per sleeper, penetrating at least 400 mm into the subgrade. Drive the rods flush with the upper surface of the sleeper. Arris the upper exposed sleeper edges to produce a 15 mm wide face at 45 to the edges.

Concrete edging or kerb

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

Edging: Place in a shallow trench between timber forms. Wood float finish flush with the adjacent finished grass level.

Joints: Provide contraction joints 20 mm deep every 5 m.

Timing: Carry out concrete edge restraints before bedding course. Allow concrete edge restraints to be harden before vibration of the surface course.

Brick

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

Joints: 3 mm struck flush.

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

Cleaning: Wash off mortar progressively.

3.4 BEDDING COURSE

General

Preparation: Remove all loose material from the prepared base.

Geotextile

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

Bedding sand

Spreading: Screed uncompacted sand over prepared base uniformly to achieve a 30 mm thick layer. Maintain sand at a uniform loose density and moisture content.

Bedding course drainage: If water ponding occurs at edge restraint, drain bedding course to existing subsurface drain or drainage pit using geotextile and 20 mm diameter PVC pipe.

Trial section

Moisture content: Prepare a trial section to establish the moisture content limits which will allow paver system compaction to be achieved.

3.5 LAYING PAVING

General

Pattern: Lay paving units on the screeded sand bedding to the nominated pattern shown on the drawings.

Joints: 2 – 5 mm gap.

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

Control: Control alignment and laying pattern by stringlines or chalked stringlines every 5 m intervals.

Variable width areas: Include in situ concrete infill strips to make a straight area for paving and take up the variable width.

If there is a concrete base, provide paving control joints:

- Located over base control joints.
- 10 mm wide and filled with bitumen impregnated fibreboard.

Laying around obstacles

Public utility access pits and penetrations: Adjust access covers as required before commencing paving. Make sure water drains away from pits with lids and into surface inlet drainage structures.

Concrete surrounds:

- Make sure the outside dimensions of the pit are square or rectangular and make a smooth connection with the laying pattern of the pavers.
- The pit does not require to be centred.
- Minimum thickness 100 mm.
- Strength grade: N32.
- Colour: grey.
- Precast access chamber: Lay pavers to suit specific dimensions of authority access chambers.
- Patterns around obstacles: Lay up both sides of the feature from the main or original laying face.

Compaction of bedding

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

Progressive compaction: Arrange the paving operations to enable the following:

- Compactor proceeds progressively behind the laying face without undue delay.
- Compaction is completed before stopping work on any day.
- No compaction within 1 m of the laying face except on completion of the pavement against an edge restraint.

Joint filling: Compact all paving units to design levels before the commencement of joint filling.

Joint filling

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

Timing: As soon as compaction is carried out, fill gaps with jointing material.

3.6 COMPLETION

Protection of the work

Protection: Prevent all vehicular and pedestrian traffic from using the pavement until all compaction and joint filling is completed and all edge restraints are in place.

Testing

Conformance: Test for levelness, flatness and lippage tolerances.

Notice: Give notice of non conformance.

Non conformance: Reject pavers that are not within tolerance.

3.7 CLEANING

Cleaning

General: Leave pavements clean on completion.

Final inspection

Cracking in bound pavements: Width 1.5 mm.

Subsidence: Offset less than 1.5 m length of the design profile, ≤ 5 mm.

Stepping: Between adjacent elements within the pavement area, ≤ 5 mm.

Chipping and spalling to pavement units: Maximum 10 per 100 units with chipped or spalled arrises.

Ponding: Maximum 10 mm deep 15 minutes after rain ceases.

Masonry units: Refill joints as required.

0277 PAVEMENT ANCILLARIES

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Provide channels, kerbs and linemarking.

Selections: Conform to **EXECUTION.**

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.
- *Site management*.
- *Earthwork*.
- *Pavement base and subbase*.

1.3 INTERPRETATION

Definitions

General: For the purposes of this worksection the definitions of AS 1348 and those given below apply.

- Absolute level tolerance: Maximum deviation from design levels.
- Relative level tolerance: Maximum deviation from a 3 m straightedge laid on the surface
- Channels and kerbs: Includes all forms of concrete gutters, dish drains, grated drains and mountable median and barrier kerbing.

1.4 SUBMISSIONS

Linemarking materials

General: Submit NATA Registered Laboratory Test Reports, at least seven days before work is scheduled to commence, on the properties of the materials, including paint.

2 PRODUCTS

2.1 MATERIALS

Concrete

Standard: To AS 1379 – Grade N20.

Pavement marking paint

Standard: To AS 4049.1, AS 4049.3 and AS 4049.4.

2.2 VEHICLE BARRIERS

Log barriers

General: Hazard class 4 to AS 1604.1.

Size: Diameter range 125 – 150 mm.

Precast concrete wheel stops

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

Size: 2000 x 150 x 100 mm high.

Steel tube bollards

Type: Bollards fabricated from heavy steel tube, to minimum nominal size DN 100, to AS 1074. Seal free ends with fabricated end caps, spot welded and ground smooth.

Finish: Galvanize after fabrication.

2.3 BICYCLE RACKS

General
Standards: Layout and location to AS 2890.3.

3 EXECUTION

3.1 LINEMARKING

Setting out
General: Set out the work to ensure that all markings are placed as documented.

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

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

Scabbling: Scabble the full area of concrete wearing surfaces to raised pavement markers and remove fine mortar material.

Provision for traffic: Allow for traffic during application and protect pavement markings until the material has hardened sufficiently to carry traffic without damage.

Mixing of paint: Mix all paint in its original container before use and produce a smooth uniform product consistent with the freshly manufactured product.

Application of paint
Longitudinal lines: Spray all longitudinal lines with a self propelled machine. Spray concurrently the two sets of lines forming a one-way or two-way barrier line pattern.

Hand spraying: Hand spray transverse lines, symbols, legends, arrows and chevrons with templates.

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

Pavement markings: Straight or with smooth, even curves where intended.

Edges: Clean with a, sharp cut off. Remove any marking material applied beyond the defined edge of the marking and leave a neat and smooth marking on the wearing surface of the pavement.

Tolerances
Longitudinal line lengths: Do not vary by more than 20 mm from the lengths shown in AS 1742.2.

Longitudinal line widths: Do not vary by more than 10 mm from the widths shown in AS 1742.2.

Transverse line lengths and widths: Do not vary by more than 10 mm from the lengths and widths shown in AS 1742.2.

Dimensions: Do not vary the dimensions of arrows, chevrons, painted medians, painted left turn islands and speed markings by more than 50 mm from the dimensions shown on the drawings or in AS 1742.2 as appropriate. Place arrows and speed markings square with the centreline of the traffic lane.

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

3.2 CHANNELS AND KERBS

Foundation preparation
Foundation material: Shape and compact to form a firm base before placing any kerb and/or gutter.
Construction not on a pavement course: Relative compaction To AS 2876.

Construction on a pavement course: To the requirements of the *Pavement base and subbase* worksection.

Standard: Construct kerb and/or gutters in fixed forms, by extrusion or by slip forming to AS 2876
Foundation, concrete quality, curing and testing details: To AS 2876.

Tolerances
Design level deviation at any point on the surface of gutters: ± 10 mm.

Surface deviation to top or face of kerbs, and to the surface of gutters: 5 mm in 3000 mm.

Design alignment deviation: 25 mm.

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

Joints

Standard: To AS 2876.

Concrete pavement: Where kerbs and/or gutters are cast adjacent with a concrete pavement, continue the same type of expansion, contraction and construction joints documented for the concrete pavement across the kerb and/or gutter.

Backfill

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

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

Compaction: Compact backfilling in layers not greater than 150 mm thick, to a relative compaction of 95% when tested in conformance with AS 1289.5.4.1, for standard compactive effort.

Pavement: Backfill pavement material adjacent to new gutter in conformance with the drawings and the *Pavement base and subbase* worksection.

3.3 VEHICLE BARRIERS

Log barriers

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

Precast concrete wheel stops

Installation: Drive 12 mm diameter galvanized steel rods 600 mm into the ground to finish 25 mm below the top of the wheel stop, or bolt the stop to masonry anchors in concrete slabs. Grout the holes flush to match the concrete finish.

Steel tube bollards

Footing: Encase in a concrete footing at least 600 mm deep x 250 mm diameter.

On slabs: Weld on a 10 mm thick baseplate drilled for 4 bolts, and bolt to masonry anchors.

Filling: Fill the tube with 15 MPa concrete.

0301S PILING

1 GENERAL

1.1 RESPONSIBILITIES

General
General: Refer to structural engineer's specification.

1.2 STANDARD

General
Standard: To AS 2159.

0310B CONCRETE – COMBINED

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Provide cast concrete as documented and as follows:

- Conforming to the design details.
- Satisfying quality and inspection requirements.
- Compatible with following finishes.

Design

Formwork: The design of the formwork, other than profiled steel sheeting composite formwork, is the contractor's responsibility.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.

1.3 STANDARDS

General

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

Plywood formwork: To AS 6669.

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

Specification and supply of concrete: To AS 1379.

Concrete materials and construction: To AS 3600.

Residential ground slabs and footings: To AS 2870.

Concrete structures for retaining liquids: To AS 3735.

Structural design: To AS 3600.

1.4 INTERPRETATION

Definitions

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

- Ambient temperature: The air temperature at the time of mixing and placing of concrete.
- Average ambient temperature: Average value of the daily maximum and minimum ambient temperatures over the relevant period at a site.
- Batch: A quantity of concrete containing a fixed quantity of ingredients and produced in a discrete operation.
- Concrete class:
  - . Normal: Concrete which is specified primarily by a standard compressive strength grade and otherwise conforming to AS 1379 clause 1.5.3.
- Early age strength: A mean compressive strength at 7 days exceeding the values shown in AS 1379 Table 1.2.
- Formwork:
  - . Lost formwork: Sacrificial formwork left in place.
  - . Slip formwork: Continuously slipped or moving formwork.
- Green concrete: Concrete which has set but not appreciably hardened.
- Production assessment: An assessment procedure for concrete specified by strength grade, carried out by the supplier on concrete produced by a specific supplying plant and based on the statistical assessment of standard compressive strength tests on concrete.

- Sample: A portion of the material used in the works, or to take such a sample.
- Specimen: A portion of a sample which is submitted for testing.
- Weather:
  . Cold: Ambient shade temperature < 10°C.
  . Hot: Ambient shade temperature > 30°C.

1.5 INSPECTION

Notice

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

- Base or subgrade before covering.
- Membrane or film underlay installed on the base or subgrade.
- Completed formwork and reinforcement, tendons, cores, fixings and embedded items fixed in place.
- Used formwork, after cleaning and before re-use.
- Surfaces or elements to be concealed in the final work before covering.
- Commencement of concrete placing.
- Evaluation of the off-form finishes.
- Evaluation of surface finish.

1.6 TOLERANCES

Formwork

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

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

Position: Construct formwork so that finished concrete conforms to AS 3600 clause 17.5 and the **Formwork dimensional deviation schedule**.

Reinforcement

Fabrication and fixing: To AS 3600 clause 17.2.

Reinforcement and tendon position: To AS 3600 clause 17.5.3.

Finishes

Surface quality of formed surfaces: Conforming to the surface finish requirements of AS 3610.1 Table 3.3.2 for the surface class nominated in the **Formed surface finishes schedule**.

Flatness of unformed surfaces: Conforming to the **Flatness tolerance class table** for the class of finish nominated using a straight edge placed anywhere on the surface in any direction.

Flatness tolerance class table

Class	Measurement	Maximum deviation (mm)
A	3 m straight edge	3
B	3 m straight edge	6
C	600 mm straight edge	6

1.7 SUBMISSIONS

Calculations

Design: Submit structural performance calculations.

Certification

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

Loading: Submit details of proposed construction systems, loads and procedures, including propping and re-shoring.

Execution details

Re-shoring: If re-shoring is intended, submit proposals.

Stripping single storey suspended work: If the requirements of AS 3610.1 cannot be met, give notice.

Surface repair method: If required, submit details of the proposed method before commencing repairs.

Concrete: Submit proposals for mixing, placing, finishing and curing concrete including the following:

- Changes to the concrete mix.
- Curing and protection methods.
- Curing period for low-pressure steam curing, if proposed.
- Cutting or displacing reinforcement, or cutting hardened concrete.
- Handling, placing, compaction and finishing methods and equipment, including pumping.
- Placing under water.
- Sequence and times for concrete placement, and construction joint locations and relocations.
- Site storage, mixing and transport methods and equipment, if applicable.
- Temperature control methods.

Cutting or coring: If cutting or coring of hardened concrete is proposed, provide details.

Loading: If proposed construction systems, loads and procedures, including propping and re-shoring, differ from submitted design documentation, submit details.

Sequence of concrete placement: If sequential placement of slab segments is proposed, provide details.

Sawn joints: Submit proposed methods, timing and sequence of sawing joints.

Reinforcement: Submit the following:

- General: If changes are proposed to reinforcement shown on the drawings, proposed details.
- Damaged galvanizing: If repair is required, proposals to AS/NZS 4680 Section 8.
- Mechanical splices: If mechanical bar splices are proposed or required, details and test certificates for each size and type of bar to be spliced.
- Provision for concrete placement: If spacing or cover of reinforcement does not conform to AS 3600, give notice.
- Splicing: If undocumented splicing is proposed, proposed details.
- Welding: Give notice before welding reinforcement.

Pre-mixed supply delivery dockets: For each batch, submit a docket listing the information required by AS 1379, and the following information:

- For special class performance concrete: Specified performance and type of cement binder.
- For special class prescription concrete: Details of mix, additives, and type of cement binder.
- Method of placement and climate conditions during pour.
- Name of concrete delivery supervisor.
- Project assessment carried out each day.
- The concrete element or part of the works for which the concrete was ordered, and where it was placed.
- The total amount of water added at the plant and the maximum amount permitted to be added at the site.

Materials

Product conformity: Submit current assessments of conformity, as appropriate, as follows:

- Certificate of conformity by a JAS-ANZ accredited third party.
- Mark of conformity of a JAS-ANZ accredited third party applied to the product.
- Report by a NATA accredited laboratory describing tests and giving results which demonstrate that the product conforms.

Concrete mixes: Submit details, for each grade and type of concrete including any proposed use of special-purpose cement types.

Curing compounds: If it is proposed to use a liquid membrane-forming curing compound, submit the following information:

- Certified test results for water retention to AS 3799 Appendix B.

- Evidence of compatibility with concrete, and with applied finishes including toppings and render, if any, including methods of obtaining the required adhesion.
- For visually important surfaces, evidence that an acceptable final surface colour will be obtained.

Coloured concrete: Using the same mix and method used in the works, submit sample blocks of concrete before colouring with mineral oxides.

- Number: 4.
- Size (nominal): 300 x 300 x 50 mm.

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

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

Reinforcement: Submit type-test reports to verify conformance for each reinforcement type as follows:

- Strength and ductility: To AS 3600 Table 3.2.1.

Shop drawings

Cores, fixings and embedded items: If the locations of these items are not shown or are shown diagrammatically, submit shop drawings showing the proposed locations, clearances and cover. Indicate proposed repositioning of reinforcement.

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.

2 PRODUCTS

2.1 MATERIALS

General

Stockpile: If uniform, consistent colour is required, stockpile sand, cement and aggregates for the project.

Aggregates

Standard: To AS 2758.1.

Aggregate properties: Conform to the **Aggregate property schedule**.

Special aggregates: Stockpile special aggregates at the beginning of the project to minimise colour and other variations.

Cement

Standard: To AS 3972.

Age: Less than 6 months old.

Storage: Store cement bags under cover and above ground.

Water

Standard: To AS 1379.

Requirement: Provide clean water, free from oil, acid, alkali, organic or vegetable matter and including not more than 500 mg/l of chloride ions.

Polymeric film underlay

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

Chemical admixtures

Standard: To AS 1478.1.

Contents: Free of chlorides, fluorides and nitrates.

Curing compounds

Curing compounds: To AS 3799.

Coloured concrete
Standard: To AS 3610.1.

2.2 CONCRETE

Properties
Concrete mix and supply: Conform to the following:
- Normal-class: To AS 1379 clause 1.5.3.
  . Properties: Conform to the **Concrete properties schedule - performance**.

Cover
Concrete cover generally: To AS 3600.

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

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

2.3 TESTING

General
Test authority: Concrete supplier or NATA registered laboratory.

Reports and records of test results: To AS 1012. Retain results on site.

Assessment process of test results
Standard: To AS 1379.

Method of assessment: Project assessment.

Sampling
Method of sampling: AS 1012.1.

Sampling locations: To AS 1012.1 and the following:
- Sample the concrete on site, at the point of discharge from the agitator.
- For compressive strength tests: Spread the site sampling evenly throughout the pour.

Frequency of sampling: To AS 1379 and the following:
- For slump tests: Take at least one sample from each batch.
- For compressive strength tests: Sample to the Project assessment strength grade sampling table.

Project assessment strength grade sampling table

Number of batches for each type and grade of concrete per day	**Minimum number of samples**	
	Columns and load bearing wall elements per batch	**Other elements per day**
1	1	1
2-5	1	2
6-10	1	3
11-20	1	4
each additional 10	1	1 additional

Making and curing of specimens
General: To AS 1012.8.1 and AS 1012.8.2.

Specimens for compressive strength tests: Make and cure at least two specimens from the sample of each grade.

Specimen size: Nominally 200 x 100 mm diameter. If aggregate size exceeds 20 mm, nominally 300 x 150 mm diameter.

Testing
Test methods: To AS 1012.

Acceptance criteria:
- General: To **Concrete properties schedule – performance**.
- Early age compressive strength: To **Control tests schedule**.

Slump tests: Assess slump for every batch. Perform slump test on each strength sample.

Drying shrinkage at 56 days: To AS 1012.13.

Embedded pressure pipes

General: Complete leak tests before embedding pipes.

Liquid retaining structures

Testing for liquid tightness: To AS 3735.

2.4 FORMWORK

General

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

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

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

Profiled steel sheeting composite formwork

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

Minimum steel grade: G550.

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

Plywood formwork

Material: Plywood sheeting to AS 6669.

Grade: To meet the design dimensions, loading and surface quality specified to AS 3610 and AS 3610.1.

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

Tolerances: To AS 3610.1 Section 3.

2.5 REINFORCEMENT

Steel reinforcement

Standard: To AS/NZS 4671:

- Type: Refer to structural engineer's specification.
- Strength grade and ductility class: Refer to structural engineer's specification.

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

Protective coating

Corrosion protection: To AS 3600 clause 4.10.3.

General: For concrete elements containing protective coated reinforcement, provide the same coating type to all that element's reinforcement and embedded ferrous metal items, including tie wires, stools, spacers, stirrups, plates and ferrules, and protect other embedded metals with a suitable coating.

Epoxy coating: High build, high solids chemically resistant coating.

- Thickness: 200 µm minimum.

Galvanizing: To AS/NZS 4680, as follows:

- Sequence: If fabrication is to occur after galvanizing, submit proposals for galvanizing repair and coating of cut ends.
- Zinc-coating (minimum): 600 g/m^2.

Tie wire

General: Annealed steel 1.25 mm diameter (minimum).

External and corrosive applications: Galvanized.

2.6 MISCELLANEOUS

Surface hardeners, sealants and protectors

Supply: If documented, provide proprietary products conforming to the manufacturer's recommendations.

Slip resistance treatment
Slip resistance classification: To AS/NZS 4663.

3 EXECUTION

3.1 POLYMERIC FILM UNDERLAY

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

Base preparation
General: According to base type, as follows:

Concrete working base: Remove projections above the plane surface, and loose material.

Graded prepared subgrade: Blind with sufficient sand to create a smooth surface free from hard projections. Lightly wet the sand just before laying the underlay.

Installation
Standard: To AS 2870 clause 5.3.3.

General: Lay underlay over the base as follows:

- Lap joints at least 200 mm and seal the laps and penetrations with waterproof adhesive tape.
- Face the laps away from the direction of concrete pour.
- Continue up vertical faces past the damp-proof course where applicable, and tape fix at the top.
- Patch or seal punctures or tears before placing concrete.
- Cut back as required after concrete has gained strength and formwork has been removed.

3.2 FORMWORK

General
General: Conform to the **Formed surface finishes schedule.**

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

Bolt holes
Removable bolts: Remove tie bolts without causing damage to the concrete.

Cover: Position formwork tie bolts left in the concrete so that the tie does not project to within 50 mm of finished surface.

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

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

Corners
Work above ground: Fillet at re-entrant angles, and chamfer at corners.

- Face of bevel 25 mm.

Embedments
General: Fix embedments through formwork to prevent movement, or loss of slurry or concrete, during concrete placement.

Openings
General: In vertical formwork 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 linings and facings.

Slip formwork
Provision for inspection: Provide access below the moving formwork for surface treatment and inspection.

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

Steel linings
Rust: Clean off any rust and apply rust inhibiting agent prior to re-use.

Visually important surfaces
General: For concrete of surface finish classes 1, 2 or 3, set out the formwork to give a regular arrangement of panels, joints, bolt holes, and similar visible elements in the formed surface.

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

3.3 REINFORCEMENT

Dowels
Fixing: If a dowel has an unpainted half, embed in the concrete placed first.

Tolerances:

- Alignment: 2 mm in 300 mm.
- Location: ± half the diameter of the dowel.

Grade: 250 N.

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

- Adequate 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.

Minimum spacing:

- Bars: ≤ 60 diameters.
- Mesh: ≤ 800 mm.

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

Projecting reinforcement
General: 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 incorporated into subsequent work.

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

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

Bundled bars: Tie bundled bars in closest possible contact. Provide tie wire of at least 2.5 mm diameter and spaced not more than 24 times the diameter of the smallest bar in the bundle.

Columns: Secure longitudinal column reinforcement to all ties at every intersection.

Mats: For bar reinforcement in the form of a mat, secure each bar at alternate intersections.

Welding
General: If welding of reinforcement is proposed, provide details.

3.4 CONCRETE

General
General: Provide concrete conforming to the **Concrete properties schedule – performance**.

Elapsed delivery time
General: Make sure the elapsed time between the wetting of the mix and the discharge of the mix at the site conforms to the **Elapsed delivery time table**. Do not discharge at ambient temperature

below 10°C or above 30°C unless approved heating or cooling measures are taken to delivered concrete within the range 5°C to 35°C.

Elapsed delivery time table

Concrete temperature at time of discharge (°C)	Maximum elapsed time (minutes)
10 – 24	120
24 – 27	90
27 – 30	60
30 – 32	45

Pre-mixed supply

Addition of water: If adding water, conform to AS 1379 clause 4.2.3.

Transport method: Prevent segregation, loss of material and contamination of the environment, and do not adversely affect placing or compaction.

Site mixed supply

Emergencies: If mixing by hand, provide details.

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

3.5 CORES, FIXINGS AND EMBEDDED ITEMS

Adjoining elements

Fixings: Provide fixings for adjoining elements including any temporary fixings that are required.

Protection

General: Grease threads. Protect embedded items against damage.

Compatibility: Make sure inserts, fixings and embedded items are compatible with each other, with the reinforcement and with the concrete mix to be used and surface finish requirements.

Corrosion: If in external or exposed locations, galvanize anchor bolts and embedded fixings or submit proposed alternate materials.

Structural integrity

Position: Fix cores and embedded items to prevent movement during concrete placing. In locating cores, fixings and embedded items, reposition but do not cut reinforcement, and maintain cover to reinforcement.

Isolation: Isolate embedded items to prevent water tracking to concrete providing minimum cover to reinforcement.

Tolerances

General: Maximum deviation from correct positions:

- Anchor bolt groups for structural steel: To AS 4100.
- Cores and embedded items generally: 10 mm.
- Other fixing bolts: 3 mm.

3.6 PLACING AND COMPACTION

Placing

Horizontal transport: Use suitable conveyors, clean chutes, troughs, hoppers or pipes.

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

Layers: Place concrete in layers ≤ 300 mm thick. Compact succeeding layer into previous layer before previous layer has taken initial set.

Compaction

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

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

Placing records

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

- Date.
- Specified grade and source of concrete.
- Slump measurements.
- The portion of work.
- Volume placed.

Rain

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

Time between adjacent placements

General: Conform to the **Minimum time delay schedule.**

Vertical elements

General: Limit the free fall of concrete to maximum of 2000 mm.

Placing in cold weather

Cement: Do not use high alumina cement.

Placing concrete: Maintain the temperature of the freshly mixed concrete at ≥ 5°C.

Formwork and reinforcement: Before and during placing maintain temperature at ≥ 5°C.

Severe weather: If severe weather conditions are predicted, use high early strength cement.

Temperature control: Heat the concrete materials, other than cement, to the minimum temperature necessary to make sure the temperature of the placed concrete is within the limits specified.

Admixtures: Do not use calcium chloride, salts, chemicals or other material in the mix to lower the freezing point of the concrete.

Frozen materials: Do not allow frozen materials or materials containing ice to enter the mixer, and keep free of frost and ice any formwork, materials, and equipment coming in contact with the concrete.

Maximum temperature of water: 60°C when placed in the mixer.

Concrete: Prevent concrete from freezing, without using salts or chemicals.

Placing in hot weather

Handling: Prevent premature stiffening of the fresh mix and reduce water absorption and evaporation losses. Mix, transport, place and compact the concrete conforming to the **Elapsed delivery time table**.

Placing concrete: Maintain the temperature of the freshly mixed concrete conforming to the **Hot weather placing table**.

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

Formwork and reinforcement: Before and during placing, maintain temperature at ≤ 35°C.

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

- Cool the concrete using liquid nitrogen injection before placing.
- Cover horizontal transport containers.
- Spray the coarse aggregate using cold water before mixing.
- Use chilled mixing water.

Hot weather placing table

Concrete element	**Temperature limit**
Normal concrete in footings, beams, columns, walls and slabs	35°C
Concrete in sections ≥ 1 m in all dimensions except for concrete of strength 40 MPa or greater, in sections exceeding 600 mm in thickness	27°C

Placing under water

Condition: If placing in the dry is practicable by pumping or other means of dewatering, do not place under water.

Minimum cement content for the mix: Increase by 25%.

Method: If required, submit proposals.

3.7 CURING

General

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

- Curing: Cure continuously from completion of finishing until the total cumulative number of days or fractions of days, during which the air temperature in contact with the concrete is above 10°C, conforms to the following, unless accelerated curing is adopted:
  - . Fully enclosed internal surfaces/Early age concrete: 3 days.
  - . Other concrete surfaces: 7 days.
- End of curing period: Prevent rapid drying out at the end of the curing period.
- Protection: Maintain at a reasonably constant temperature with minimum moisture loss, during the curing period.
- Curing method: Refer to structural engineer's specification.

Curing compounds

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

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

Self levelling toppings: If used also as curing compounds, conform to AS 3799.

Visually important surfaces: Apply curing compounds to produce uniform colour on adjacent surfaces.

Hot weather curing

Curing compounds: If curing compounds are proposed, provide details.

Protection: Select a protection method from the following:

- If the concrete temperature > 25°C or if not protected against drying winds, protect the concrete using a fog spray application of aliphatic alcohol evaporation retardant.
- If ambient shade temperature is > 35°C, protect from wind and sun using an evaporative retarder until curing is commenced.
- Immediately after finishing, either cover exposed surfaces using an impervious membrane or hessian kept wet until curing begins, or apply a curing compound.

Water curing

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

3.8 JOINTS

Construction joints

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

Finish: Butt join the surfaces of adjoining pours. In visually important surfaces make the joint straight and true, and free from blemishes impermissible for its surface finish class.

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

Expansion joints

Joint filling: Fill with jointing materials as documented. Finish visible jointing material neatly flush with adjoining surfaces.

Preparation: Before filling, dry and clean the joint surfaces, and prime.

Watertightness: Apply the jointing material so that joints subject to ingress of water are made watertight.

Jointing materials: Provide jointing materials compatible with each other, and non-staining to concrete in visible locations.

Bond breaking: Provide back-up materials for sealants, including backing rods, which do not adhere to the sealant.

Foamed materials (in compressible fillers): Closed-cell or impregnated types not water absorbing.

Slip joints

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

3.9 SURFACE MODIFIERS

General

Application: Apply to clean surfaces conforming to the manufacturer's recommendations.

3.10 FORMED SURFACES

General

Surface finish: Provide formed concrete finishes conforming to the **Formed surface finishes schedule.**

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

Curing

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

Evaluation of formed surfaces

General: If evaluation of formed surface tolerance or colour is required, complete the evaluation before surface treatment.

Surface repairs

Method: If surface repairs are required, submit proposals.

Finishing methods

General: If soffits of concrete elements or faces of concrete columns are to have a finish other than an off-form finish, provide details of proposed procedures.

Blasted finishes:

- Abrasive: Blast the cured surface using hard, sharp graded abrasive particles until the coarse aggregate is in uniform relief.
- Light abrasive: Blast the cured surface using hard, sharp graded abrasive particles to provide a uniform matt finish without exposing the coarse aggregate.

Bush hammered finish: Remove the minimum matrix using bush hammering to expose the coarse aggregate, recessing the matrix no deeper than half the aggregate size, to give a uniform texture.

Exposed aggregate finish: Remove the vertical face formwork while the concrete is green. Wet the surface and scrub using stiff fibre or wire brushes, using clean water freely, until the aggregate is uniformly exposed. Do not use acid etching. Rinse the surface with clean water.

Floated finishes:

- Sand floated finish: Remove the vertical face formwork while the concrete is green. Wet the surface and rub using a wood float. Rub fine sand into the surface until a uniform colour and texture are produced.
- Grout floated finish: Remove the vertical face formwork while the concrete is green. Dampen the surface and spread a slurry, using hessian pads or sponge rubber floats. Remove surplus slurry and work until a uniform colour and texture are produced.

Smooth rubbed finish: Remove the vertical face formwork while the concrete is green. Wet the surface and rub using a carborundum or similar abrasive brick until a uniform colour and texture are produced.

3.11 UNFORMED SURFACES

General

Finished levels: Strike off, screed and level slab surfaces to finished levels, to and the flatness tolerance class documented.

Surface repairs

Method: If surface repairs are required, submit proposals.

Finishing methods – primary finish

Machine float finish:

- After levelling, consolidate the surface using a machine float.
- Cut and fill and 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, appearance and free of trowel marks and defects.

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

Broom finish: After machine floating and steel trowelling use a broom or hessian belt drawn across the surface to produce a coarse even-textured transverse-scored surface.

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

Sponge finish: After machine floating and steel trowelling, use a damp sponge to wipe the surface to produce an even textured sand finish.

3.12 COMPLETION

Formwork removal

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

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

Stripping:

- General: To AS 3600 where it is more stringent than AS 3610.1.
- Vertical formwork: To AS 3610.1 Appendix B Table B1.
- Multi-storey work: Remove formwork without disturbing props supporting succeeding floors.
- Post-tensioned concrete: Remove formwork supporting post-tensioned concrete members to AS 3600 clause 17.6.2.7.

Loading

General: Give notice before loading the concrete structure.

Protection

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

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

0311B CONCRETE FORMWORK

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Provide formwork as documented and as follows:

- Construct formwork to provide cast concrete with the documented dimensions, location, profile, shape and finish.
- Allow for dimensional changes, deflections and cambers resulting from the following:
  - . Imposed actions.
  - . Concrete shrinkage and creep.
  - . Temperature changes.

Design

General: The design of formwork, other than profiled steel sheeting composite formwork, is the contractor's responsibility.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

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

1.3 STANDARDS

General

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

Plywood formwork: To AS 6669.

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

Concrete materials and construction: To AS 3600.

1.4 INSPECTION

Notice

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

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

1.5 SUBMISSIONS

Certification

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

Execution certification: Submit certification by a professional engineer experienced in formwork design and construction verifying conformance of the completed formwork, including the suitability of the formwork for the documented surface finish class.

Execution details

Surface repair method: If required, submit details of the proposed method before commencing repairs.

2 PRODUCTS

2.1 MATERIALS

General

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

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

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

Profiled steel sheeting composite formwork

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

Minimum steel grade: G550.

Corrosion protection: Refer to structural engineer's specification.

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

Plywood formwork

Material: Plywood sheeting to AS 6669.

Grade: To meet the design dimensions, loading and surface quality specified to AS 3610.1.

Joints: Seal the joints consistent with the surface finish class

Tolerances: To AS 3610.1 Section 3.

3 EXECUTION

3.1 PREPARATION

Cleaning

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

3.2 CONSTRUCTION

General

General: Conform to the *Concrete finishes* worksection.

Bolt holes

Removable bolts: Remove tie bolts without causing damage to the concrete.

Corners

Work above ground: Fillet at re-entrant angles, and chamfer at corners.

- Face of bevel 25 mm.

Embedments

General: Fix embedments through formwork to prevent movement, or loss of slurry or concrete, during concrete placement.

Openings

General: In vertical formwork, 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.

Profiled steel sheeting composite formwork

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

Steel linings

Rust: Clean off any rust and apply rust inhibiting agent before re-use.

Visually important surfaces

General: For concrete of surface finish classes 1, 2 or 3, set out the formwork to give a regular arrangement of panels, joints, bolt holes, and similar visible elements in the formed surface.

Void formers

Protection: Keep void formers dry until use, place them on a firm level surface and place reinforcement and concrete with minimum delay.

3.3 COMPLETION

Formwork removal

Extent: Remove formwork, other than profiled steel sheeting composite formwork and lost formwork, including formwork in concealed locations.

Timing: Do not disturb formwork until concrete is hardened enough to withstand formwork movements and removal without damage.

Stripping:

- General: To AS 3600 where it is more stringent than AS 3610.1.
- Vertical formwork: To AS 3610.1 Appendix B Table B1.

0312B CONCRETE REINFORCEMENT

1 GENERAL

1.1 RESPONSIBILITIES

General
General: Provide concrete reinforcement as documented.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following worksection(s):
- *General requirements*.
- *Concrete in situ*.

1.3 STANDARDS

General
Concrete materials and construction: To AS 3600.

1.4 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of the following:
- Cores and embedments fixed in place.
- Reinforcement fixed in place, with formwork completed.

1.5 SUBMISSIONS

Execution details
Reinforcement: Submit the following:
- General: If changes are proposed to reinforcement shown on the drawings, proposed details.
- Damaged galvanizing: If repair is required, proposals to AS/NZS 4680 Section 8.
- Mechanical splices: If mechanical bar splices are proposed or required, details and test certificates for each size and type of bar to be spliced.
- Provision for concrete placement: If spacing or cover of reinforcement does not conform to AS 3600, give notice.
- Splicing: If undocumented splicing is proposed, proposed details.
- Welding: Give notice before welding reinforcement.

2 PRODUCTS

2.1 MATERIALS

Steel reinforcement
Standard: To AS/NZS 4671:
- Type: Refer to structural engineer's specification.
- Strength grade and ductility class: Refer to structural engineer's specification.

Surface condition: Free of loose mill scale, rust, oil, grease, mud or other material which would reduce the bond between the reinforcement and concrete.

Protective coating
Corrosion protection: To AS 3600 clause 4.10.3.

General: For concrete elements containing protective coated reinforcement, provide the same coating type to all that element's reinforcement and embedded ferrous metal items, including tie wires, stools, spacers, stirrups, plates and ferrules, and protect other embedded metals with a suitable coating.

Epoxy coating: Provide a high build, high solids chemically resistant coating.

- Thickness: 200 µm minimum.

Galvanizing: To AS/NZS 4680, as follows:

- Sequence: If fabrication is to occur after galvanizing, submit proposals for galvanizing repair and coating of cut ends.
- Zinc-coating (minimum): 600 g/m^2.

Tie wire

General: Annealed steel 1.25 mm diameter (minimum).

External and corrosive applications: Galvanized.

3 EXECUTION

3.1 CONSTRUCTION

Dowels

Fixing: If a dowel has an unpainted half, embed in the concrete placed first.

Tolerances:

- Alignment: 2 mm in 300 mm.
- Location: ± half the diameter of the dowel.

Grade: 250 N.

Supports

General: Provide proprietary concrete, metal or plastic supports to reinforcement in the form of chairs, spacers, stools, hangers and ties, as follows:

- Adequate 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.

Minimum spacing:

- Bars: ≤ 60 diameters.
- Mesh: ≤ 800 mm.

Supports over membranes: Prevent damage to waterproofing membranes or vapour barriers. If appropriate, place a metal or plastic plate under each support.

Projecting reinforcement

General: 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 incorporated into subsequent work.

Tying

General: Secure the reinforcement against displacement by tying at intersections with either wire ties, or clips. Bend the ends of wire ties away from nearby faces of formwork or unformed faces to prevent the ties projecting into the concrete cover.

Beams: Tie stirrups to bars in each corner of each stirrup. Fix other longitudinal bars to stirrups at 1 m maximum intervals.

Welding

General: If welding of reinforcement is proposed, provide details.

0314B CONCRETE IN SITU

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Provide concrete in situ as documented and as follows:

- Conforming to the design details.
- Satisfying the quality and inspection requirements.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.
- *Concrete formwork*.
- *Concrete reinforcement*.
- *Concrete finishes*.

1.3 STANDARDS

General

Concrete materials and construction: To AS 3600.

Specification and supply of concrete: AS 1379.

Concrete structures for retaining liquids: To AS 3735.

1.4 INTERPRETATION

General: For the purposes of this worksection the following definitions apply:

- Ambient temperature: The air temperature at the time of mixing and placing of concrete.
- Average ambient temperature: Average value of the daily maximum and minimum ambient temperatures over the relevant period at a site.
- Batch: A quantity of concrete containing a fixed quantity of ingredients and produced in a discrete operation.
- Concrete class:
  - . Normal: Concrete which is specified primarily by a standard compressive strength grade and otherwise conforming to with AS 1379 clause 1.5.3.
- Early age strength: A mean compressive strength at 7 days exceeding the values shown in AS 1379 Table 1.2.
- Green concrete: Concrete which has set but not appreciably hardened.
- Production assessment: An assessment procedure for concrete specified by strength grade, carried out by the supplier on concrete produced by a specific supplying plant and based on the statistical assessment of standard compressive strength tests on concrete.
- Sample: A portion of the material used in the works, or to take such a sample.
- Specimen: A portion of a sample which is submitted for testing.
- Weather:
  - . Cold: Ambient shade temperature < 10°C.
  - . Hot: Ambient shade temperature > 30°C.

1.5 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Base or subgrade before covering.
- Membrane or film underlay installed on the base or subgrade.

- Completed formwork, and reinforcement, cores, fixings and embedded items fixed in place.
- Surfaces or elements to be concealed in the final work before covering.
- Commencement of concrete placing.

1.6 SUBMISSIONS

Execution details

Concrete: Submit proposals for mixing, placing, finishing and curing concrete including the following:

- Changes to the concrete mix.
- Curing and protection methods.

Cutting or coring: If cutting or coring of hardened concrete is proposed, provide details.

Sawn joints: Submit proposed methods, timing and sequence of sawing joints.

Pre-mixed supply delivery dockets: For each batch, submit a docket listing the information required by AS 1379, and the following information:

- For special class performance concrete, specified performance and type of cement binder.
- For special class prescription concrete, details of mix, additives, and type of cement binder.
- Method of placement and climate conditions during pour.
- The amount of water, if any, added at the site.

2 PRODUCTS

2.1 MATERIALS

Polymeric film underlay

Vapour barriers and damp-proofing membranes: To AS 2870 clause 5.3.3.

Chemical admixtures

Standard: To AS 1478.1.

Contents: Free of chlorides, fluorides and nitrates.

Curing compounds

Standard: To AS 3799.

Coloured concrete

Standard: To AS 3610.1.

2.2 CONCRETE

Properties

Concrete mix and supply: Conform to the following:

- Normal-class: To AS 1379 clause 1.5.3.
  . Properties: Conform to the **Concrete properties schedule - performance**.

Cover

Concrete cover generally: To AS 3600.

Concrete cover for structures for retaining liquids: To AS 3735.

Concrete cover for residential ground slabs and footings: To AS 2870.

2.3 TESTING

General

Test authority: Concrete supplier or NATA registered laboratory.

Reports and records of test results: To AS 1012. Retain results on site.

Assessment process of test results

Standard: To AS 1379.

Method of assessment: Project assessment.

Sampling

Method of sampling: AS 1012.1.

Sampling locations: To AS 1012.1 and the following:

- Sample the concrete on site, at the point of discharge from the agitator.
- For compressive strength tests: Spread the site sampling evenly throughout the pour.

Frequency of sampling: To AS 1379 and the following:

- For slump tests: Take at least one sample from each batch.
- For compressive strength tests: Sample to the Project assessment strength grade sampling table.

Project assessment strength grade sampling table

Number of batches for each type and grade of concrete per day	**Minimum number of samples**	
	Columns and load bearing wall elements per batch	**Other elements per day**
1	1	1
2-5	1	2
6-10	1	3
11-20	1	4
each additional 10	1	1 additional

Making and curing of specimens

General: To AS 1012.8.1 and AS 1012.8.2.

Specimens for compressive strength tests: Make and cure at least two specimens from the sample of each grade.

Specimen size: Nominally 200 x 100 mm diameter. If aggregate size exceeds 20 mm, nominally 300 x 150 mm diameter.

Testing

Test methods: To AS 1012.

Acceptance criteria:

- General: To **the Concrete properties schedule – performance**.
- Early age compressive strength: To the **Control tests schedule**.

Slump tests: Assess slump for every batch. Perform slump test on each strength sample.

Drying shrinkage at 56 days: To AS 1012.13.

Other tests: To the **Tests schedule**.

Embedded pressure pipes

General: Complete leak tests before embedding pipes.

Liquid retaining structures

Testing for liquid tightness: To AS 3735.

3 EXECUTION

3.1 POLYMERIC FILM UNDERLAY

Location

General: Under slabs on ground including integral ground beams and footings, provide a vapour barrier or, in areas prone to rising damp or salt attack, a damp-proofing membrane.

Base preparation

General: According to base type, as follows:

- Concrete working base: Remove projections above the plane surface, and loose material.
- Graded prepared subgrade: Blind with sufficient sand to create a smooth surface free from hard projections. Lightly wet the sand just before laying the underlay.

Installation

Standard: To AS 2870 clause 5.3.3.

3.2 CONCRETE

General

General: Provide concrete conforming to the **Concrete properties schedule – performance**.

Elapsed delivery time

General: Make sure the elapsed time between the wetting of the mix and the discharge of the mix at the site conforms to the **Elapsed delivery time table**. Do not discharge at ambient temperature below 10°C or above 30°C unless approved heating or cooling measures are taken to delivered concrete within the range 5°C to 35°C.

Elapsed delivery time table

Concrete temperature at time of discharge (°C)	Maximum elapsed time (minutes)
10 – 24	120
24 – 27	90
27 – 30	60
30 – 32	45

Pre-mixed supply

Addition of water: If adding water, conform to AS 1379 clause 4.2.3.

Transport method: Prevent segregation, loss of material and contamination of the environment, and do not adversely affect placing or compaction.

Site mixed supply

Emergencies: If mixing by hand, provide details.

Plant: Mix concrete in plant located on the construction site.

3.3 CORES, FIXINGS AND EMBEDDED ITEMS

Adjoining elements

Fixings: Provide fixings for adjoining elements including any temporary fixings that are required.

Protection

General: Grease threads. Protect embedded items against damage.

Compatibility: Make sure inserts, fixings and embedded items are compatible with each other, with the reinforcement and with the concrete mix to be used and surface finish requirements.

Corrosion: If in external or exposed locations, galvanize anchor bolts and embedded fixings or submit proposed alternate materials.

Structural integrity

Position: Fix cores and embedded items to prevent movement during concrete placing. In locating cores, fixings and embedded items, reposition but do not cut reinforcement, and maintain cover to reinforcement.

Isolation: Isolate embedded items to prevent water tracking to concrete providing minimum cover to reinforcement.

Tolerances

General: Maximum deviation from correct positions:

- Anchor bolt groups for structural steel: To AS 4100.
- Cores and embedded items generally: 10 mm.
- Other fixing bolts: 3 mm.

3.4 PLACING AND COMPACTION

Placing

Horizontal transport: Use suitable conveyors, clean chutes, troughs, hoppers or pipes.

Methods: Avoid segregation and loss of concrete, and minimise plastic settlement. Maintain a nominally vertical and plastic concrete edge during placement.

Layers: Place concrete in layers ≤ 300 mm thick. Compact succeeding layer into previous layer before previous layer has taken initial set.

Compaction

Methods: Use immersion and screed vibrators accompanied by hand methods as appropriate to remove entrapped air and to fully compact the mix.

Vibrators: Do not allow vibrators to contact set concrete, reinforcement or items including pipes and conduits embedded in concrete. Do not use vibrators to move concrete along the formwork. Avoid causing segregation by over-vibration.

Placing records

General: Keep on site and make available for inspection a log book recording each placement of concrete, including the following:

- Date.
- Specified grade and source of concrete.
- Slump measurements.
- The portion of work.
- Volume placed.

Rain

General: During placement and before setting, protect the surface from damage.

Time between adjacent placements

General: Conform to the **Minimum time delay schedule.**

Vertical elements

General: Limit the free fall of concrete to maximum of 2000 mm.

Placing in cold weather

Cement: Do not use high alumina cement.

Placing concrete: Maintain the temperature of the freshly mixed concrete at ≥ 5°C.

Formwork and reinforcement: Before and during placing maintain temperature at ≥ 5°C.

Severe weather: If severe weather conditions are predicted, use high early strength cement.

Temperature control: Heat the concrete materials, other than cement, to the minimum temperature necessary to make sure the temperature of the placed concrete is within the limits specified.

Admixtures: Do not use calcium chloride, salts, chemicals or other material in the mix to lower the freezing point of the concrete.

Frozen materials: Do not allow frozen materials or materials containing ice to enter the mixer, and keep free of frost and ice any formwork, materials, and equipment coming in contact with the concrete.

Maximum temperature of water: 60°C when placed in the mixer.

Concrete: Prevent concrete from freezing, without using salts or chemicals.

Placing in hot weather

Handling: Prevent premature stiffening of the fresh mix and reduce water absorption and evaporation losses. Mix, transport, place and compact the concrete conforming to the **Elapsed delivery time table**.

Placing concrete: Maintain the temperature of the freshly mixed concrete conforming to the **Hot weather placing table**.

Evaporation control barriers: Erect barriers to protect freshly placed concrete from drying winds.

Formwork and reinforcement: Before and during placing, maintain temperature at ≤ 35°C.

Temperature control: Select one or more of the following methods of maintaining the specified temperature of the placed concrete at < 35°C:

- Cool the concrete using liquid nitrogen injection before placing.
- Cover horizontal transport containers.
- Spray the coarse aggregate using cold water before mixing.
- Use chilled mixing water.

Hot weather placing table

Concrete element	**Temperature limit**
Normal concrete in footings, beams, columns, walls and slabs	35°C
Concrete in sections ≥ 1 m in all dimensions except for concrete of strength 40 MPa or greater,	27°C

Concrete element	Temperature limit
in sections exceeding 600 mm in thickness	

3.5 CURING

General

Requirements: Taking into account the average ambient temperature at site over the relevant period affecting the curing, adopt procedures to make sure of the following:

- Curing: Cure continuously from completion of finishing until the total cumulative number of days or fractions of days, during which the air temperature in contact with the concrete is above 10°C, conforms to the following, unless accelerated curing is adopted:
  - . Fully enclosed internal surfaces/Early age concrete: 3 days.
  - . Other concrete surfaces: 7 days.
- End of curing period: Prevent rapid drying out at the end of the curing period.
- Protection: Maintain at a reasonably constant temperature with minimum moisture loss, during the curing period.
- Curing method: Refer to structural engineer's specification.

Curing compounds

Application: Provide a uniform continuous flexible coating without visible breaks or pinholes, which remains unbroken at least for the required curing period after application.

Substrates: Do not use wax-based or chlorinated rubber-based curing compounds on surfaces forming substrates to applied finishes, concrete toppings and cement-based render.

Self levelling toppings: If used also as curing compounds, conform to AS 3799.

Visually important surfaces: Apply curing compounds to produce uniform colour on adjacent surfaces.

Hot weather curing

Curing compounds: If curing compounds are proposed, provide details.

Protection: Select a protection method from the following:

- If the concrete temperature > 25°C or if not protected against drying winds, protect the concrete using a fog spray application of aliphatic alcohol evaporation retardant.
- If ambient shade temperature is > 35°C, protect from wind and sun using an evaporative retarder until curing is commenced.
- Immediately after finishing, either cover exposed surfaces using an impervious membrane or hessian kept wet until curing begins, or apply a curing compound.

Water curing

General: Select a method of ponding or continuously sprinkling to prevent damage to the concrete surface during the required curing period.

3.6 JOINTS

Construction joints

Location: Do not relocate or eliminate construction joints, or make construction joints not documented. If emergency construction joints are made necessary by unforeseen interruptions to the concrete pour, submit a report on the action taken.

Finish: Butt join the surfaces of adjoining pours. In visually important surfaces make the joint straight and true, and free from blemishes impermissible for its surface finish class.

Preparation: Roughen and clean the hardened concrete joint surface. Remove loose or soft material, free water, foreign matter and laitance. Dampen the surface just before placing the fresh concrete and coat with a neat cement slurry.

Expansion joints

Joint filling: Fill with jointing materials as documented. Finish visible jointing material neatly, flush with adjoining surfaces.

Preparation: Before filling, dry and clean the joint surfaces, and prime.

Watertightness: Apply the jointing material so that joints subject to ingress of water are made watertight.

Jointing materials: Provide jointing materials compatible with each other, and non-staining to concrete in visible locations.

Bond breaking: Provide back-up materials for sealants, including backing rods, which do not adhere to the sealant. .

Foamed materials (in compressible fillers): Closed-cell or impregnated types which do not absorb water.

Slip joints

Requirement: If concrete slabs are supported on masonry, provide proprietary slip joints.

0315B CONCRETE FINISHES

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Provide finishes to formed and unformed concrete surfaces as documented and as follows:

- Appropriate to the importance (visual or physical) of the concrete elements.
- Compatible with following trades and finishes.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.
- *Concrete formwork*.
- *Concrete in situ*.

1.3 STANDARDS

General

Formed surfaces: To AS 3610.1.

1.4 INTERPRETATION

Definitions

General: For the purposes of this worksection the following definition applies:

- Green concrete: Concrete which has set but not appreciably hardened.

1.5 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Evaluation of the off-form finishes.

1.6 TOLERANCES

Surface quality

Formed surfaces: Conforming to the surface finish requirements of AS 3610.1 Table 3.3.2 for the surface class nominated in the **Formed surface finishes schedule**.

Flatness

Unformed surfaces: Conforming to the **Flatness tolerance class table** for the class of finish nominated using a straight edge placed anywhere on the surface in any direction.

Flatness tolerance class table

Class	Measurement	Maximum deviation (mm)
A	3 m straight edge	3
B	3 m straight edge	6
C	600 mm straight edge	6

2 PRODUCTS

2.1 MATERIALS

Surface hardeners, sealants and protectors

Supply: If documented, provide proprietary products conforming to the manufacturer's recommendations.

3 EXECUTION

3.1 SURFACE MODIFIERS

General

Application: Apply to clean surfaces in conformance with the manufacturer's recommendations.

3.2 FORMED SURFACES

General

Surface finish: Provide formed concrete finishes conforming to the Formed surface finishes schedule.

Damage: Do not damage concrete works through premature removal of formwork.

Curing

General: If formwork is stripped before the minimum curing period for the concrete has elapsed, continue curing the exposed faces as soon as the stripping is completed.

Evaluation of formed surfaces

General: If evaluation of formed surface tolerance or colour is required, complete the evaluation before surface treatment.

Surface repairs

Method: If surface repairs are required, submit proposals.

Finishing methods

General: If soffits of concrete elements or faces of concrete columns are to have a finish other than an off-form finish, provide details of proposed procedures.

Blasted finishes:

- Abrasive: Blast the cured surface using hard, sharp graded abrasive particles until the coarse aggregate is in uniform relief.
- Light abrasive: Blast the cured surface using hard, sharp graded abrasive particles to provide a uniform matt finish without exposing the coarse aggregate.

Bush hammered finish: Remove the minimum matrix using bush hammering to expose the coarse aggregate, recessing the matrix no deeper than half the aggregate size, to give a uniform texture.

Exposed aggregate finish: Remove the vertical face formwork while the concrete is green. Wet the surface and scrub using stiff fibre or wire brushes, using clean water freely, until the aggregate is uniformly exposed. Do not use acid etching. Rinse the surface with clean water.

Floated finishes:

- Sand floated finish: Remove the vertical face formwork while the concrete is green. Wet the surface and rub using a wood float. Rub fine sand into the surface until a uniform colour and texture are produced.
- Grout floated finish: Remove the vertical face formwork while the concrete is green. Dampen the surface and spread a slurry, using hessian pads or sponge rubber floats. Remove surplus slurry and work until a uniform colour and texture are produced.

Smooth rubbed finish: Remove the vertical face formwork while the concrete is green. Wet the surface and rub using a carborundum or similar abrasive brick until a uniform colour and texture are produced.

3.3 UNFORMED SURFACES

General

Finished levels: Strike off, screed and level slab surfaces to finished levels and the flatness tolerance class documented.

Surface repairs

Method: If surface repairs are required, submit proposals.

Finishing methods – primary finish

Machine float finish:

- After levelling, consolidate the surface using a machine float.
- Cut and fill and 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, appearance and free of trowel marks and defects.

Wood float finish: After machine floating use wood or plastic hand floats to produce the final consolidated finish free of float marks and uniform in texture and appearance.

Broom finish: After machine floating and steel trowelling use a broom or hessian belt drawn across the surface to produce a coarse even-textured transverse-scored surface.

Scored or scratch finish: After screeding, use a stiff brush or rake drawn across the surface before final set, to produce a coarse scored texture.

Sponge finish: After machine floating and steel trowelling, use a damp sponge to wipe the surface to produce an even textured sand finish.

0318S SHOTCRETE

1 GENERAL

1.1 RESPONSIBILITIES

General

General: If used, provide shotcrete that:

- Is readily sprayed into corners and around reinforcement and built-in items without segregation or vertical slumping or sag.
- Is not porous, cracked or honeycombed.
- Has acceptable plastic shrinkage cracking.
- Can be readily worked to the required finish.

1.2 STANDARDS

General

Materials and construction: To AS 3600.

Concrete: To AS 1379.

Concrete structures for retaining liquids: To AS 3735.

Curing compounds: To AS 3799.

0331B BRICK AND BLOCK CONSTRUCTION

1 GENERAL

1.1 RESPONSIBILITIES

General
General: Provide brick and block construction as documented.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following worksection(s):
- *General requirements*.

1.3 STANDARDS

General
Materials and construction: To AS 3700.

1.4 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of the following:
- Set out.
- Unit type, colour and texture.
- Bottoms of cavities, after cleaning out.
- Bottoms of core holes, before grouting.
- Reinforcement type and diameter.
- Positioning of reinforcing before grouting.
- Control joints, ready for insertion of joint filler.
- Damp-proof courses, in position.
- Flashings, in position.
- Lintels, in position.
- Structural steelwork, including bolts and shelf angles, in position.

1.5 TOLERANCES

Brick and block construction
Standard: To AS 3700 Table 12.1.

2 PRODUCTS

2.1 DURABILITY

General
Exposure locations: To AS 3700 clause 5.4.

2.2 MATERIALS

Brick and block units
Selections: To **Brick and block construction schedule.**
Standard: To AS/NZS 4455.1 and AS/NZS 4455.3.
Salt attack resistance grade: To AS 3700 Table 5.1.
Minimum age of clay bricks: 7 days.
Mortar materials
Mortar class: To AS 3700 Table 5.1.
Cement: To AS 3972.

White cement: With ≤ 1% iron salts content.

Lime: To AS 1672.1.

Sand: Fine aggregate with a low clay content and free from efflorescing salts, selected for colour and grading.

Water: Clean and free from any deleterious matter.

Admixtures: To AS 3700 clause 11.4.2.4.

Pigment: To BS EN 12878, and as follows:

- Quantity: Less than 10% of the mass of cement in the mix.

Proportions: Conform to the **Mortar mix table.**

Mortar mix table

Mortar class to AS 3700	**Cement, lime, sand ratios (by volume)**			**Water thickener**
	Clay	**Concrete**	**Calcium silicate**	
Masonry cement				
M3	1:0:4	1:0:4	n/a	Yes
M4	1:0:3	n/a	n/a	Yes
Cement (GP/GB)				
M2	1:2:9	n/a	n/a	No
M3	1:1:6	1:1:6	n/a	Optional
M3	1:0:5	1:0:5	1:0:5	Yes
M4	1:0.5:4.5	1:0.5:4.5	n/a	Optional
M4	1:0:4	1:0:4	1:0:4	Yes
M4	1:0-0.25:3	1:0-0.25:3	n/a	Optional

Grout

Standard: To AS 3700 clause 11.7.

Minimum characteristic compressive strength: 12 MPa.

2.3 BUILT-IN COMPONENTS

General

Durability class of built-in components: To AS 3700 Table 5.1.

Steel lintels

Angles and flats: To AS/NZS 3679.1.

Cold formed proprietary lintels: Designed to AS/NZS 4600.

Corrosion protection: To AS/NZS 2699.3.

Galvanizing: Do not cut after galvanizing.

Reinforcement

Standard: To AS/NZS 4671.

Corrosion protection: To AS 3700 clause 5.9.

Minimum cover: To AS 3700 Table 5.1.

Wall ties

Standard: To AS/NZS 2699.1.

Corrosion protection: To AS/NZS 2699.1.

Connectors and accessories

Standard: To AS/NZS 2699.2.

Corrosion protection: To AS/NZS 2699.2.

Flashings and damp-proof courses

Standard: To AS/NZS 2904.

Slip joints

Standard: To AS 3700 clause 4.13.

Material: Refer to structural engineer's specification.

3 EXECUTION

3.1 GENERAL

Mortar mixing

General: Measure volumes accurately to the documented proportions. Machine mix for at least six minutes.

Protection from contamination

General: Protect masonry materials and components from ground moisture and contamination.

Bond

Type: Stretcher bond.

Building in

Embedded items: Build in wall ties and accessories as the construction proceeds. If it is not practicable to obtain the required embedment wholly in the mortar joint in hollow masonry units, fill appropriate cores with grout or mortar.

Steel door frames: Fill the backs of jambs and heads solid with mortar as the work proceeds.

Clearance for timber frame shrinkage

General: In timber frame brick veneer construction, leave clearances between window frames and brick sill and between roof frames and the brick veneer as follows:

- Additional clearance: To accommodate additional shrinkage of unseasoned floor timbers.
- Single storey frames and ground floor windows (not for slab on ground): 10 mm.
- Two storey frames and upper floor windows: 20 mm.

Construction at different rates or times

Monolithic structural action: If two or more adjoining sections of masonry, including intersecting walls, are constructed at different rates or times, rake back or tie the intersections between those sections so that monolithic structural action is obtained in the completed work.

Joining to existing

General: Provide a control joint where joining to existing structures. Do not tooth new masonry into existing work unless approved by a professional engineer.

Mortar joints

Solid and cored units: Lay on a full bed of mortar. Fill perpends solid. Cut mortar flush.

Face-shell bedded hollow units: Fill perpends solid. Cut mortar flush.

Finish: Conform to the following:

- Externally: Tool to give a dense water-shedding finish.
- Internally: If wall is to be plastered, do not rake more than 10 mm to give a key.
- Thickness: 10 mm.

Cutting: Set out masonry with joints of uniform width and minimum cutting of masonry units.

Monolithic structural action

Header units: Except in stretcher bond facework, provide brick and block header units, to AS 3700 clause 4.11.2.

Spacing: 600 mm maximum.

Location: Provide header units in the following locations:

- At engaged piers.
- At engagement of diaphragms with the leaves in diaphragm walls.
- At intersections of flanges with shear walls.
- At intersections with supporting walls and buttresses.
- Between leaves in solid masonry construction.

Rate of construction

General: Regulate the rate of construction to eliminate joint deformation, slumping or instability.

Rods
Set out: Construct masonry to the following rods:
- 75 mm high units: 7 courses to 600 mm.
- 90 mm high units: 6 courses to 600 mm.
- 190 mm high units: 3 courses to 600 mm.

Protection
General: Cover the top surface of brickwork and blockwork to prevent the entry of rainwater and contaminants.

Single leaf and solid walls: Moisture protection to AS 3700 clause 4.7.4.

Temporary support
General: If the final stability of the masonry is dependent on construction of(structural) elements after the brickwork and blockwork is completed, provide proposals for temporary support or bracing.

3.2 FACEWORK

Cleaning
General: Clean progressively as the work proceeds to remove mortar smears, stains and discolouration. Do not erode joints if using pressure spraying.

Acid solution: Do not use.

Colour mixing
Distribution: In facework, distribute the colour range of units evenly to prevent colour concentrations and banding.

Below ground
Facework: Commence face brickwork at least 1 full course for blockwork, or 2 full courses for brickwork, below adjacent finished surface level.

Double face walls
Selection: Select face units for uniform width and double-face qualities.

Preferred face: Before starting, obtain approval of the preferred wall face, and favour that face should a compromise be unavoidable.

Perpends
General: If other than vertically aligned perpends 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, leave door width openings beneath doorways to give access to underfloor areas.

Air vent locations
General: Provide air vents to give adequate cross ventilation to the space under suspended ground floors.

Cavity walls: Provide matching vents in the internal leaves located as near as practicable to the vents in the external leaves.

Location: Below damp-proof course to internal and external walls.

Air vent types
Blockwork: Select from the following:
- Concrete framed: Bronze wire mesh in concrete frame 390 x 190 mm.
- Vent blocks: Purpose-made vent blocks.

Brickwork: Select from the following:
- Concrete framed: Bronze wire mesh in concrete frames, 470 x 160 mm.
- Cut brick: 2 cut bricks laid vertically and evenly spaced in a 230 mm wide x 2 course high opening, backed with bronze wire mesh built in.

- Terra cotta: Perforated, 230 x 160 mm.

Underpinning

Requirement: Install underpinning while maintaining the building undamaged.

Grouting: Pack dry mix M4 mortar between underpinning and 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 to 1 course above adjacent finished (ground) level with mortar. Fall the top surface towards the outer leaf.

Cavity width

General: Provide minimum cavity widths in conformance with the following:

- Masonry walls: 50 mm.
- Masonry veneer walls: 40 mm between the masonry leaf and the load bearing frame and 25 mm minimum between the masonry leaf and sheet bracing.

Openings

Care: Do not close the cavity at the jambs of external openings.

Wall ties connectors and accessories

Protection: Install to prevent water passing across the cavity.

3.5 DAMP-PROOF COURSES

Location

General: Provide damp-proof courses as follows:

- Timber floors: In the first course below the level of the underside of ground floor timbers in internal walls and inner leaves of cavity walls.
- Cavity walls built off slabs on ground: In the bottom course of the outer leaf, continuous horizontally across the cavity and up the inner face bedded in mortar, turned 30 mm into the inner leaf 1 course above.
- Masonry veneer construction: In the bottom course of the outer leaf, continuous horizontally across the cavity. Fasten to the inner frame 75 mm above floor level.
- Walls adjoining infill floor slabs on membranes: In the course above the underside of the slab in internal walls and inner leaves of cavity walls. Project 40 mm and dress down over the membrane turned up against the wall.

Height: Not less than:

- 150 mm above the adjacent finished ground level.
- 75 mm above the finished paved or concrete area.
- 50 mm above the finished paved or concreted area and protected from the direct effect of the weather.

Installation

General: Lay in long lengths. Lap full width at angles and intersections and at least 150 mm at joints. Step as necessary, but not exceeding 2 courses per step for brickwork and 1 course per step for blockwork. Sandwich damp-proof courses between mortar.

Junctions: Preserve continuity of damp-proofing at junctions of damp-proof courses and waterproof membranes.

Lap sealing: Seal with a bituminous adhesive and sealing compound.

3.6 FLASHINGS

Location

General: Provide flashings as follows:

- Floors: Full width of outer leaf immediately above slab or shelf angle, continuous across cavity and up the inner face bedded in mortar, turned 30 mm into the inner leaf 2 courses above for brick and

1 course above for block. If the slab supports the outer skin and is not rebated, bed the flashing in a suitable sealant.

- Under sills: 30 mm into the outer leaf bed joint 1 course below the sill, extending up across the cavity and under the sill in the inner leaf or the frame.
- Over lintels to openings: Full width of outer leaf immediately above the lintel, continuous across cavity, turned 30 mm into the inner leaf 2 courses above for brick and 1 course above for block or turned up against the inner frame and fasten to it. Extend at least 150 mm beyond the lintels. Extend at least 50 mm beyond the lintels.
- At abutments with structural frames or supports: Vertical flash in the cavity using 150 mm wide material, wedged and grouted into a groove in the frame opposite the cavity.
- At jambs: Vertically flash jamb, extending 75 mm into the cavity, interleaved with the sill and head flashing at each end. Fix to jambs.
- At roof abutments with cavity walls: Cavity flash immediately above the roof and over-flash the roof apron flashing.

Installation

General: Sandwich flashings between mortar except on lintels or shelf angles. Bed flashings, sills and copings in one operation to maximise adhesion.

Laps: If required, lap full width at angles and intersections and at least 150 mm at joints. Step as necessary, but not exceeding 2 courses per step for brickwork and 1 course per step for blockwork.

Lap sealing: Seal with a bituminous adhesive and sealing compound.

Pointing: Point up joints around flashings, filling voids.

Weepholes

Location: Provide weepholes to external leaves of cavity walls in the course immediately above flashings, and cavity fill, and at the bottoms of unfilled cavities.

Form: Open perpends.

Maximum spacing: 1200 mm.

3.7 WALL TIES

Location

General: Space wall ties in conformance with AS 3700 clause 4.10 or AS 4773.2, as appropriate, and at the following locations:

- Not more than 600 mm in each direction.
- Adjacent to vertical lateral supports.
- Adjacent to control joints.
- Around openings.

Installation

Fixing of masonry veneer ties:

- To timber frames: Screw fix to outer face of timber frames with AS 3566 fixings.
- To concrete: Masonry anchors.
- To steel frames: Screw fix to outer face of steel studs with AS 3566 fixings.

3.8 CONTROL JOINTS

General

Location and spacing: Provide contraction joints, expansion joints or articulation joints to AS 3700 clause 4.8.

Control joint filling

Filler material: Provide compatible sealant and bond breaking backing materials which are non-staining to brickwork and blockwork. Do not use bituminous materials with absorbent masonry units.

- Bond breaking materials: Non-adhesive to sealant, or faced with a non-adhering material.
- Foamed materials: Closed-cell or impregnated, not water-absorbing.

Installation: Clean the joints thoroughly and insert an easily compressible backing material before sealing.

Sealant depth: Fill the joints with a gun-applied flexible sealant for a depth of at least two-thirds the joint width.

Fire rated control joints

General: If a control joint occurs in an element of construction required to have a fire resistance rating, construct the control joint with fire stopping materials which maintain the fire resistance rating of the element.

Fire stopping: To AS 4072.1.

3.9 BRICKWORK AND BLOCKWORK DUCT RISERS

Location

General: Build a one-piece corrosion resistant metal tray to the masonry duct risers at roof level.

Material: [complete/delete]

Installation

General: Cut an opening for the riser. Turn tray edges up 25 mm around the opening 13 mm clear of the walls. Externally turn the tray up 100 mm under the stepped flashing and down 100 mm over the apron flashing. Lap and solder joints.

Weepholes

General: Provide 2 weepholes through the masonry duct riser walls on opposite sides immediately above the tray.

3.10 BRICKWORK BED JOINT REINFORCEMENT

Location

General: Locate as follows:

- In 2 bed joints below and above head and sill flashings to openings.
- In 2 bed joints below and above openings.
- In third bed joint above bottom of wall.
- In second bed joint below top of wall.

Maximum vertical intervals: 500 mm.

Installation

General: Lap 450 mm at splices. Fold and bend at corners so that the longitudinal wires are continuous. Stop 50 mm short of control joints. Extend 450 mm beyond each side of openings.

Reinforcement

Material: Galvanized welded wire mesh.

Width: Equal to the width of the leaf, less 15 mm cover from each exposed surface of the mortar joint.

3.11 REINFORCED AND GROUTED BLOCKWORK

Cleaning core holes

General: Provide purpose-made cleanout blocks or machine cut a cleaning hole at the base of each grouted core.

Location: Locate on the side of the wall which is to be rendered or otherwise concealed.

Cleaning: Rod cores to dislodge mortar fins protruding from the blocks and mortar droppings from reinforcement. Remove through the clean-out blocks.

Grouting

Commencement: Do not commence until grout spaces have been cleaned out and the mortar joints have attained sufficient strength to resist blow-outs.

Height of lift: Limit the height of individual lifts in any pour to make sure that the grout can be thoroughly compacted to fill all voids.

Compaction: Compact by vibration or by rodding.

Topping up: On the completion of the last lift, top up the grout after 10 min to 30 min, and vibrate or rod to mix with the previous pour.

3.12 LINTELS

Location

General: Provide 1 lintel to each wall leaf in conformance with the **Lintel schedule**.

Installation

General: Do not cut on site. Keep lintels 10 mm clear of heads of frames.

Steel lintels: Pack mortar between any vertical component and supported masonry units. For angles, install the long leg vertical.

Minimum bearing each end:

- Span ≤ 1000 mm: 100 mm.
- Span > 1000 mm ≤ 3000 mm: 150 mm.
- Span > 3000 mm: 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: Provide slip joints to top of all unreinforced masonry walls supporting concrete slabs and other concrete elements.

Protection: Keep the slip joints in place and protect from displacement.

Flexible masonry ties

General: Provide stabilising ties at control joints and abutting structural elements, including columns, beams and slab soffits.

Locations and details: To structural drawings.

4 SELECTIONS

4.1 SCHEDULES

Refer to architectural drawings.

0341B STRUCTURAL STEEL

1 GENERAL

1.1 RESPONSIBILITIES

General
General: Provide structural steelwork that is integrated into the building construction.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following worksection(s):
- *General requirements*.
- *Steel – hot-dip galvanized coatings*.
- *Steel – protective paint coatings*.
- *Structural fire protection systems*.

1.3 STANDARDS

General
Materials, construction, fabrication and erection: To AS 4100.
Cold-formed steel: To AS/NZS 4600.

1.4 INTERPRETATION

Abbreviations
ILAC: International Laboratory Accreditation Cooperation.

1.5 ADJOINING ELEMENTS

General
Fixing: Provide for the fixing of adjoining building elements that are to be connected to or supported on the structural steel.

1.6 INSPECTION

Notice – on site
Inspection: Give notice so that inspection may be made of the following:
- Anchor bolts in position before casting in.
- Steelwork and column bases erected on site, before grouting, encasing, site painting or cladding.
- Reinforcement and formwork in place before any encasement.
- Completed grouting, encasement, fire protection or site painting.

1.7 SUBMISSIONS

Origin of steel
Requirement: Only use steel of Australian origin.

Bolts
Compliance: Submit a manufacturer's compliance/test certificate from an ILAC accredited testing organization confirming compliance with AS/NZS 1252.
Independent certification: Provide a local NATA-accredited laboratory independent compliance certificate based on appropriate testing and verification.

Shop drawings
General: Submit shop drawings showing the following information:
- Marking plans.
- Identification.
- Steel type and grade.
- Dimensions of items.

- Required camber, where applicable.
- Connection details
- Orientation of members.
- Surface preparation methods and coating system if shop applied.
- Breather holes for hollow sections (with seal plates) being hot-dip galvanized.
- Location of and preparation for site welds.
- Temporary works such as lifting lugs, support points, temporary cleats and bracing which are required for transport and erection of the structural steelwork, and the procedure for final removal.
- Required fixings for adjoining building elements.

Materials and components

Concrete or masonry anchors: If masonry anchors other than as shown on the drawings are required or proposed for the support or fixing of structural steel, submit evidence of the anchor capacity to carry the load.

Execution

Splicing: If splicing of structural members is intended, submit proposals.

Distortions: Submit proposals for preventing or minimising distortion or galvanized components, welded components or welded and galvanized components; and proposals for restoration to design shape.

2 PRODUCTS

2.1 STEEL TYPE AND GRADE

Material

Steel members and sections: Conform to the **Steel grade (minimum) table** and or the **Steel grade schedule**.

Steel grade (minimum) table

Type of steel	Grade
Universal beams and columns, parallel flange channels, large angles to AS/NZS 3679.1	300
Flat, small angles, taper flange beams and columns to AS/NZS 3679.1	250
Welded sections to AS/NZS 3679.2	300
Hot rolled plates, floor plates and slabs to AS/NZS 3678	250
Hollow sections to AS/NZS 1163: -Circular sections less than 165 mm nominal outside diameter -Sections other than the above	C250/C350 C350/C450
Cold formed purlins and girts to AS 1397	G550 Z350 or Z450 G450 Z350 or Z450

2.2 BOLTS

Bolts, nuts and washers

General: Hot-dip galvanized, corrosion-free, and in serviceable condition.

3 EXECUTION

3.1 FABRICATION AND ERECTION

General

Substitution: If substitution of members is proposed, provide details.

Beam camber
General: If beam members have a natural camber within the straightness tolerance, fabricate and erect them with the camber up.

Straightening
Care: If correcting distorted members, conform to the submitted procedures and avoid damage.

Work exposed to view
Welds: Grind smooth but do not reduce the weld below its nominal size.

Shearing, flame cutting and chipping: Perform carefully and accurately.

Corners and edges: Grind fair those corners and edges which are sharp, marred, or roughened.

Site work
General: Other than work shown on the shop drawings as site work, do not fabricate, modify or weld structural steel on site.

Identification marks
General: Provide marks or other means of identifying each member compatible with the finish, for the setting out, location, erection and connection of the steelwork in conformance with the marking plans.

Monorail beams: Identify and mark rated capacity in conformance with AS 1418.18 clause 5.12.6.

Tolerances
Measurement: Tolerances are to be checked by measurement after fabrication when corrosion protection has been applied.

Conformance: To AS 4100 clause 14.4.

3.2 WELDING

General
Standard: To AS/NZS 1554.1.

Weld category
Weld categories not shown on the drawings: Category GP.

Weld type
Weld type not shown on the drawings: Submit proposals for weld type and electrodes.

3.3 BOLTING

General
Standards: To AS 1110.1, AS 1111.1 and AS/NZS 1252.

Anchor bolts
General: Provide each anchor bolt with 2 nuts and 2 oversize washers and provide sufficient thread to permit the levelling nut and washer to be set below the base plate.

Galvanizing: Galvanize all components.

Hexagonal bolts: To AS 1111.1.

Hexagonal nuts: To AS 1112.3.

Plain washers: To AS 1237.1.

Set out: Set out bolt groups using templates and subjected to survey check.

Lock nuts
General: Provide lock nuts for bolts in moving parts or parts subject to vibration and for vertical bolts in tension.

Tensioning of bolting categories 8.8/TB and 8.8/TF
Method: Use part-turn-of-nut or load indicating washers.

3.4 SURFACE PREPARATION AND TREATMENT

General
General: Conform to the *Steel – protective paint coatings* and/or *Steel – hot-dip galvanized coatings* worksections as appropriate.

General: Coat structural steelwork not encased in concrete.

Standards: To AS 1627.4 and AS/NZS 2312 Section 1.

Surface preparation: Class 1 blast.

Coating: Coat prepared steelwork as follows:

- Primer: Zinc phosphate primer.
- Thickness: 70 µm.
- Requirement: Verify and record thickness.
- Concrete encasing: Where members are part concrete encased extend the priming 25 mm into the surface to be encased.
- Inaccessible surfaces: Where surfaces will be in contact or near contact after fabrication or erection, apply the finish and allow it to dry before assembly.

Shop work: Apply the primer coat or protective system to the structural steel before delivery to the site.

Transport and handling: Do not damage the paintwork.

Site work: After erection, repair damage to the shop coating and apply coating omitted at site connections.

3.5 FIRE PROTECTION COATINGS

General

General: Apply fire protection to structural steelwork as required.

3.6 ERECTION

Temporary work

General: Provide all necessary temporary bracing or propping.

Temporary connections: If cleats not shown on shop drawings are required, submit details.

Cold-formed purlins

Trimming members: Provide to support edges of roof sheeting along hips, valleys and roof penetrations.

Site welds

Completion: Weld only when correct alignment and preset or camber have been achieved.

Overhead welding: If overhead welding is required, submit proposals.

Anchor bolts

General: For each group of anchor bolts provide a template with setting out lines clearly marked for positioning the bolts when casting in.

Grouting at supports

Preparation: Before grouting steelwork to be supported by concrete, masonry and the like, set steelwork on packing or wedges.

Minimum compressive strength (MPa): Refer to structural engineer's specification.

Handling

Care: Handle members or components without overstressing or deforming them.

Protection: Wrap or otherwise protect members or components to prevent damage to surface finishes during handling and erection.

3.7 REPAIRS

General

General: Repair finishes to make sure the full integrity of each phase and each coating.

3.8 COMPLETION

Temporary connections

General: Remove temporary cleats on completion and restore the surface.

0342 LIGHT STEEL FRAMING

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Provide light steel floor, wall and roof framing that is:

- In conformance with the performance criteria documented.
- Integrated into the building.
- Suitable for the fixing to it of flooring, linings cladding and roofing.
- Independently designed and documented.
- Independently certified by a professional engineer for the design and the erected framing.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.

1.3 STANDARDS

General

Design, materials and protection: To AS/NZS 4600.

Residential and low-rise steel framing: To NASH-1 (National Association of Steel Housing) Standard.

1.4 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of steel framing erected on site before lining or cladding.

1.5 SUBMISSIONS

Design

General: Where the structural drawings define performance criteria, submit independent design, documentation and certification from a professional engineer including for the erected work.

Reactions: Provide location and magnitude of reactions to be accommodated by the support structure.

Floor and wall frame member sizes: Submit a schedule of proposed member sizes, certified as meeting stated project and AS/NZS 4600 requirements for span, spacings and loadings.

Shop drawings

General: Submit shop detail drawings certified by a professional engineer stating that the design has been carried out in accordance with documented project and AS/NZS 4600 requirements for the configurations and loadings.

Roof trusses: Prepare drawings to show:

- On a plan, the truss layout.
- On elevations, the arrangement of members allowing for the accommodation of in-roof services and the size and section type of each member.
- The method of assembly, connection, holding down and bracing.

Wall frames: If wall framing is to be pre-fabricated, prepare drawings to show:

- On plan, the wall layout.
- On elevations, the arrangement of members, and the size and section type of each member.
- The method of assembly, connection, holding down and bracing.

1.6 TOLERANCES

General

Manufacturing and assembly tolerances: To NASH-1 Standard, Appendix D.

Installation tolerances for attachments to supporting structures, walls, trusses, rafters, ceiling joists and floor members: To NASH-1 Standard, Appendix D.

2 PRODUCTS

2.1 COMPONENTS

Cold-formed steel framing

Cold-form sections from metallic-coated steel to AS 1397.

Corrosion protection: To BCA 3.4.2.2.

Framing members

Cold-formed steel framing: For a proprietary system, comply with NASH-1.

3 EXECUTION

3.1 CONSTRUCTION GENERALLY

Fabrication

Length: Cut members accurately to length so that they fit firmly against abutting members.

Service holes: Form holes by drilling or punching.

Bushes: Provide plastic bushes or grommets to site cut holes.

- Swarf: Remove swarf and other debris from cold-formed steel framing immediately.

Site work: Do not fabricate on site where welded connections are required.

Fastening

Type: Select from the following:

- Bolting.
- Self-drilling, self-tapping screws.
- Blind rivets.
- Proprietary clinching system.
- Structural adhesives.
- Welding.

Welding

Burning: Avoid procedures that result in greater than localised burning of the sheets or framing members.

Prefabricated frames

General: Protect frames from damage or distortion during storage, transport and erection.

Metal separation

General: Install lagging to separate non-ferrous service pipes and accessories from the framing.

Unseasoned or CCA treated timber

General: Do not fix in contact with framing without fully painting the timber and/or the steel.

Earthing

Permanent earthing: Required.

Temporary earthing: Provide temporary earthing during erection until the permanent earthing is installed.

Protection

General: Restore coatings which have been damaged by welding or other causes. Thoroughly clean affected areas to base metal and coat with zinc rich organic primer .

Grommets: Provide grommets to isolate piping and wiring from cold-formed steel framing.

Swarf: Remove swarf and other debris from cold-formed steel framing immediately.

Certification
General: For components for which independent design certification has been required, provide independent certification for the erected components confirming compliance with the design intent.

3.2 FLOOR FRAMING

General
General: Construct framing in conformance with all required standards.

Tolerance: Construct floors to a tolerance of 5 mm maximum deviation in 3 m measured under a straight edge placed anywhere on the surface in any direction.

Protection: If floor framing is for ground floor construction, ensure that it is protected from moisture.

Construction loads: If construction loading exceeds design loading, provide additional support so as to avoid overstressing of members.

3.3 WALL FRAMING

Wall studs
General: Provide studs in single lengths without splices. Place a stud under, or within 40 mm from, each structural load point from roof or ceiling (except for openings). Provide multiple studs at points of concentrated load.

Maximum stud spacing: 600 mm.

Heads to openings
General: Provide lintels appropriate to load and span.

Additional support
General: Provide additional support in the form of noggings, trimmers and studs for support and fixing of lining, cladding, hardware, accessories, fixtures and fittings.

Vermin barriers
General: Provide vermin barriers as follows:

- Brick veneer barrier: Close nail 10 mm steel wire mesh to the underside of the bottom plate of external stud walls, extending across the cavity for building into brickwork.

Damp-proof course
General: Provide damp-proof courses under the bottom plate of stud walls built off slabs or masonry dwarf walls, as follows:

- External walls (not masonry veneer): Turn up at least 75 mm on the inside and tack. Project 10 mm beyond the external slab edge or dwarf wall and turn down at 45°.
- Walls of bathrooms, shower rooms and laundries: Turn up at least 150 mm on the wet side and tack to studs.

Installation: Lay in long lengths. Lap full width at angles and intersections and at least 150 mm at joints.

Junctions: Preserve continuity of damp-proofing at junctions of damp-proof courses, 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 FRAMING

Beam framing
General: Construct framing for flat or pitched roofs where the ceiling follows the roof line, consisting of rafters or purlins supporting both ceiling and roof covering.

Antiponding
Requirement: Fix appropriate members to the tops of framing at the rear of fascias, to prevent sagging of and ponding on the sarking.

Additional support
Provide a frame member behind every joint in fibre cement or plasterboard sheeting or lining.

Battens
Requirement: Supply and fix battens suitable for span, spacing and roofing.

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.

Water container and heater: Where a water container or heater is located in the roof space, provide a support platform to AS/NZS 3500.4 clause 5.5.

Marking
General: Permanently mark each truss to show:

- Project identification.
- Manufacturer.
- Tag or number.
- Location.
- Support points.

Installation
General: Fix to support structures, plumb to within H/200, where H is the height at the apex.

Support: Support trusses on bottom chord at two points only, unless designed for additional support.

Vertical movement: Over internal walls provide at least 10 mm vertical clearance and use bracing methods which allow for vertical movements.

Holding down and bracing: Provide details demonstrating capability to resist lateral and uplift forces.

Certification: Obtain certification from a professional engineer for the erected trusses.

3.6 ROOF TRIM

Fascia, valley gutter and barge boards
Requirement: Supply and fix fascia, valley gutter and barge boards in conformance with the manufacturer's requirements.

3.7 COMPLETION

Cleaning
General: On completion of framing remove debris from any gaps between members.

0344B STEEL – HOT-DIP GALVANIZED COATINGS

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Provide hot-dip galvanized coatings that controls atmospheric corrosion to structural steelwork or steel products in the time to first maintenance.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.

1.3 STANDARDS

General

Coating: To AS/NZS 4680.

Coating on fasteners: To AS 1214.

Durability: To AS 2309 and AS/NZS 2312.

Metal finishing

Steel preparation methods: To AS 1627.

Coating mass/thickness minimum: To AS/NZS 4680.

Threaded fasteners coating mass/thickness minimum: To AS 1214 Table 2.

2 EXECUTION

2.1 GENERAL

Care

Dimensional change: If design and fabrication features of items to be galvanized are likely to lead to dimensional change or distortion, identify these and submit proposals for its minimisation.

Embrittlement: Take due care to avoid embrittlement of susceptible steels.

Mechanical properties: Avoid mechanical damage. Ensure that mechanical properties of the base metal do not change.

Surface preparation

Surface contaminants and coatings generally: Chemical clean, then acid pickle.

Chemical cleaning: To AS 1627.1.

Acid pickling: To AS 1627.5.

- Inhibitor: Required.

Post treatment

General: Passivate.

Drilling after completion of hot-dip galvanizing

Repair: Prime drill hole surfaces to AS/NZS 4680 clause 8 before the surfaces begin to corrode.

Coating

Threaded fasteners: To AS 1214.

Structural sections

Cold worked items: Except for hollow sections, anneal to 650°C before galvanizing.

Hollow sections: Provide seal plates with breather holes.

Surface finish

Standard: To AS/NZS 4680 clause 7.

Coating quality: Continuous, adherent, smooth or evenly textured and uniform, free from defects detrimental to the end use of the finished article, such as lumps, blisters, gritty areas, uncoated spots, acids and black spots, dross and flux.

- Silicon killed steels: Dull grey is acceptable.

Friction-type bolted connections: Treat coated contact surfaces to achieve the required design slip factor, without removing excessive coating thickness.

- Contact surface preparation: To GAA After-fabrication hot dip galvanizing Chapter 4.

Slip factor test: To AS 4100 Appendix J.

Surplus zinc on fastener threads: Remove.

Coating repair

Rejection: If uncoated surfaces or areas damaged by handling at the galvanizing plant exceed the limits specified for repair in AS/NZS 4680 clause 8, reject the galvanizing.

Extent and methods: To AS/NZS 4680 clause 8.

Preparation for paint finishes

Coarse preparation: Remove spikes, and ensure edges are free from lumps and runs.

Light sweep blasting before painting: Required.

- Maximum zinc removal: 10 µm.
- Abrasive grade (range): 150 – 180 µm.
- Abrasive type - clean ilmenite or garnet.
- Blasting angle to surface: 45° maximum.
- Blast pressure (maximum): 275 kPa.
- Distance of nozzle from surface (range): 350 – 400 mm.
- Nozzle type: 10 – 13 mm minimum diameter venturi type.

2.2 SITE WORK

Site welding

Grinding of edges: Permitted.

Weld areas: Reinstate coating to AS/NZS 4680 clause 8.

Site coating reinstatement

Rejection: If any item has damaged areas exceeding the limits specified for repair in AS/NZS 4680 clause 8.1, reject the object.

Extent: Areas damaged by transport, site welding, site flame cutting, site handling, or erection.

Method: To AS/NZS 4680 clause 8.

0345B STEEL – PROTECTIVE PAINT COATINGS

1 GENERAL

1.1 RESPONSIBILITIES

General
General: Provide protective paint coatings that control corrosion to structural steelwork and steel products in the time to first scheduled maintenance as documented.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following worksection(s):
- *General requirements*.

1.3 STANDARDS

General
Surface preparation and coating: Conform to the recommendations of AS/NZS 2312.

Site testing of protective coatings
Test methods: To AS 3894.

1.4 INTERPRETATION

Abbreviations
General: For the purposes of this worksection the following abbreviations apply:

DFT: Dry Film Thickness.

ITP: Inspection and Test Plan.

µm: micron (10^{-6}m).

Definitions
General: For the purposes of this worksection the definitions given in AS/NZS 2310 and those below apply.
- Coating contractor: The protective coatings application contractor conducting the on or off site coating application works.
- Coating manufacturer: The supplier and/or manufacturer of the protective coating materials used.
- ITP: A series of formal Inspection and Test Plans, prepared by the coating contractor to reflect the specific inspection and testing that will be carried out on the surface preparation, coating application and the record keeping tasks to be undertaken.
- MSDS: The formal Material Safety Data Sheet, prepared in conformance with Worksafe Australia's requirements and distributed by the coating manufacturer to provide information on the safe handling, storage, personal protective equipment requirements, use and disposal of a coating product.

1.5 SUBMISSIONS

Detailing of structural steelwork
General: If design and fabrication features of the items to be coated may lead to difficulties, advise before commencing surface preparation.

Maintenance paint coating systems
Existing systems: Itemise areas of corrosion, damage, and other degradation.

Recoating systems: Supply coating systems for maintenance painting of previously coated items and structural elements, including surface preparation.

Warranties
General: Submit details of the proposed warranty terms, form and period. If separate warranties are offered by the manufacturer and the applicator, ensure they are interlocking.

1.6 SAMPLES

Painting and coating colour

General: Submit a sample of the finished product for each different coating system.

Size of each sample: 400 x 400 mm.

Retention: Retain half of each sample for comparison during coating application.

2 PRODUCTS

2.1 GENERAL

General

Care: Handle, store, mix and apply all protective coatings in conformance with the manufacturer's recommendations.

Original containers: Provide coating products in unopened containers bearing the brand name and name of the manufacturer with a clearly legible batch number.

Ambient temperature range for storage: 15°C to 25°C.

Use-by-date: Use products with limited shelf life before their use-by-date unless written authorisation from the coating manufacturer's technical services section is provided.

Proprietary products

Requirement: Provide all products in the **Protective paint coating schedule** from the one manufacturer's supply.

3 EXECUTION

3.1 GENERAL

General

Product warnings: Conform to the requirements and recommendations of product MSDS's.

3.2 PROTECTION

Surroundings

Protection: Prevent the release of abrasive, overspray or paint waste debris to air, ground or to any watercourse. Repair or clean affected surrounding areas.

Damage: Prevent damage to other assets, services or equipment.

Contamination

Coating contamination: Prevent contamination of coatings contaminated from abrasive or other foreign matter.

Surfaces: Prevent contamination of coated surfaces which are not yet dry from blasting dust, abrasive or surface preparation debris.

Post application care

General: Provide protection to the coating against physical, chemical or atmospheric damage until all components are fully cured.

Care: Stack and handle all coated items using fabric slings or padded chains. Adopt soft packaging, carpet strips or other deformable materials between all coated items.

Water ponding: Stack coated items to prevent water ponding.

3.3 SURFACE PREPARATION

General

Defects: Remove all surface defects, including cracks, laminations, deep pitting, weld spatter slag, burrs, fins, sharp edges and other defects before the preparation of the surface to be coated.

Temporary welds: Grind flush temporary welds.

Site welding: Where possible avoid site welding.

Porous, skip or stitch welds: Not acceptable.

Edges: De-burr and round all edges to a 2 mm radius.

Surface contaminants: Remove surface contaminants such as oil, grease, dirt and loose particles, using an alkaline oil emulsifier/ degreaser to AS 1627.1.

Surface preparation: Prepare surfaces to the required finish to AS 1627.1, AS 1627.2, AS 1627.4, AS 1627.5, AS 1627.6 and AS 1627.9.

Surface cleaning: Remove spent abrasive from the surface by blowing with clean, dry air and/or by vacuum cleaning.

Bolts: Provide washers at heads and nuts at replacement bolts.

Surface preparation for atmospheric steel

General: Conform to the following requirements:

- Wash and degrease all surfaces to be coated in conformance with AS 1627.1 with a free-rinsing, alkaline detergent, in conformance with the manufacturer's recommendations and all safety warnings.
- Wash with fresh potable water and remove all soluble salts in conformance with AS 3894.6 Methods A and D.
- Grind all sharp edges with a power tool to a minimum radius of 2 mm.
- Power tool clean welds to AS 1627.2 Class 2 to remove roughness. Remove filings, preferably by vacuum or compressed air.
- Abrasive blast clean all steel surfaces to be painted in conformance with AS 1627.4 to visual standard AS 1627.9 Class 2.5 (equivalent to ISO 8501-1, Sa 2.5: Very Thorough Blast-Cleaning). Use a non-metallic medium that will generate a surface profile of 35 to 65 microns (as tested to AS 3894.5 Method A.).
- Commence application within 4 hours of abrasive blast cleaning or before surface becomes contaminated, otherwise repeat abrasive blasting step.
- Stripe coat welds, bolts, boltholes and all edges with primer before application of full primer coat nominated in the **PROTECTIVE PAINT COATING SYSTEMS**.
- Before application, ensure that the surface is free of contaminants including oil, grease, dirt, dust, salt and any other deleterious materials that will interfere with coating performance.

Treatment of on-site welding

On-site welding: If on site welding is performed, adopt the following procedures:

- Remove weld spatter.
- Power tool clean welds to AS 1627.2 Class 2 to remove roughness. Remove filings, preferably by vacuum or compressed air.
- Prime welds immediately with the nominated primer before contamination can reoccur. Ensure that the primer overlaps the sound adjacent coating by between 25 mm and 50 mm.
- Apply intermediate and topcoats over the primed welds to match the surrounding coating system, overlapping the sound adjacent coating by between 25 mm and 50 mm.

Preparing galvanized and aluminium surfaces

Remove grease, oil and other solvent-soluble contaminants by wiping with mineral turpentine or white spirit. Finally wipe with a clean solvent. Allow to dry and proceed with the next operation immediately. Abrade surfaces to a medium coarse type finish to provide an adhesion key.

Preparing zinc primed surfaces

If present, remove zinc salts from zinc primers. Remove grease, oil and other solvent-soluble contaminants by wiping with mineral turpentine or white spirit. Finally wipe with a clean solvent. Allow to dry and proceed with the next operation immediately.

Shop priming

Dust off and apply a coat of primer, according to the technical specification.

Site coating

General: High pressure fresh water wash down all surfaces. Lightly sand down primer/intermediate coats, which have been shop applied, before site application of next coat.

3.4 COATING APPLICATION

General

General: Conform to the Product Data Sheets.

Painting and coating colour: Verify all project finish colours with the retained samples.

Final surface preparation or coating application

Limits: If the following climatic/substrate conditions are present do not apply coating:

- The relative humidity is above 85%.
- The substrate temperature is less than 3°C above the dewpoint.
- The ambient air temperature is below 5°C or above 40°C.
- The substrate temperature is below 10°C or above 45°C.
- The surface to be coated is wet or damp.
- Where the full prime coat application cannot be carried out before the specified cleanliness of the surface deteriorates.
- For external or site applied coatings:
  . The weather is clearly deteriorating or unfavourable for application or curing.
  . High wind conditions.
- The surface preparation standard has not been achieved.
- The time between surface blast cleaning and the commencement of coating exceed 4 hours.
- Visual tarnishing or black spots develop on the surface of the metal.

Exception: Preliminary blast or other surface preparations may be performed in conditions that are outside the limits, providing the final surface preparation and all coating applications are undertaken under the limit conditions.

Prior coating: Before the spray application of each coating stripe coat by brush method all edges, welds, seams, rivets bolts and boltholes (including slots). Prime the underlying surfaces of replacement bolting, washers and nuts before installation.

Procedure: Conform to the order shown in the **PROTECTIVE PAINT COATING SYSTEMS**.

Timing: Conform to the minimum and maximum recoat intervals and curing times.

Detail: Stripe coat all welds, bolt holes, corners and difficult to spray areas by brushing in with the prime coat and intermediate coat material before the full coating application.

Subsequent coats: Ensure that before any subsequent coating layer is applied, the surface condition of the preceding coat is complete and correct in all respects, including its DFT achievement, cleanliness, freedom from defects.

Correction: Correct any defect in a coating layer before the subsequent coating layer is applied.

Protection

General: Perform all painting under cover and/or protected from rain, condensation, dew, excessive wind, overspray or wind-blown dust.

Period: Continue protection where any of these conditions exist before the coating has cured to a sufficient degree so as to be unaffected.

3.5 COATING REPAIR

Repair of coating damage

Preparation: Feather back by hand or machine sanding all leading edges of intact coating adjacent to the repair, to remove any sharp edge.

Surface contamination: Remove by dusting or blowing down before applying the first coat of paint.

Sequence: Apply the repair coating in the same sequence and manner as the original coating.

Areas damaged without exposing the primer: Wash with a proprietary detergent solution and rinse with fresh water, followed by abrading and ensuring that edges of sound paint are feathered. Then coat the area with the appropriate intermediate and finishing coat materials.

Areas damaged to the primer or steel surface: Blast clean to the original standard. Prepare at least 50 mm into the sound coating and to a further feathering zone of approximately 50 mm. Recoat with the specified system to restore the film thickness and integrity over the whole prepared surface including the feathered zone.

Aesthetic reinstatement: If required, repaint to a physical or discernable boundary line.

Defects: If corrosion pitting or areas of significant metal loss and defects are exposed by the blasting process, advise for inspection and have areas passed as being fit for service before proceeding with the coating system.

Timing: Apply the Protective Coating system within 4 hours of blast cleaning or in any case before visual tarnishing of the steel occurs.

3.6 COMPLETION

General

Joints: On completion, seal all joints and mating surfaces with a compatible polyurethane sealant.

Warranty

General: Provide the approved warranty.

4 SELECTIONS

4.1 PROTECTIVE PAINT COATING SYSTEMS

Polyurethane – AS/NZS 2312 Category A and B table

Location	Primer	Second Coat	Third Coat
Interior non-decorative	75 µm Epoxy zinc phosphate conforming to AS/NZS 3750.13	Nil	Nil
Internal decorative	75 µm Epoxy zinc phosphate conforming to AS/NZS 3750.13	50 µm High Solids Polyurethane conforming to AS/NZS 3750.6	Nil
External non-decorative conforming to AS/NZS 2312 PUR2	75 µm Epoxy Zinc phosphate conforming to AS/NZS 3750.13	50 µm High Solids Polyurethane conforming to AS/NZS 3750.6	Nil
External decorative conforming to AS/NZS 2312 PUR2	75 µm Epoxy zinc phosphate conforming to AS/NZS 3750.13	50 µm High Solids Polyurethane conforming to AS/NZS 3750.6	Nil

Polyurethane – AS/NZS 2312 Category C, D and E table

Location	Primer	Second Coat	Third Coat
Interior non-decorative	75 µm Zinc rich epoxy conforming to AS/NZS 3750.9 Type 2	Nil	Nil
Internal decorative	75 µm Zinc rich epoxy conforming to AS/NZS 3750.9 Type 2	75 µm High Solids Polyurethane conforming to AS/NZS 3750.6	Nil
External non-decorative conforming to AS/NZS 2312 EHB4	75 µm Zinc rich epoxy conforming to AS/NZS 3750.9 Type 2	200 µm High-Build Epoxy MIO conforming to AS/NZS 3750.14	Nil
External decorative conforming to AS/NZS 2312 PUR 5	75 µm Zinc rich epoxy conforming to AS/NZS 3750.9 Type 2	200 µm High-Build Epoxy MIO conforming to AS/NZS 3750.14	75 µm High Solids Polyurethane conforming to AS/NZS 3750.6

Micaceous Iron Oxide – AS/NZS 2312 Category A and B table

Location	Primer	Second Coat	Third Coat
Interior non-decorative	75 µm Alkyd zinc phosphate containing MIO and Aluminium	Nil	Nil

Location	Primer	Second Coat	Third Coat
	pigment conforming to AS/NZS 3750.19 Type 2		
Internal decorative	75 µm Alkyd zinc phosphate containing MIO and Aluminium pigment conforming to AS/NZS 3750.19 Type 2	50 µm Alkyd MIO finish conforming to AS/NZS 3750.12	Nil
External non-decorative conforming to AS/NZS 2312 ALK2	75 µm Alkyd zinc phosphate containing MIO and Aluminium pigment conforming to AS/NZS 3750.19 Type 2	Nil	Nil
External decorative conforming to AS/NZS 2312 ALK6	75 µm Alkyd zinc phosphate containing MIO and Aluminium pigment conforming to AS/NZS 3750.19 type 2	40 µm Alkyd MIO finish conforming to AS/NZS 3750.12	40 µm Alkyd MIO finish conforming to AS/NZS 3750.12

Micaceous Iron Oxide – AS/NZS 2312 Category C, D and E table

Location	Primer	Second Coat	Third Coat
Interior non-decorative	75 µm Zinc rich epoxy conforming to AS/NZS 3750.9 Type 2	Nil	Nil
Internal decorative	75 µm Zinc rich epoxy conforming to AS/NZS 3750.9 Type 2	75 µm Epoxy MIO conforming to AS/NZS 3750.14	Nil
External non-decorative conforming to AS/NZS 2312 EHB4	75 µm Zinc rich epoxy conforming to AS/NZS 3750.9 Type 2	200 µm High-Build Epoxy MIO conforming to AS/NZS 3750.14	Nil
External decorative conforming to AS/NZS 2312 EHB6	75 µm Zinc rich epoxy conforming to AS/NZS 3750.9 Type 2	125 µm Epoxy MIO conforming to AS/NZS 3750.14	125 µm Epoxy MIO conforming to AS/NZS 3750.14

Epoxy Acrylic – AS/NZS 2312 Category A and B table

Location	Primer	Second Coat	Third Coat
Interior non-decorative	75 µm Epoxy zinc phosphate conforming to AS/NZS 3750.13	Nil	Nil
Internal decorative	75 µm Epoxy zinc phosphate conforming to AS/NZS 3750.13	50 µm Epoxy Acrylic conforming to AS/NZS 3750.5	Nil
External non-decorative conforming to AS/NZS 2312 ACC2	75 µm Epoxy zinc phosphate conforming to AS/NZS 3750.13	50 µm Epoxy Acrylic conforming to AS/NZS 3750.5	Nil
External decorative conforming to AS/NZS 2312 ACC2	75 µm Epoxy zinc phosphate conforming to AS/NZS 3750.13	50 µm Epoxy Acrylic conforming to AS/NZS 3750.5	Nil

Epoxy Acrylic – AS/NZS 2312 Category C, D and E table

Location	Primer	Second Coat	Third Coat
Interior non-decorative	75 µm Zinc rich epoxy conforming to AS/NZS 3750.9 Type 2	Nil	Nil

Location	Primer	Second Coat	Third Coat
Internal decorative	75 µm Zinc rich epoxy conforming to AS/NZS 3750.9 Type 2	50 µm Epoxy Acrylic conforming to AS/NZS 3750.5	Nil
External non-decorative conforming to AS/NZS 2312 EHB4	75 µm Zinc rich epoxy conforming to AS/NZS 3750.9 Type 2	200 µm High-Build Epoxy MIO conforming to AS/NZS 3750.14	Nil
External decorative conforming to AS/NZS 2312 ACC6	75 µm Zinc rich epoxy conforming to AS/NZS 3750.9 Type 2	200 µm High-Build Epoxy MIO conforming to AS/NZS 3750.14	50 µm Epoxy Acrylic conforming to AS/NZS 3750.5

Steel protection and decoration for green buildings - AS/NZS 2312 Category A and B table

Location	Primer	Second Coat	Third Coat
Interior non-decorative	50 µm waterborne inorganic zinc conforming to AS/NZS 3750.15 Type 3 VOC < 15 g/L	Nil	Nil
Internal decorative	50 µm waterborne inorganic zinc conforming to AS/NZS 3750.15 Type 3 VOC < 15 g/L	40 µm waterborne acrylic conforming to AS/NZS 3750.16 VOC < 75 g/L	Nil
External non-decorative conforming to AS/NZS 2312 IZS2	75 µm waterborne inorganic zinc conforming to AS/NZS 3750.15 Type 3 VOC < 15 g/L	Nil	Nil
External decorative exceeding AS/NZS 2312 IZS2	75 µm waterborne inorganic zinc conforming to AS/NZS 3750.15 Type 3 VOC < 15 g/L	40 µm waterborne Acrylic conforming to AS/NZS 3750.16 VOC < 75 g/L	Nil

Steel protection and decoration for green buildings – AS/NZS 2312 Category C, D and E table

Location	Primer	Second Coat	Third Coat
Interior non-decorative	50 µm waterborne inorganic zinc conforming to AS/NZS 3750.15 Type 3 VOC < 15 g/L	Nil	Nil
Internal decorative	50 µm waterborne inorganic zinc conforming to AS/NZS 3750.15 Type 3 VOC < 15 g/L	40 µm waterborne Acrylic conforming to AS/NZS 3750.16 VOC < 75 g/L	Nil
External non-decorative conforming to AS/NZS 2312 IZS2	75 µm waterborne inorganic zinc conforming to AS/NZS 3750.15 Type 3 VOC < 15 g/L	Nil	Nil
External decorative	75 µm waterborne	50 µm waterborne epoxy	40 µm waterborne

Location	Primer	Second Coat	Third Coat
exceeding AS/NZS 2312 IZS2	inorganic zinc conforming to AS/NZS 3750.15 Type 3 VOC < 15 g/L	conforming to AS/NZS 3750.13 VOC < 20 g/L	Acrylic conforming to AS/NZS 3750.16 VOC < 75 g/L

Industrial silicone enamel – AS/NZS 2312 Category A and B table

Location	Primer	Second Coat	Third Coat
Interior non-decorative	75 µm Alkyd zinc phosphate containing MIO and Aluminium pigment conforming to AS/NZS 3750.19 Type 2	Nil	Nil
Internal decorative	75 µm Alkyd zinc phosphate containing MIO and Aluminium pigment conforming to AS/NZS 3750.19 Type 2	50 µm Silicone Enamel conforming to AS/NZS 3750.22	Nil
External non-decorative conforming to AS/NZS 2312 ALK2	75 µm Alkyd zinc phosphate containing MIO and Aluminium pigment conforming to AS/NZS 3750.19 Type 2	Nil	Nil
External decorative conforming to AS/NZS 2312 ALK4	75 µm Alkyd zinc phosphate containing MIO and Aluminium pigment conforming to AS/NZS 3750.19 Type 2	50 µm Silicone Enamel conforming to AS/NZS 3750.22	Nil

0346 STRUCTURAL FIRE PROTECTION SYSTEMS

1 GENERAL

1.1 RESPONSIBILITIES

General
General: Provide protection systems coatings to ensure structural elements conform to documented fire-resistance levels.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following worksection(s):
- *General requirements*.

1.3 STANDARDS

Structural fire protection systems
Materials and components: To BCA Spec A2.3.

Coatings for fire protection of building elements
Standard: AS 3784.1.

1.4 INTERPRETATION

Definition
FRL: Fire-resistance level, in conformance with BCA A1.1.

2 PRODUCTS

2.1 SPRAYED FIRE-RESISTING MATERIALS

Base
General: Either perlite or vermiculite with gypsum as the hydraulic binding agent to form plaster.

Standard: To BS EN 13055-1.

Fillers
General: Either hydrated lime or limestone.

Decorative and protective surface finishes
Compatibility: Conform to AS 3784.1, clause 6.3.

2.2 BOARD FIRE PROTECTION

Grade and thickness
FRL: Provide grade and thickness to achieve the required FRL.

System: Select from the following for building elements to achieve the required FRL or refer to a finishes schedule.

2.3 COMPONENTS

Metal components generally
Corrosion protection: As nominated in the *General requirements* worksection.

Corrosion category: As nominated in the *Adhesives, sealants and fasteners* worksections.

Expanded metal lath
Conformance: To BCA Spec A2.3 Annexure to Table 1: clause 1.6.

Aperture: 6 – 20 mm.

Self-furring expanded metal lath
Aperture: 6 – 20 mm.

Ribs: V-shaped at 100 – 150 mm intervals.

Steel wire mesh
Finish: Galvanized.

Welded rectangular mesh:

- Keying: 10 – 25 mm aperture.
- Wire diameter: 0.7 – 1.6 mm.

Twisted hexagonal mesh:

- Conformance: To AS 2423.
- Mesh size: Nominally 25 – 32 mm.

Fixings
Screws: Deep threaded self-tapping screws, preferably with ribbed heads.

Staples: Steel wire staples.

Adhesive cement: Fixing cement nominated by the board manufacturer as being part of the complete protection system as tested.

3 EXECUTION

3.1 SPRAYED FIRE-RESISTING PRODUCTS

Applicators
General: Must be licensed by the coating manufacturer to install the coating.

Surface preparation
Sprayed to contour: Immediately before applying the coating, remove materials which will impair adhesion to the substrate, including mill scale, dirt, grime, oil, grease, dust, loose rust, non-compatible primers and paint.

Compatibility: If paint on the steel sections is not compatible with the spray, apply an alkali-resistant sealer which is compatible with the paint.

Stable gaps and joints wider than 15 mm: Bridge with an appropriate supporting material before applying the spray.

Unstable gaps and joints: Provide a control joint in the spray, with metal lath support on either side of the joint.

Protection of areas not to be coated
General: Prevent damage from spillage, overspray, contamination and fallout.

Sequence
General: Apply coatings after installation of supports, fixings and other attachments, but before installation of items which may obstruct the application.

Fixing reinforcement and support
Encapsulated substrates: If no support needed wrap and overlap reinforcement at joints and wire tie together.

Spraying
General: Provide full cohesion in the coating.

External coatings
During setting: Prevent exposure to rapid drying, wind-driven rain, running water, freezing conditions, structural movement, vibration or impact.

Detailing: Provide water shedding. Weather-seal at the coating-substrate interface with UV stable mastic sealant or weather shields.

Thickness measurements
Acceptance criteria: Conform to the following:

- Thickness ≥ 85% specified thickness: Deficient area ≤ 1 m^2, and no other deficient area within 3 m of this deficient area.
- Thickness ≥ 75% specified thickness: Deficient area ≤ 0.2 m^2, and no other deficient area within 1 m of this deficient area.

Thickness gauge: Where possible, use a reliable direct-reading pin-type thickness gauge with a base plate of 25 mm diameter, of the sort shown in AS 3784.1 Figure 5. Otherwise use prefixed gauges which will not impair fire performance.

Frequency of measurement:

- Flat substrates: 4 measurements for an area of 3 x 3 m, and 1 measurement for each additional area of 3 x 3 m. Take measurements where thickness is likely to be low.
- Contoured substrates: As for flat substrates. Take random measurements at changes in plane. For I columns and beams, take at least 1 measurement per 3 m on each surface. Check thickness across the flange and over the flange edges if the coating appears to taper on the flanges.
- Substrates overlaid with expanded metal lath or steel wire mesh: As for flat and contoured substrates. Measure thickness to the face of the overlay.

Density measurements

Acceptance criterion: Manufacturer's stated average dry density ± 15%.

Frequency of measurement: 1 per 10 m^2 of sprayed surface.

3.2 BOARD FIRE PROTECTION

Fixing

System: Fix the following proprietary systems in conformance with the current written recommendations and instructions of the manufacturer or supplier to achieve the required FRL (as calculated or prototype-tested):

- Mineral fibre board.
- Vermiculite board.
- Gypsum plasterboard.

Joints

General: Make butt joints true and flush. For single layer construction provide 6 mm thick cover strip on the rear face of the joint. For multi-layer systems stagger the joints in the inner and outer layers at least 100 mm.

Access panels

Sealing: Seal joints to the manufacturer’s or supplier’s details.

3.3 COMPLETION SUBMISSIONS

Certification

Compliance: Submit a Certificate as evidence of compliance with BCA requirements for suitability of the completed fire protection system for the designated FRL.

0381 STRUCTURAL TIMBER

1 GENERAL

1.1 RESPONSIBILITIES

General
General: Provide structural timber that is integrated into the building construction.

Design
Refer to structural engineer's drawings and specification.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following worksection(s):

- *General requirements*.
- *Adhesives, sealants and fasteners*.
- *Termite management*.
- *Timber products, finishes and treatment*.

1.3 STANDARDS

General
Design: To AS 1720.1.

1.4 INTERPRETATION

Definitions
General: For the purposes of this worksection the definitions given in AS 1720.1 apply.

1.5 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of the following:

- Prefabricated items before priming or water-repellent treatment.
- Structural timberwork after erection but before being concealed.
- On site preservative treated members before being concealed.
- Post holes/foundations before placing concrete.
- Bolts after final tightening.

1.6 SUBMISSIONS

Certification
Design: If design by the contractor is required, submit independent certification by a professional engineer of the design and documentation, and of the erected work for compliance with AS 1720.1 and project performance criteria.

Shop drawings
General: Submit shop drawings showing the following:

- Marking plans.
- Arrangement of members.
- Location of the members in the building.
- Loading parameters and bracing lengths assumed in the design.
- Species, stress grade, strength group and joint group of timber.
- Size of each member.
- Tolerances on member sizes.
- Joint details including connector plates.
- Lifting points.

- Method of fixing and bracing.
- Preservative treatment, if any.
- Long term deflection.
- Moisture content at time of manufacture.
- Method of fabrication.
- Precamber.
- For pole construction: Pole footing hole diameter and pole embedment length.

Glued laminated timber: Show the following additional information:

- Design stresses.
- Appearance grade.
- Service class.
- Strength grade.
- Precamber.

Contractor design: For items designed by the contractor, submit independent certification of shop details by a professional engineer for compliance with AS 1720.1 and the project performance criteria.

Materials

Identification:

- Certification: Submit a supplier's certificate (which may be included on an invoice or delivery docket) verifying that the timber complies with the specification, including moisture content.
- Inspection: Submit the inspection authority’s certificate verifying that the timber complies with the specification.

Moisture content: Submit records of moisture content.

Preservative treatment

Confirmation of preservative retention: Submit a test certificate from an independent testing authority confirming that the required retention has been achieved for every member.

Treatment record: Submit a certified copy of the charge sheet.

CCA treated timber: If proposed, provide details of treatment.

2 PRODUCTS

2.1 TIMBER

Structural timber

Timber grading methods:

- Hardwood: To AS 1720.1 Table H2.3 strength group classification.
- Softwood: To AS 1720.1 Table H2.4 strength group classification.
- F-grades: To AS 1720.1 Table H2.1.
- MGP grade: To AS 1720.1 Table H3.1.
- Visually graded F-grade: To AS 2082 or AS 2858.

Preservative treatment: To the *Timber products, finishes and treatment* worksection.

Termite treatment: To the *Termite management* worksection.

Recycled timber

Grit blasted or re-machined: Remove all nails and screws.

Identification

Method: Identify timber using branding, certification or both.

Branding: Brand structural timber, under the authority of a recognised product certification program applicable to the product. Locate the brand mark on faces or edges which will be concealed in the works. Include the following data for timbers not covered by branding provisions Australian standards or regulations for which branding is required:

- Stress grade.
- Method of grading.

- Seasoned or as s.
- The certification mark of the product certification program.
- The applicable standard.

Certification: Forest certification, chain of custody and product labelling to the *Timber products, finishes and treatment* worksection.

2.2 STRUCTURAL PLYWOOD

General

Standard: To AS/NZS 2269.0.

Bond: Type A to AS/NZS 2754.1 (Int).

Preservative treatment: To the *Timber products, finishes and treatment* worksection.

Veneer

Veneer quality to visible surfaces: CD (minimum) to AS/NZS 2269.0.

Identification

Branding: To AS/NZS 2269.0.

Brand mark: Locate the brand mark on faces or edges which will be concealed in the works.

2.3 GLUED LAMINATED TIMBER

Product

Glued laminated structural timber: To AS/NZS 1328.1.

Production record: To AS/NZS 1328.1.

Laminated members: Widths and depths to AS/NZS 1328.2 Table 2.2.

Direction of laminations: Horizontal.

Preservative treatment: To the *Timber products, finishes and treatment* worksection.

Joints

End joints: Finger or precured joint.

Camber

Orientation: Install cambered members with the camber up.

Protection from weather

Duration: Provide temporary protection for glued laminated timber members until permanent covering is in place.

Exposed applications: Paint glued products or otherwise protect them with a moisture-excluding envelope.

Long span applications: Provide adhesive with non-creep permanent characteristics, applied under rigid control procedures.

2.4 LAMINATED VENEER LUMBER

General

Standard: To AS/NZS 4357.0.

Branding: To AS/NZS 4357.0 clause 1.8.

Veneer quality: To AS/NZS 2269.0.

Bond: Type A to AS/NZS 2754.1 (Int).

Preservative treatment: To the *Timber products, finishes and treatment* worksection.

2.5 FINGER JOINTED STRUCTURAL TIMBER

General

Standard: To AS 5068.

2.6 FASTENERS

Materials

Conformance: To the fasteners requirements in the *Adhesives, sealants and fasteners* worksection.

Fastener type
Metal fasteners: Select fastener as appropriate for the documented atmospheric category and the life of the structure.

Fastener configuration: If timber elements experience tension perpendicular to the grain, use the appropriate fastener configuration.

Bolts
Thread: Provide thread length at least four times the bolt diameter.

Holes: Drill bolt holes 2 mm larger than the bolt diameter.

Washers
Standard: To AS 1720.1 Table 4.11.

3 EXECUTION

3.1 TRANSPORT AND DELIVERY

General
Handling and protection: Do not distort or damage timber or timber products.

Moisture content: Maintain the equilibrium moisture content of seasoned timber.

Appearance products: Store under cover.

3.2 STRUCTURAL TIMBER

General
Preservative treatment: If holes are drilled in treated timber, apply a saturation coating of preservative to the sides of the holes before inserting fixings.

Outdoor structures
Sealing: Seal the ends of members with wax emulsion or petroleum jelly immediately after sawing.

Anti splitting plates: Plate the ends of members 250 x 75 mm or larger with pressed or hammer-on galvanized nail plates equal to 50% of the cross-sectional area.

Bolt holes: Treat bolt holes with a protective treatment before inserting the bolt.

Coating: After completion of fabrication, notching and machining, coat joints, holes and notches with a protective coating.

Heart: Place the heart side of bracing members on the inside of joints. Place the heart side of other members on the downside wherever possible.

Minimum bolts size: M20.

Minimum washers size: 5 mm thick and 65 mm square or 75 mm diameter.

Bolt protection: Coat bolts with a bituminous coating before insertion in the bolt hole.

Recessed fixing: For fixings punched or sunk below the surface, fill the recess with a suitable wood filler or mastic.

Finishing: If a protective or decorative finish is required apply one coat of primer and one finishing coat all around before fixing.

3.3 POLE STRUCTURES

Poles
Standard: To AS 3818.10

Barrel checks and end splits:

Straightness: To AS 3818.10 clause 1.5.5.

Mechanical damage: To AS 3818.10 clause 2.2.3, clause 3.2.2 and clause 4.2.2. Indentations may be dressed out before or after preservative treatment provided that such dressing does not adversely affect the treatment and is visually acceptable.

Stress grade: To AS 1720.1 Section 6.2 strength group and F-grade for round timbers.

Removal of bumps
General: Trimming or removal of bumps is not permitted.

Protection
Metal caps and bands: Protect pole tops exposed to weather with metal caps or bands.

Site preservative treatment
Application: If untreated timber is exposed by docking, checking or dressing, apply a saturation coating of preservative before erection or concealment.

Erecting poles
Tolerance: Erect poles plumb and true within the limits of deviation from verticality set by the allowed straightness of the poles.

Setting out
General: Centre the poles on the framing grids at ground level and roof level. Align any allowable straightness deviation parallel to the roof beams.

Tolerance: ± 10 mm from grid location at ground level.

Temporary bracing
Provision: Provide temporary bracing to maintain poles in correct position until structural framing is complete.

Pole footings
Preparation: Make sure holes are dry and clear of loose material before placing concrete footings.

Concrete: Minimum 20 MPa.

Connection: Slope concrete top of footing away from the pole to prevent water ingress and compromise to the timber pole.

Curing
Period: Allow 10 days after placing concrete encasing before loading or carrying out fabrication work.

Beam connection
Bearing surface: Form flat bearing surfaces by checking or notching into the pole to a depth just sufficient to achieve the required width of bearing.

3.4 COMPLETION

Tightening
Initial: Tighten bolts, screws and other fixings so that joints and anchorages are secure at the date for practical completion.

Subsequent: If unseasoned timber is used, retighten after 6 months all bolts, screws and other fixings.

0382 LIGHT TIMBER FRAMING

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Provide light timber floor, wall and roof framing.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.
- *Adhesives, sealants and fasteners*.
- *Timber products, finishes and treatment*.

1.3 STANDARDS

General

Framing: To AS 1684.2, AS 1684.3 or AS 1684.4, as appropriate.

Design: To AS 1720.1.

1.4 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Prefabricated units before installation.
- Fabricated items before priming or water-repellent treatment.
- Bolts after final tightening.
- Timber work after erection but before it is covered.

1.5 SUBMISSIONS

Certification

General: Submit certification by a professional engineer of the design, documentation and erected work to AS 1684 and AS 1720.1. Include the following:

- Reactions: Provide location and magnitude of reactions to be accommodated by the support structure.
- Floor and wall and roof frame member sizes: A schedule of proposed member sizes, certified as meeting stated project requirements for span, spacings, loadings and deflections.
- Species and stress grade.
- Moisture content at time of manufacture.
- Preservative treatment, if any.

Shop drawings

General: Submit shop detail drawings certified by a professional engineer stating that the design has been carried out to AS 1684 and AS 1720.1 requirements for the configurations and loadings. Include the following:

- Prefabricated roof trusses:
  - . Marking plans.
  - . Truss plan layout.
  - . Elevations, with the arrangement of members allowing for the accommodation of in-roof services and the size and section type of each member.
  - . Camber of all elements.
  - . The method of assembly, connection, lifting, holding down and bracing.
- Prefabricated wall frames:

. Wall plan, showing all wall layouts.
. Elevations showing the arrangement of members, and the size and section type of each member.
. The method of assembly, connection, lifting, holding down and bracing.

Materials
Identification:

- Certification: Submit a supplier's certificate (which may be included on an invoice or delivery docket) verifying that the timber complies with the specification, including moisture content.
- Inspection: Submit the inspection authority's certificate verifying that the timber complies with the specification.

Moisture content: Submit records of moisture content.

Preservative treatment
Certificate: Submit a test certificate from an independent testing authority confirming that the required preservative retention has been achieved.

CCA treated timber: If proposed, provide details of treatment.

1.6 TOLERANCES

General
Walls: Conform to the **Walls tolerances table**.

Walls tolerances table

Property	Permitted deviation (mm)
Generally: Verticality in 2000 mm	4
Generally: Flatness[1] in 2000 mm	3
Features[2]: Verticality in 2000 mm	2
Features: Horizontality in 2000 mm	2
1. Flatness: Measured under a straightedge laid in any direction on a plane surface. 2. Features: Conspicuous horizontal or vertical lines including external corners, parapets, reveals, heads, sills.	

2 PRODUCTS

2.1 TIMBER

Identification
Method: Identify timber using branding, certification or both.

Branding: Brand structural timber, under the authority of a recognised product certification program applicable to the product. Locate the brand mark on faces or edges which will be concealed in the works. For timbers not covered by the branding provisions of Australian standards or regulations for which branding is required, include the following data:

- Stress grade.
- Method of grading.
- Seasoned or as s.
- The certification mark of the product certification program.
- The applicable standard.

Certification: Forest certification, chain of custody and product labelling to the *Timber products, finishes and treatment* worksection.

Fascias and barge boards
Hardwood: To AS 2796.1.

Seasoned cypress pine: To AS 1810.

Softwood: To AS 4785.1.

Preservation treatment: To the *Timber products, finishes and treatment* worksection.

Fascia dimensions:

- Refer to architectural drawings.

Barge board dimensions:

- Refer to architectural drawings.

2.2 LAMINATED VENEER LUMBER AND GLUED LAMINATED TIMBER

Laminated veneer lumber
Standard: To AS/NZS 4357.0.

Glued laminated timber
Standard: To AS/NZS 1328.1.

2.3 SHEET PRODUCTS

Structural plywood
Standard: To AS/NZS 2269.0.

Bond: Type A to AS/NZS 2754.1 (Int).

Veneer
Veneer quality to visible surfaces: CD (minimum) to AS/NZS 2269.0.

Identification
Branding: To AS/NZS 2269.0.

Brand mark: Locate the brand mark on faces or edges which will be clearly visible for certification inspections and concealed in the works.

2.4 COMPONENTS

Nail plated joined beams
Standard: To AS 4446.

Type: Proprietary composite member made up by butt and horizontally joining timber with pressed in nail plates.

Mild steel post bases
Minimum dimensions:

- Conform to AS 1684.2 Table 9.20(p) and AS 1684.3 Table 9.20(p), as appropriate.

Location: To timber posts supported off concrete slabs or footings.

Finish: Galvanize after fabrication.

Fasteners
General: Conform to the *Adhesives, sealants and fasteners* worksection.

Installation: Do not split or otherwise damage the timber.

Coating: Before placing bolts in contact with CCA treated timber, coat the shank of the bolt in a grease or bituminous coating.

Damp-proof course
Material: To AS/NZS 2904.

Flashings
Material: To AS/NZS 2904.

2.5 FINGER JOINTED STRUCTURAL TIMBER

General
Standard: To AS 5068.

2.6 RECONSTITUTED STRUCTURAL TIMBER PRODUCTS

Wet-processed fibreboard (including hardboard)
Standard: To AS/NZS 1859.4.

3 EXECUTION

3.1 TRANSPORT AND DELIVERY

General

Handling and protection: Do not distort or damage timber or timber products.

Moisture content: Maintain the equilibrium moisture content of seasoned timber.

Protection from weather

General: Provide temporary protection for members until permanent covering is in place.

3.2 FLOOR FRAMING

Bearers and joists

Levelling: Level bearers and joists by checking or by packing for the full width of the member with dense corrosion resistant material which is secured in place:

- Maximum thickness of packing: 3 mm.

Spring: Lay bearers and joists to allow for straightening under loading.

Joints: Locate joints only over supports:

- Minimum bearing of bearers: 50 mm.
- Minimum bearing of joists: 30 mm.

Fixing: Secure bearers and joists to supports to provide restraint against lateral movement.

Joist restraint:

- Unseasoned timber: If joist timber is unseasoned, the span ≥ 3000 mm, and there is no ceiling lining, provide solid blocking between each joist in rows at 1800 mm centres.
- Deep joists: If the joist depth:width ratio is ≥ 4, restrain joists at the ends of the joists over supports and at ≤ 1800 mm centres using either of following as appropriate:
  - . Continuous trimming joists.
  - . Solid blocking or herringbone strutting.
- Trimmers or blocking dimensions:
  - . Depth: Joist depth less 25 mm.
  - . Width: ≥ 25 mm.
- Herringbone strutting dimensions: ≥ 38 x 38 mm.

Tolerance

Floors: 5 mm maximum deviation in 3 m measured under a straight edge placed anywhere on the surface in any direction.

3.3 WALL FRAMING

Additional support

General: Provide additional support in the form of noggings, trimmers and studs for fixing lining, cladding, hardware, accessories, fixtures and fittings as required.

Maximum spacing of noggings: 1350 mm centres.

Vermin barriers

General: Provide vermin barriers as follows:

- Brick veneer barrier: Close nail 10 mm 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

General: Provide damp-proof courses under the bottom plate of stud walls built off slabs or masonry dwarf walls, as follows to AS/NZS 4200.1:

- External walls (not masonry veneer): Turn up at least 75 mm on the inside and tack. Project 10 mm beyond the external slab edge or dwarf wall and turn down at 45°.
- Walls of bathrooms, shower rooms and laundries: Turn up at least 150 mm on the wet side and tack to studs.

Installation: Lay in long lengths. Lap full width at angles and intersections and at least 150 mm at joints.

Junctions: Preserve continuity of damp-proofing at junctions of damp-proof courses, sarkings and waterproof membranes.

Flashings

Location: Provide flashings to external openings to prevent the entry of moisture. Form trays at the ends of sill flashings.

Masonry veneer construction: Extend across cavities and build into brickwork.

3.4 ROOF AND CEILING FRAMING

Wall plates

Fixing: Fix timber wall plates to masonry, with straps, bolts or both.

Nailing plates

General: Where timber joists, rafters or purlins bear on or into steel members, provide nailing plates to transfer the design loads, bolted to the steel member at 500 mm maximum centres and 100 mm maximum from the end of the nailing plate.

Nailing plates

General: Where timber joists, rafters or purlins bear on or into steel members, provide 50 mm thick nailing plates bolted to the steel member at 500 mm maximum centres.

Beam framing

Ridge straps: Butt ends of rafters together at ridge, and strap each pair together with 900 mm long steel strap passing over the ridge, triple nailed to each rafter.

Roof space: If a water container or heater is located in the roof space, provide a support platform to AS/NZS 3500.4 clause 5.5.

Additional support: Provide a frame member behind every joint in fibre cement sheeting or lining.

Anti-ponding boards

Standard: To AS/NZS 4200.2.

3.5 COMPLETION

Tightening

General: Tighten bolts, screws and other fixings so that joints and anchorages are secure at the date of practical completion.

0383 SHEET FLOORING AND DECKING

1 GENERAL

1.1 CROSS REFERENCES

General
Requirement: Conform to the following worksection(s):
- *General requirements*.

1.2 STANDARD

General
Flooring and decking: To AS 1684.2, AS 1684.3 or AS 1684.4, as appropriate.

1.3 INTERPRETATION

Definitions
General: For the purposes of this worksection the following definitions apply:
- Subfloor: The structure that supports the sheet flooring and decking.
- Moisture content: The percentage by mass of water present in the timber.
- Equilibrium moisture content (EMC): For given conditions of humidity and temperature, the moisture content which timber approaches at which it neither gains nor loses moisture while the conditions of its environment are maintained.
- Flooring:
  - . Fitted: Flooring fitted between the walls of each room. i.e. not platform floors.
  - . Intermittently-supported: Flooring which is supported by, and spans across, beams or joists.
- Continuously-supported: Flooring which is supported by, and directly fixed to, a continuous supporting surface.
- Platform: Flooring laid over the whole of the joisted floor structure before the erection of external and internal wall frames.
- Decking: Intermittently-supported external flooring with drainage gaps between boards.
- Joints:
  - . Butt: Floor boards cross cut square with plain ends for joining over supports.
  - . End-matched: Floor boards tongue and grooved at the ends to allow joining between supports.

1.4 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of the following:
- Subfloor before laying sheet flooring, fibre cement flooring or decking.

1.5 TESTS

Product moisture content
General: Confirm that the moisture content of the timber decking as delivered matches the ambient moisture content of the site. If there is a mismatch allow for acclimatisation.

1.6 SUBMISSIONS

Product samples
General: Submit samples of each timber or synthetic decking type illustrating the range of variation in colour and figure in conformance with the **Samples table**.

Samples table

Item	Sample size	Number
Decking.	600x600	1

Verification
Certificate: Submit a supplier's certificate (which may be included on an invoice or delivery docket) verifying conformance to grading, species and board size and noting the moisture content.

Inspection: If neither branding nor certification is adopted, submit a report by an independent inspecting authority verifying conformance.

1.7 TOLERANCES

Tolerances
General: Maximum deviation of the finished floor surface under a 3 m straight edge laid in any direction: 3 mm.

2 PRODUCTS

2.1 GENERAL

General
Conformance: Conform to the **Flooring and decking schedule**.

Storage
Timber decking: Deliver to site and store on dry ground on level bearers 150 mm high, block stacked, banded and protected against the weather.

Plywood and particleboard sheet flooring: Deliver to site and store on dry ground on level bearers 150 mm high, stacked on flat and protected against the weather.

2.2 DECKING

Recycled timber decking
Standard: To FWPA PN06.1039.

- Grading: To Section 5.

New timber decking
Standard:

- Treated softwood to AS 4785.1 Section 4.
- Hardwood to AS 2796.1 Section 4.
  . Grade to AS 2796.2: Select.

Durability

- Natural durability classification to AS 5604: Class 2 minimum.
- Preservative treatment to AS 1604.1 Table D1: H3 minimum.
- Identification: Brand preservative treated decking timber to AS 1604.1.

Arrises: Chamfered or round.

ModWood Composite decking
Standard: In conformance with manufacturer's recommendations.

Compressed fibre cement
Standard: To AS/NZS 2908.2.

Category: 5.

- Type: A

2.3 SHEET FLOORING

Plywood
Standard: To AS/NZS 2269.0.

Plywood formaldehyde emission class to AS/NZS 2269.0: Class E_1.

Grading:

- Surface grade: CD.
- Bond: Type A to AS/NZS 2754.1 (Int).

Particleboard
Particleboard: To AS/NZS 1860.1, Class 1.

Particleboard formaldehyde emission Class to AS/NZS 1860.1: Class E_1.

Identification

General: Identify timber using branding or certification.

- Branding: Brand plywood and particleboard under the authority of a recognised product certification or accreditation program applicable to the product. Locate the brand mark on faces or edges which will be concealed.
- Provide certification from the recognised product certification or accreditation programs, as appropriate:
  . Plywood and particleboard: Engineered Wood Products Association of Australia Quality Control and Product Certification Scheme.

Compressed fibre cement sheeting

Standard: To AS/NZS 2908.2.

Category: 5.

- Type: B.

3 EXECUTION

3.1 GENERAL

Subfloors

General: Ensure support members are in full lengths without splicing.

Flatness: < 3 mm deviation of the substrate under a 3 m straight edge laid in any direction with no abrupt variations greater than 1 mm over 250 mm.

Timber decking on steel joists

General: Screw fix seasoned battens to the steel joists so that their top surfaces are aligned.

- Batten size: Minimum 35 mm thick.
- Spacing of fasteners: < 600 mm.

3.2 FIXING SHEET FLOORING

Particleboard flooring

Installation: To AS 1860.2.

Plywood flooring

Installation: To AS 1684.2, AS 1684.3 or AS 1684.4, as appropriate.

Compressed fibre cement flooring

Installation: Lay the length of the sheets at right angles to the joists. Stagger the end joints and locate centrally over joists. Apply adhesive to edges of sheets and firmly butt join together.

Minimum number of spans across support: 2.

Fixing: Pre-drill screw holes with 1 mm clearance over screw diameter and countersink. Fix with corrosion resistant countersunk screws.

Spacing of fasteners:

- Sheet edge and intermediate: < 450 mm.
- Corners and sheet edges: At least 12 mm from sheet edges and 50 mm from corners.

Wet area flooring: Stop screw heads with sealant.

3.3 FIXING DECKING

Timber decking

Installation: Lay in long lengths with the ends of each board firmly butted to the next and firmly in contact with the joists. Stagger joints and make over joists.

Gap between edges of seasoned boards: 4 mm.

Minimum number of spans across support: 3.

Nailing:

- General: Make sure the boards are in contact with the joists at the time of nailing, particularly where boards are machine nailed. If nails are to be less than 10 mm from ends of boards, pre-drill nail holes 0 – 1 mm undersize.
- Top nailing: Double nail at each bearing with nails driven flush. Offset nails at intermediate fixings or skew nail 10° in opposite directions.

Sealing: Apply 1 coat of water repellent preservative and 1 coat of finish coat to top surface of joists and all surfaces of boards before fixing.

Compressed fibre cement decking

Installation: Lay the length of the sheets parallel or at right angles to the joists. Locate end joints centrally over joists. Provide noggings or trimmers joists, cut between and fixed to joists to support the edges of sheets.

Minimum number of spans across support: 2.

Fixing: Pre-drill screw holes with 1 mm clearance over screw diameter and countersink. Fix with corrosion resistant countersunk screws. Apply sealant to screw hole and screw before fixing and stop screw head with sealant, finished slightly below the surface after fixing.

Spacing of fasteners:

- Sheet edge and intermediate: < 450 mm.
- Corners and sheet edges: At least 12 mm from sheet edges and 50 mm from corners.

Joints: Provide butt joints 5 mm wide. Insert compressible closed cell polyethylene foam backing rod and fill the joint with a flexible sealant.

ModWood Composite decking

Installation: To be in accordance with ModWood's specifications (refer to web site) and relevant building codes. If using Kleva Klip please refer to Kleva Klip's fixing instructions, www.klevaklip.com.au

As ModWood expands in heat and sun, to avoid building stress into the boards and having possible lengthways shrinkage, it is best to fix the boards when the ambient temperature is less than 25˚C and when the boards are not sitting in full sun (see "coefficient of thermal linear expansion" on our web site).

Storage & Handling: ModWood packs should be stored in a dry, flat area under roof and off the ground. Loose boards should be stored on its edge in a dry, flat area under roof and off the ground. Failure to keep packs dry in storage can lead to the growth of mould spores on boards. When moving product, ModWood should be carried on its edge. Please note ModWood is a finished product – take care.

0411B WATERPROOFING – EXTERNAL AND TANKING

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Provide roof and deck waterproofing systems to substrates, as documented, which are:

- Waterproof under five minutes duration rainfall intensity, which has an average recurrence interval of 100 years.
- Graded to falls to dispose of stormwater without ponding above the depth of lapped seams.
- Able to accommodate anticipated building movements.
- Able to accommodate its own shrinkage over the warranty life of the roofing system.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.
- The *General requirements* worksection contains umbrella requirements for all building and services worksections.

1.3 STANDARDS

Membrane materials

Standard: To AS 4654.1.

Membrane design and installation

Standard: To AS 4654.2.

Stormwater drainage

Standard: To AS/NZS 3500.3.

1.4 INTERPRETATION

Definitions

General: For the purposes of this worksection the definitions given in AS 4654.1 and AS 4654.2 and the following apply:

- Acrylic - liquid applied: Water based formulations which air dry to form plastic membranes.
- Bitumen: A viscous material from the distillation of crude oil comprising complex hydrocarbons, which is soluble in carbon disulphide, softens when it is heated, is waterproof and has good powers of adhesion. It is produced as a refined by-product of oil.
  - . SBS bitumen: Bitumen modified with Styrene Butadiene Styrene, a thermoplastic rubber that undergoes a phase inversion at elevated temperature and converts to an elastomeric material. The membrane is reinforced with fibreglass or non-woven polyester (NWP).
  - . APP bitumen: Bitumen modified with Atactic (meaning non-crystalline or amorphous) polypropylene wax to form a plastomeric sheet. The membrane is reinforced with fibreglass or non-woven polyester (NWP).
- Bond breakers: A system preventing a membrane bonding to the substrate, bedding or lining.
- Double detail joint: A joint formed by turning up and bonding the horizontal membrane to a vertical substrate and adding an overflashing of membrane material bonded to the vertical substrate and folded over and bonded to the horizontal membrane. In certain situations the double detail can be achieved by bonding an angle profile of membrane material to the junction prior to laying the membrane.
- Elastomer: A polymer having elastic properties similar to rubber.
- Plasticised PVC: Rigid PVC made flexible with plasticisers to form a plastic sheet membrane (vinyl).
- Polyurethane - liquid applied: solvent based formulations which moisture cure to form an elastic rubber membrane.

- Seamless membranes: Membranes applied in liquid or gel form and air cured to form a seamless film.
- Slip sheet: A sheet used to isolate the membrane system from the supporting substrate or from the topping or mortar bedding. The most common material is polyethylene sheeting.
- Substrate: The surface to which a material or product is applied.

1.5 INSPECTION

Notice

Inspection: Give notice so that inspection may be made as follows:

- Substrate preparation completed.
- Secondary layers preparation completed.
- Before membranes are covered up or concealed.
- Underflashings complete before installation of overflashings.
- After flood testing.

1.6 SUBMISSIONS

Execution records

Placing records: Photographically record the application of membranes and label with the following information:

- Date.
- Portion of work.
- Substrate preparation.
- Weather during application and curing.
- Protection provided from traffic and weather.

2 PRODUCTS

2.1 MEMBRANES

Membrane systems

Requirement: Provide a proprietary membrane systems certified as suitable for the intended external waterproofing by the following:

2.2 ACCESSORIES

Internal roof outlets

General: Proprietary funnel shaped sump cast into the roof slab, set flush with membrane, with a flat removable grating and provision (e.g. clamp ring) for sealing the membrane into the base of the outlet.

Control joint covers

Corners, crossovers, tees and bends: Factory mitred, welded and provided with 500 mm legs.

End closures: Factory folded and sealed to match joint cover profile.

2.3 THERMAL INSULATION

2.4 DRAINAGE CELL PANELS

General: Refer to architectural drawings.

3 EXECUTION

3.1 PREPARATION

General

Substrates: Prepare substrates as follows:

- Fill all cracks in substrates wider than 1.5 mm with a filler compatible with the membrane system.
- Fill voids and hollows in concrete substrates with a concrete mix not stronger than the substrate.
- Remove projections.

- Remove deleterious and loose material.
- Remove all traces of a concrete curing compound if used.

Leave the surface free of contaminants, clean and dust free.

Moisture content

Concrete substrates: Cure for > 21 days.

Moisture content: Verify that the moisture content of the substrate is compatible with the water vapour transmission rate of the membrane system by testing to AS/NZS 2455.1 Appendix B.

Test type: select from the following:

- Hygrometer test: Seal a hygrometer to the substrate for > 16 hours and measure the relative humidity of the air between the instrument and the slab.

Falls

Verify that falls in substrates are > 1.5%.

Joints and fillets

External corners: Round or arris edges.

Control joints: Prepare all substrate joints to suit the membrane system.

Priming

Compatibility: If required, prime the substrates with compatible primers for adhesion of membrane systems.

3.2 APPLICATION

Protection during installation

Damage: Protect membrane from damage during installation and for the period after installation until the membrane achieves its service characteristics that resist damage.

Drains

General: Prevent moisture from tracking under the membranes at drainage locations.

Drains and cages: Provide removable grates or cages to prevent blockage from debris. If the finished surface is above the level of the membrane provide a slotted extension piece to bring the grate up to the level of the finished surface.

Overflows: Apply a bond breaker to the perimeter of the overflow outlet at its junction with the surface to which the membrane will be fixed. Turn the membranes into the overflow to prevent moisture from tracking behind the membrane.

Sheet joints

Orientation of laps: Lap sheets on the upslope side of the roof fall over sheets on the downslope side.

End laps generally: Stagger end lap joints.

Bituminous sheet membranes:

- Side laps: 75 mm.
- End laps: 100 mm.
- Method: Heat welded.

Synthetic rubber membranes:

- Factory–vulcanized laps > 40 mm.
- Field side laps > 50 mm for side laps.
- Field end-laps > 100 mm for end laps.

Plasticised PVC (Polyvinyl chloride) membranes:

- Factory welded laps > 30 mm.
- Field-welded laps:
  - . If used over insulation boards > 100 mm.
  - . Other instances > 75 mm overlaps.

Curing of liquid applied systems

General: To the manufacturers' instructions.

Control of movement

General: Provide control joints located over control joints in the substructure.

Fillets and bond breakers: Adequately size to allow the membrane to accommodate movement.

Control joint covers: Install after fixing hobs and membranes.

Bonded membranes: Carry control joints in the substrate through to and into the surface finish.

Membrane terminations

Membrane upturns: Provide upturns above the maximum water level expected from the exposure conditions of rainfall intensity and wind.

- Height: > 150 mm.
- Anchoring: Secure sheet membranes along the top edge.
- Edge protection: Protect edges of the membrane.
- Waterproofing above terminations: Waterproof the structure above the termination to prevent moisture entry behind the membrane using cavity flashings, capping, waterproof membranes or waterproof coatings.

Horizontal terminations: Do not provide. Use vertical terminations.

Membrane vertical penetrations

Pipes, balustrades, ducts, and vents: Provide separate sleeves for all pipes, ducts, and vents and have them fixed to the substrate.

Membrane horizontal penetrations

Sleeves: Protect rigid PVC conduits and pipes with a sleeve of SBS bitumen in order to seal to the membrane without burning the PVC. Do not use high density polyethylene (HDPE), polypropylene (PP) pipes or flexible PVC conduit.

Membrane at balcony doors and windows

Requirement: Install membrane before the fixing of door or window frames.

Membrane upturn:

- Sheltered areas: 40 mm above the finished external floor surface or overflow level, whichever is the higher.
- Exposed areas: 150 mm upturn from the finished external floor level or overflow level, whichever is the higher.

Hobless and flush thresholds: Install membrane before the fixing of door or window frames with a continuous grated drain abutting the external face of the door or window sill.

Membrane around skylights and hatches

Requirement: Install membranes to upstands before the installation of the skylight or hatch.

Membrane at parapets

Requirement: Terminate membrane upstands under parapet flashing or capping giving 75 mm overlap. Do not top fix parapet cappings. Seal heads of fasteners against capping.

Membrane at gutters

Requirement: Terminate membrane over a corrosion resistant metal angle fixed to the gutter support substrate with the vertical leg of the angle turned down into the gutter at least 35 mm.

Overlaying finishes on membranes

Compatibility: If a membrane is to be overlayed with another system such as tiles, pavers, ballast, insulation or soil, provide an overlaying system that is compatible with and will not cause damage to the membrane.

Bonded or partially bonded systems: If the topping or bedding mortar requires to be bonded to the membrane, provide sufficient control joints in the topping or bedding mortar to reduce the movement over the membrane.

Slip sheet: If the topping or bedding mortar is structurally sufficient not to require bonding to the substrate, lay a double slip sheet over the membrane to separate it from the topping or bedding mortar.

Paint coatings: If maintenance pathways are indicated by a paving paint, use a paving paint which is compatible with the membrane.

3.3 FLOOD TEST

General

Application: Perform a flood test before the installation of surface finishes.

Set-up:

- Measure for dryness the wall/floor junction of adjacent spaces to the slab soffit below using electrical resistance testing to AS/NZS 2455.1 Appendix B.
- Record the result for each area.
- Dam the access openings and seal drainage outlets to allow 50 mm water level but no higher than 25 mm below the weir level of the perimeter flashings.
- Provide temporary overflows of the same capacity as the roof outlets to maintain the flood level.
- Fill space with clean water and leave overnight.

Evaluation:

- Make a visual inspection of the wall/floor junction of adjacent spaces and of the slab soffit below for obvious water or moisture.
- Test the same areas for dryness using a moisture meter, and compare the results to the measurements taken before flooding.

Conformance:

- Evidence of water from the visual test: Failure.
- No visual evidence of water: Proceed with the moisture meter test.
- Increase in test results before and after flooding: Failure.

Records: Submit records of all flood tests.

3.4 COMPLETION

Protection

General: Keep traffic off membrane surfaces until bonding has set or for 24 hours after laying, whichever period is the longer.

Reinstatement: Repair or replace faulty or damaged work. If the work cannot be repaired satisfactorily, replace the whole area affected.

Warranty

Waterproofing: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the supplier and the applicator.

- Form: Against failure of materials and execution under normal environment and use conditions.
- Minimum period: 7 years.

0421 ROOFING – COMBINED

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Provide a roofing system and associated work as documented and which satisfies the product performance requirements as documented.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.

1.3 INSPECTION

Notice

Inspection: Give sufficient notice so that inspection may be made of:

- Roof supports.
- Those parts of the roofing, sarking, vapour barrier, insulation and roof plumbing installation which will be covered up or concealed.

1.4 SUBMISSIONS

Tests

General: Submit results of type tests as follows:

- Metal roofing general tests: Roof sheeting and fastenings to AS 1562.1 for resistance to concentrated load and to wind pressure.
- Metal roofing in cyclonic regions AS/NZS 1170.2: Roof sheeting and fastenings to AS 1562.1 clause 5.6.
- Fibre cement roofing: Type test the roof sheeting and fixings to AS/NZS 1562.2 for resistance to wind forces.

Internal downpipes: Submit results of site tests to each stack hydrostatically in stages 2 storeys high for two hours. Remedy defects and retest if necessary.

2 PRODUCTS

2.1 COMPONENTS

Fasteners

Finish: Prefinish exposed fasteners with an oven baked polymer coating to match the roofing material.

Fastenings to timber battens: Provide fastenings just long enough to penetrate the thickness of the batten without piercing the underside.

Profiled fillers

Type: Purpose-made closed cell polyethylene foam profiled to match the roofing profile.

Location: Provide profiled fillers under flashings to the following:

- Ridges.
- Eaves.
- Lapped joints in roof sheeting.

Safety mesh

Standard: To AS/NZS 4389.

2.2 SHEET METAL ROOFING

Standards

Design and installation: To AS 1562.1.

Prepainted and organic film/metal laminate products: To AS/NZS 2728.

Roofing product

Refer to architectural drawings.

2.3 ROOF PLUMBING

General

Standard: To AS/NZS 3500.3.

General: Provide the flashings, cappings, gutters, rainwater heads, outlets and downpipes necessary to complete the roof system.

Materials

Metal rainwater goods: To AS/NZS 2179.1.

PVC rainwater goods and accessories: To AS/NZS 3500.3.

Flashings and cappings

Standard: To AS/NZS 2904.

Material and colour: Match roof sheeting.

Rib notching: Match roof sheeting.

Ridge and barge cappings

Material and colour: Match roof sheeting.

Eaves gutters

Material and colour: Match roof sheeting.

Matching fascia/barge: If the selected eaves gutter is a proprietary high front pattern forming part of a combined system of gutter, fascia and barge, provide the matching proprietary fascias and barge cappings to roof verges and edges.

Box gutters

Refer to hydraulic and architectural drawings.

Downpipes

Refer to hydraulic and architectural drawings.

Internal downpipes

Refer to hydraulic and architectural drawings.

Rainheads

Refer to hydraulic and architectural drawings.

Vents

Refer to hydraulic drawings.

Gratings

Gratings: Provide removable gratings over rainwater heads and sumps:

Leaf screens

Refer to hydraulic and architectural drawings.

Location: To the extent of all gutters and rainwater heads.

2.4 SKYLIGHTS

Standard

General: To AS 4285.

Skylights (rooflights) in bushfire prone areas: To AS 3959 clause 5.6.5, AS 3959 clause 6.6.5, AS 3959 clause 7.6.5, AS 3959 clause 8.6.5, or AS 3959 clause 9.6.3, as applicable to the site's Bushfire Attack Level (BAL).

Description

General: A proprietary skylight system including framing, fixing, trim, accessories and flashings.

Description: Refer to architectural drawings.

Solar heat gain coefficient (SHGC): Refer to Basix certificate.

U-value: Refer to Basix certificate.

2.5 ROOF VENTILATORS

Description

General: A proprietary roof ventilator system including framing, fixing, trim, accessories and flashings.

Product: Refer to architectural drawings.

Finish: Match adjacent roofing.

3 EXECUTION

3.1 INSTALLATION

Protection

General: Keep the roofing and rainwater system free of debris and loose material during construction, and leave them clean and unobstructed on completion. Repair damage to the roofing and rainwater system.

Touch up: If it is necessary to touch up minor damage to prepainted metal roofing, do not overspray onto undamaged surfaces.

Thermal movement

Requirement: Provide for thermal movement in the roof installation and the structure, including movement in joints and fastenings.

Pan type sheets

Removal: Capable of being de-indexed and removed without damage.

Curved corrugated sheet

General: Form by rolling from material recommended for curving or bullnosing. Minimise crimping or creasing across the face of the sheet. Trim off crimped or creased edges and ends.

Metal separation

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: Conform to the **Tolerances table**.

Tolerances table

Property	Tolerance criteria: Permitted deviation (mm)
Spacing of supporting members	± 5 mm on the nominated support member spacing
Vertical or horizontal misalignment at the abutting ends of sheets	≤ 2 mm
Tops of supporting members in a plane parallel to the nominated roof slope	≤ 7 mm smooth deviation per metre length of supporting member

3.2 SHEET METAL ROOFING

Roof sheet installation

Laying start location: Centre of cranked ridge line where appropriate.

Eaves: Treat ends of sheets as follows:

- Generally: Close off ribs at tops and bottoms of sheets by mechanical means or with purpose-made fillers or end caps.
- At gutters: Project sheets 50 mm into gutters.

Swarf: Remove swarf and other debris as soon as it is deposited.

Accessories: Provide material with the same finish as roofing sheets.

3.3 BUILDING ELEMENTS

Ridges and eaves

Treat ends of sheets as follows:

- Project sheets 50 mm into gutters.
- Close off ribs at bottom of sheets using mechanical means or with purpose-made fillers or end caps.
- Turn pans of sheets up at tops and down into gutters by mechanical means.
- Provide pre-cut notched eaves flashing and bird proofing where necessary.
- Close off ridges with purpose-made ridge fillers of closed cell polyethylene 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.

3.4 ROOF PLUMBING

Jointing sheet metal rainwater goods

Butt joints: Make joints over a backing strip of the same material.

Soldered joints: Do not solder aluminium or aluminium/zinc-coated steel.

Sealing: Seal fasteners and mechanically fastened joints. Fill the holes of blind rivets with silicone sealant.

Flashings

Installation: Flash roof junctions, upstands, abutments and projections through the roof. Preform to required shapes if possible. Notch, scribe, flute or dress down as necessary to follow the profile of adjacent surfaces. Mitre angles and lap joints 150 mm in running lengths. Provide matching expansion joints at 6 m maximum intervals.

Upstands: Flash projections above or through the roof with two part flashings, consisting of a base flashing and a cover flashing, with at least 100 mm vertical overlap. Provide for independent movement between the roof and the projection.

Large penetrations: To low pitch roofs extend the base flashing over the roofing ribs to the ridge to prevent ponding behind the penetrating element.

Wall abutments: Provide overflashings where roofs abut walls, stepped to the roof slope in masonry and planked cladding, otherwise raking and as follows:

- In masonry: Build into the full width of the outer leaf. Turn up within cavity, sloping inward across the cavity and fixed to or built in to the inner leaf at least 75 mm above.
- In concrete: Turn 25 mm into joints or grooves, wedge at 200 mm centres with compatible material and point up.

Fixing to masonry or concrete: Step in courses to the roof slope. Interleave with damp proof course, if any.

Fixing to pipes: Solder, or seal with neutral cured silicone rubber and either of the following:

- Secure with a clamping ring.
- Provide a proprietary flexible clamping shoe with attached metal surround flashing.

Gutters

General: Prefabricate box gutters. Form stop ends, downpipe nozzles, bends and returns. Dress downpipe nozzles into outlets. Provide overflows to prevent back-flooding.

Gutter and sump support: Provide framing and lining to support valley gutters, box gutters and sumps. Line the whole area under the gutters and sumps.

Valley gutters: Profile to suit the valley boarding. Turn back both edges 180 x 6 mm radius. Nail or screw to the valley boarding at the top end to prevent the gutter creeping downwards.

Expansion joints: Provide expansion joints in guttering longer than 30 m:

Downpipes

General: Prefabricate downpipes to the required section and shape where possible. Connect heads to gutter outlets and, if applicable, connect feet to rainwater drains.

Access cover: Provide a removable watertight access cover at the foot of each downpipe stack.

Downpipe support: Provide supports and fixings for downpipes.

Internal downpipes

Access: Provide access openings as follows:

- At each junction and bend.
- At the foot of each stack.
- At every second floor level.

Sound insulation: Mineral fibre pipe insulation 50 mm thick, spirally bound on with 1.5 mm wire at 150 mm pitch.

Building in: If pipes are built into masonry or concrete, spiral wrap the pipe (and insulation, if any) with building paper.

3.5 SKYLIGHTS

Installation

Fixing: Per manufacturer's recommendations.

3.6 ROOF VENTILATORS

Installation

Fixing: Per manufacturer's recommendations.

3.7 COMPLETION

Warranties

Roofing materials: Submit the manufacturer's published product warranties.

Maintenance manual

On completion: Submit a manual of recommendations from the roof manufacturer or supplier for the maintenance of the roofing system including, frequency of inspection and recommended methods of access, inspection, cleaning, repair and replacement.

Spare tiles

Number: Provide one spare matching tile for every hundred tiles on the roof. Provide spare accessories in the same ratio.

Location: Stack spares within the roof space.

Designated locations: On or next to lines of supporting walls.

0431B CLADDING – COMBINED

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Provide lightweight external wall cladding and associated work which is as follows:

- Satisfies the product performance requirements.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.

1.3 INSPECTION

Notice

Inspection: Give sufficient notice so that the framing, sarking, vapour barrier and insulation may be inspected before they are covered up or concealed.

2 PRODUCTS

2.1 HARDBOARD PLANKS

Wet-processed fibreboard (including hardboard)

Standard: To AS/NZS 1859.4.

Plank cladding

Type: A proprietary system of hardboard planks.

Product: Refer to architectural drawings.

Plank thickness: 9.5 mm.

Joints and edges: PVC extrusion.

External corners: Preformed metal joining pieces.

Internal corners: Scribe.

2.2 FIBRE CEMENT PLANKS

Fibre cement

Standard: To AS/NZS 2908.2.

Plank cladding

General: Provide a proprietary system of single faced fibre cement building planks.

Product: Refer to architectural drawings.

Plank thickness: 7.5 mm.

Joints and edges: UPVC extrusion.

Corners: Preformed metal joining pieces.

2.3 FIBRE CEMENT CLADDING

Fibre cement

Standard: To AS/NZS 2908.2.

Cladding, eaves and soffit linings: Type A Category 3 (modulus of rupture ≥ 7 MPa).

Compressed cladding: Type A Category 5 (modulus of rupture ≥ 18 MPa).

- Edges: Square.

Sheet cladding

General: Provide a proprietary system of single faced fibre cement sheets.

Arrangement: Set out in even panels with joints coinciding with framing.

Sheet thickness: 6 mm.

Joints, corners and edges: UPVC extrusion.

Eaves and soffit lining
Sheets: Single faced fibre cement.

Sheet thickness: 4.5 mm.

Joints: UPVC extrusion.

2.4 COMPONENTS

Flashings
Standard: To AS/NZS 2904.

3 EXECUTION

3.1 TOLERANCES

Tolerances
Requirement: Conform to the **Tolerances table**.

Tolerances table

Property	Tolerance criteria: Permitted deviation (mm)
Spacing of supporting members	± 5 mm on the nominated support member spacing
Vertical or horizontal misalignment at the abutting ends of cladding	≤ 2 mm

3.2 CONSTRUCTION GENERALLY

Substrates or framing
Requirement: Before fixing cladding check and, if necessary, adjust the alignment of substrates or framing.

Fixing
Method: Nail to timber framing, screw to steel framing.

Accessories and trim
Provide accessories and trim necessary to complete the installation.

Fixing eaves and soffit lining
Nailing: 150 mm centres to bearers at maximum 450 mm centres.

Metal separation
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 PROPRIETARY SYSTEMS OR PRODUCTS

Fixing
Product fixing: Fix the following proprietary systems in conformance with the current written recommendations and instructions of the manufacturer or supplier:

- Hardboard plank cladding.
- Fibre cement plank cladding.
- Fibre cement cladding.
- Compressed fibre cement cladding.

3.4 COMPLETION

Warranties
Cladding materials: Submit the manufacturer's published product warranties.

0451 AWS ALUMINIUM WINDOWS AND DOORS

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Provide AWS aluminium windows and doors as documented.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.

Manufacturer's documents

Manufacturer's and supplier's documents related to this worksection are:

- Commercial: **AWS Commercial Design** – Specifiers Guide available at www.awscommercial.com.au.
- Residential: **Vantage Design** – Specifiers Guide to Aluminium Joinery available at www.vantagealuminium.com.au.

1.3 STANDARDS

General

Selection and installation: To AS 2047.

Building classification: Car park is class 7a and townhouse class 2.

Glazing

Glass type and thickness: To AS 1288, if no glass type or thickness is nominated.

Materials and installation: To AS 1288.

Quality requirements for cut-to-size and processed glass: To AS/NZS 4667.

Terminology for work on glass: To AS/NZS 4668.

1.4 INTERPRETATION

Abbreviations

General: For the purposes of this worksection the abbreviations given in AS 4145.1 Appendix D and the following abbreviations apply:

- AWA: Australian Window Association.

Definitions

General: For the purposes of this worksection the definitions given in AS 4145.1 Section 2 and the following definitions apply:

- Aluminium joinery: The collective term used for aluminium framed and glazed windows and doors.
- U-value: Total U-Value as defined by BCA and determined in conformance with NFRC 100.
- SHGC: Solar heat gain coefficient as defined by BCA and determined in conformance with NFRC 200.

1.5 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Fabricated aluminium joinery assemblies delivered to the site, before installation.
- Commencement of aluminium joinery installation.

1.6 SUBMISSIONS

Samples

Submit samples of aluminium joinery as follows:

- Accessory and hardware items documented descriptively or by performance (i.e. not specified as proprietary items) including locks, latches, handles, catches, sash operators, anchor brackets and attachments, masonry anchors and weather seals (pile or extruded).

Sealant compatibility
Compatibility statements: Submit statements from, all parties to the installation, that certify the compatibility of sealants and glazing systems to all substrates.

Subcontractors
General: Submit names and contact details of proposed subcontractors endorsed by AWS Architectural Window Systems Pty Ltd.

Type-test reports
General: Submit type-test reports verifying conformance to AS 2047 and the **Aluminium joinery performance schedule**.

Opacified glass
General: Submit a statement by the manufacturer certifying that the proposed method of opacifying the glass will not be detrimental to the glass or detract in any way from the glass product warranty.

2 PRODUCTS

2.1 GENERAL

Product substitution
Other aluminium windows and doors: Conform to **SUBMISSIONS**, **Substitutions** in the *General requirements* worksection.

Standards
Flashings: To AS/NZS 2904.

Extrusions: To AS/NZS 1866.

2.2 GLASS

Glass types and quality
Standard: To AS/NZS 4667.

Glazing plastics
General: Free from surface abrasions, and warranted by the manufacturer for 10 years against yellowing or other colour change, loss of strength and impact resistance, and general deterioration.

Safety glazing materials
Standard: To AS/NZS 2208.

Safety glasses
Standard: To AS/NZS 2208.

Certification: Required.

Certification provider: An organisation accredited by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ).

Type: Grade A when used in curtain walls.

Heat soaking
Requirement: All toughened glass products.

Ceramic coated glass
Description: Heat strengthened or toughened glass with a coloured ceramic coating fused to and made an integral part of the surface: To ASTM C1048, Condition B.

Opacified glass
Description: Glass with an opacifier permanently bonded to the inner face.

Unacceptable blemishes in heat-treated flat glass (including tinted and coated glass)
Standard: To AS/NZS 4667.

Insulating glass units (IGU's)
Selection and installation: To AS/NZS 4666.

2.3 GLASS IDENTIFICATION

Safety glazing materials

Identification: Identify each piece or panel, 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.

Bullet-resistant panels

Marking: To AS/NZS 2343.

2.4 INSECT SCREENS

Aluminium framed screens

General: Provide proprietary aluminium screen sections with mesh fixing channel, mitred, staked and screwed at corners. Provide an extended frame section where necessary to adapt to window opening gear.

- Mesh: Provide black aluminium mesh. Bead the mesh into the frame channel with a continuous resilient gasket, so that the mesh is taut and without distortion.

Fixed screens

General: Provide fixed screens to the window frames with a clipping device which permits removal for cleaning.

Hinged screens

General: Hinge at the top to give access to opening sash.

Roll up screens

General: Provide a proprietary retractable insect screen comprising aluminium frame with baked enamel finish, fibreglass mesh beaded into the frame, and a retraction system including tension spring, nylon bearings, positive self-locking device, and plastic sealing strip at sill.

Sliding screens

General: Provide a matching aluminium head guide, sill runner, and frame stile sections for screens not part of the window frame.

- Hardware: Nylon slide runners and finger pull handle. Provide pile strip closers against sash where necessary to close gaps.

2.5 ALUMINIUM JOINERY FINISHES

Powder coatings

Product: Refer to architectural drawings.

Powder coat thickness: ≥ 50 microns to 90 microns.

Anodised

Thickness: 20 microns.

2.6 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.

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 in conformance with **SELECTIONS**.

2.7 KEYING

Contractor's keys

Master key systems: Do not use any key under a master key system.

Delivery of keys

Number of keys: Conform to the **Number of keys table**.

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: Provide a keying system in conformance with the **Key codes schedule**.

Coding of locks: If window locks are included in building key code groups, provide cylinder or pin tumbler locks coded accordingly.

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
	-3-10 locks in code group	6
	-11-40 locks in code group	10
	-41 and over locks in code group	1 for every 4 locks or part thereof

3 EXECUTION

3.1 INSTALLATION

Glazing

General: Install the glass so that:

- Each piece is held firmly in place by permanent means which enable it to withstand the normal loadings and ambient conditions at its location without distortion or damage to glass and glazing materials.
- Building movements are not transferred to the glass.
- External glazing is watertight and airtight.

Temporary marking: Use a method which does not harm the glass. Remove marking on completion.

Toughened glass: Do not cut, work, or permanently mark after toughening. Use installation methods which prevent the glass making direct contact with metals or other non-resilient materials.

Heat absorbing glass: In locations exposed to direct sunlight, provide wheel cut edges free from damage or blemishes, with minimum feather.

Aluminium joinery

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 following:

- Commercial: **AWS Commercial Design** – Specifiers Guide available at www.awscommercial.com.au .
- Residential: **Vantage Design** – Specifiers Guide to Aluminium Joinery available at www.vantagealuminium.com.au .

Fasteners: Conceal fasteners.

Packing: Pack behind fixing points with durable full width packing.

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. Apply a neutral cure sealant to powder coated surfaces.

Operation

General: Make sure moving parts operate freely and smoothly, without binding or sticking, at correct tensions or operating forces and are lubricated.

Protection

Protective coverings: Retain proprietary temporary protection measures during installation and remove as follows:

- Contact mating surfaces before joining up.
- Exposed surfaces: Upon completion.

In situ touch up

Polyester or fluoropolymer coatings: Contact supplier for approval to apply touch up products, otherwise replace damaged material.

Trim

General: Provide mouldings, architraves, reveal linings, and other internal trim using materials and finishes matching the window frames. Install to make neat and clean junctions between frames and the adjoining building surfaces.

3.2 HARDWARE

Fasteners

Materials: Use materials compatible with the item being fixed and of sufficient strength, size and quality to perform their function.

- Concealed fixings: Provide a corrosion-resistant finish.
- Exposed fixings: Match exposed fixings to the material being fixed.

Support: Provide appropriate back support (for example lock stiles, blocking, wall noggings and backing plates) for hardware fixings.

- Hollow metal sections: Provide backing plates drilled and tapped for screw fixing, or provide rivet nuts with machine thread screws. Do not use self-tapping screws or pop rivets.

Proprietary window systems

Requirement: Provide the standard hardware and internal fixing points for personnel safety harness attachment, where required by and conforming with the governing regulations.

Operation

General: Make sure working parts are accurately fitted to smooth close bearings, without binding or sticking, free from rattle or excessive play, lubricated where appropriate.

Supply

Delivery: Deliver window hardware items, ready for installation, in individual complete sets for each window set, as follows:

- Clearly labelled with the intended location.
- In a separate dust and moisture proof package.
- Including the necessary templates, fixings and fixing instructions.

3.3 COMPLETION

Trade clean

Method: Clean with soft clean cloths and clean water, finishing with a clean squeegee. Do not use abrasive or alkaline materials.

Extent: All frames and glass surfaces inside and out.

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.

Warranty

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 AWA Code of Conduct.

Powdercoating:

- Dulux Duralloy:
  - . Film integrity: 7 years.
  - . Colour integrity: 7 years.
- Interpon D 610:
  - . Film integrity: 7 years.
  - . Colour integrity: 10 years.

Hardware supplied by Vantage: Refer to architectural drawings.

Hardware supplied separately: Refer to architectural drawings.

4 COMMERCIAL SELECTIONS – AWS PRODUCTS

General: Refer to architectural drawings.

4.1 KEYING

Key codes schedule

Window no.	KD	KA group code
All windows in townhouse 1	N/A	W1
All windows in townhouse 2	N/A	W2
All windows in townhouse 3	N/A	W3
All windows in townhouse 4	N/A	W4
All windows in townhouse 5	N/A	W5

0453B DOORS AND ACCESS PANELS

1 GENERAL

1.1 RESPONSIBILITIES

General
General: Provide doors, frames, doorsets, security screen doors and fire doorsets as documented.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following worksection(s):
- *General requirements*.
- *Door hardware*

1.3 INTERPRETATION

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.
  . Louvred door: A joinery door with spaces filled in with louvre blades.
  . Panelled door: A joinery door with spaces filled in with panels including glass.

1.4 SUBMISSIONS

Type tests
General: Submit type-test certification conforming to the following standards to verify conformance with the **Doorsets performance schedule**:
- Fire and smoke doors: To AS 1905.1 and BCA Spec C3.4.
- Weighted sound reduction index (R_w): To AS/NZS ISO 717.1.

2 PRODUCTS

2.1 FRAMES

Aluminium frames
General: Assembled from aluminium sections, including accessories such as buffers, pile strips, strike plates, fixing ties or brackets and cavity flashing, with provision for fixing documented hardware.

Threshold: If the frame includes a threshold member, provide a self-draining section with anti-skid surface.

Steel frames

General: Continuously welded from metallic-coated steel sheet sections, including accessories such as buffers, strike plates, spreaders, mortar guards, switch boxes, fixing ties or brackets, and cavity flashing with provision for fixing documented hardware and electronic security assemblies, and prefinished with a protective coating.

Finish: Grind the welds smooth, cold galvanize the welded joints and shop prime.

Hardware and accessories: Provide 4 mm backplates and lugs for fixing hardware including hinges and closers. Screw fix the hinges into tapped holes in the backplates.

Base metal thickness:

- General: ≥ 1.1 mm.
- Fire rated doorsets: ≥ 1.5 mm.
- Security doorsets: ≥ 1.6 mm.

Metallic-coated steel sheet: To AS 1397.

- Coating class interior: ZF100.

Timber frames

Hardwood: To AS 2796.1:

- Grade: Select.

Softwood: To AS 4785.1:

- Grade: Select.

Joints:

- Morticed head and through tenons.
- Trenched head:
  - . Bare faced tenons on jambs.
  - . Full let-in jambs.

2.2 DOORS

General

Doors: Proprietary products manufactured for interior or exterior applications and for the finish required.

Materials

Standards: Conform to the following:

- Decorative laminated sheets: To AS/NZS 2924.1.
- Wet processed fibreboard (including hardboard): To AS/NZS 1859.4.
- Dry processed fibreboard (including medium density fibreboard): To AS/NZS 1859.2.
- Particleboard: To AS/NZS 1859.1.
- Plywood and blockboard for interior use: To AS/NZS 2270.
- Plywood and blockboard for exterior use: To AS/NZS 2271.
- Seasoned cypress pine: To AS 1810.
- Timber – hardwood: To AS 2796.1.
- Timber – softwood: To AS 4785.1.

Certification

Panel doors: Provide panels branded under the authority of a recognised certification program applicable to the product. Locate the brand on faces or edges which will be concealed in the works.

Joinery doors

General: Provide joinery doors, as documented.

Flush doors

General: Provide flush doors of balanced construction.

Cellular core and intermediate rail core flush doors:

- Provide a subframe of 25 mm minimum width timber around openings for louvres and glazing.
- Provide additional material to take hardware, fastenings and grooves.

Solid core: Solid flush doors as follows:

- Flush door with blockboard: Core plate of timber strips laid edge to edge, fully bonded to each other and to facings each side of no less than two sheets of timber veneer.
- Flush doors with particleboard: Core plate of particleboard fully bonded to facings each side of no less than two sheets of timber veneer.

Medium density fibreboard doors: Single thickness of moisture resistant general purpose medium density fibreboard with the same surface finish to both sides, for internal use.

Smoke doors: Solid core ≥ 35 mm thick.

Construction

Adhesives:

- Internal: To AS/NZS 2270.
- External: To AS/NZS 2271.

Door thickness:

- General: 35 mm.
- External doors and doors over 900 mm wide: 40 mm.

Cut outs: If openings are required in flush doors (e.g. for louvres or glazing), do not make cut outs closer than the width of the stiles at the edges of the doors.

Edge strips: Minimum thickness 10 mm. Increase overall thickness to greater than 15 mm to accommodate the full depth of the rebate in rebated doors. Apply to the external edges of door after the facings are bonded to the door framing/core and finish flush with outside surface of the facings.

Louvre grilles: Construct by inserting the louvre blades into a louvre frame, and fix the frame into the door.

Double doors

General: Bevel square edged doors as necessary to prevent binding between the leaves.

Rebated meeting stiles: If not double acting doors, provide rebated meeting stiles or fix equivalent metal T stop to one leaf. Form rebates to suit standard rebated hardware.

Tolerance

Squareness: The difference between the lengths of diagonals of a door: ≤ 3 mm.

Twist: The difference between perpendicular measurements taken from diagonal corners: ≤ 3 mm.

Nominal size (mm):

- Height: + 2, - 2.
- Width: - 0, + 2.

2.3 DOORSETS

Cavity sliding doors

General: Proprietary product comprising steel and timber frame construction with rigid steel top, base and rear supporting members and incorporating the overhead door track, ball race type wheel carriages guides, stops, split jamb linings and removable pelmet.

Duct access panels

General: Proprietary products comprising metal-faced doors side hung to steel door frames, including hardware and accessories such as hinges and lock and installation lugs.

Fire-resistant doorsets

Standard: To AS 1905.1 and BCA Spec C3.4.

Security screen doorsets

Standard: To AS 5039.

2.4 ANCILLARY MATERIALS

Trims

Timber: Solid timber at least 19 mm thick, mitred at corners.

Extruded gaskets and seals

General: Provide seals to the architectural drawings.

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.

Type: Refer to architectural drawings.

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.

Fixing to stud frame openings: Attach galvanized steel brackets to jambs and screw twice to studs at each fixing.

Timber frames

Building in to masonry: Screw galvanized steel brackets twice to jambs and build in.

Fixing to masonry openings: Build in seasoned timber plugs to masonry joints or use proprietary expansion anchors and screw twice through jambs at each fixing.

Fixing to stud frame openings: Back screw twice to jambs at each fixing.

Fixing to thresholds: Dowel external door frames to thresholds other than timber with 10 mm diameter brass dowels, 100 mm long.

Heads of fasteners: Conceal if possible, otherwise sink the head below the surface and fill the sinking flush with a material compatible with the surface finish.

Finishing

Trim: Provide mouldings, architraves, reveal linings, and other internal trim using materials and finishes matching the door frames to make neat and clean junctions between the frame and the adjoining building surfaces.

Seals

General: Provide the fixings, rebates, grooves, and clearances required for installation and operation of the seals. Allow seals unwound from coils to settle before use.

Weatherproofing

Flashings and weatherings: Install flashings, weather bars, drips, storm moulds, caulking and pointing to prevent water from penetrating the building between the door frame and the building structure under the prevailing service conditions, including normal structural movement of the building.

3.2 DOORS

Priming

General: Prime timber door leaves on top and bottom edges before installation.

3.3 DOORSETS

Security screen doorsets

Standard: To AS 5040.

3.4 COMPLETION

Operation

General: Ensure moving parts operate freely and smoothly, without binding or sticking, at correct tensions or operating forces and that they are lubricated where appropriate.

Protection

Temporary coating: On or before the date for practical completion, or before joining up to other surfaces, remove all traces of temporary coatings used as a means of protection.

0455 DOOR HARDWARE

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Provide door hardware as documented.

Handing: Before supply, verify on site, the correct handing of hardware items.

Hardware specified generically: Provide hardware of sufficient strength and quality to perform its function, appropriate to the intended conditions of use, suitable for use with associated hardware, and fabricated with fixed parts firmly joined.

Operation: Make sure working parts are accurately fitted to smooth close bearings, without binding or sticking, free from rattle or excessive play, lubricated where appropriate.

Supply

Delivery: Deliver door hardware items, ready for installation, in individual complete sets for each door, as follows:

- Clearly labelled to show the intended location.
- In a separate dust and moisture proof package.
- Including the necessary templates, fixings and fixing instructions.

Replacement items

Door hardware: Match items being replaced with existing unless documented otherwise. Upgrade hinges as necessary to conform to **Hinges table A** and **Hinges table B**.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.

1.3 INTERPRETATION

Abbreviations

General: For the purposes of this worksection the 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.

1.4 SUBMISSIONS

Door-by-door schedule

General: Submit a door-by-door hardware schedule.

Information sources: This worksection and the contract drawings.

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.

Key control System
New works: Submit details of the proprietary key control security system proposed by the lock manufacturer for locks required to accept a group key (master, grandmaster).

Alterations and additions: Submit details to extend the existing key control security system for locks required to accept a group key.

Subcontractors
Automatic door operators: Submit names and contact details of proposed supplier and installer.

Pressure floor mat: Submit names and contact details of proposed supplier and installer.

Record documents
Door hardware schedule: Submit an amended schedule, prepared by the door hardware supplier, showing changes to the contract door hardware schedule caused as follows:

- By the approval of a hardware sample.
- By the acceptance of an equivalent to a specified proprietary item.
- By a contract variation to a door hardware requirement.

Keys
Key codes: Submit the lock manufacturer's record of the key coding system showing each lock type, number and type of key supplied, key number for re-ordering, and name of supplier.

Keys: For locks keyed to differ and locks keyed alike, verify quantities against key records, and deliver to the contract administrator at practical completion.

2 PRODUCTS

2.1 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 timber or steel frames:

- Material: Grade 304 stainless steel.

Aluminium framed doors in aluminium frames:

- Material: 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 400 x 35	≤ 19	2
2040 x 600 x 35	≤ 29	2
2040 x 720 x 35	≤ 35	3
2040 x 820 x 35	≤ 39	3
2040 x 920 x 35	≤ 44	3
2040 x 1020 x 35	≤ 49	4
2040 x 720 x 40	≤ 37	3
2040 x 820 x 40	≤ 42	3
2040 x 920 x 40	≤ 48	3
2040 x 1020 x 40	≤ 52	4
2040 x 720 x 50	≤ 45	3
2040 x 820 x 50	≤ 50	3
2040 x 920 x 50	≤ 57	3
2040 x 1020 x 50	≤ 68	4
2400 x 720 x 40	≤ 50	4
2400 x 820 x 40	≤ 52	4
2400 x 920 x 40	≤ 55	4
2400 x 1020 x 40	≤ 60	4
2400 x 1220 x 50	≤ 72	5
2040 x 920 x 70	≤ 88	Nominate pivot hinges

Aluminium doors

Application: Provide aluminium hinges for aluminium doors, or for doors of other materials in aluminium frames of a weight of 40 kg or less to **Hinge table B**.

Hinge table B

Nominal hinge size (L x W x T) (mm)	**Door leaf weight (kg – approx)**	**Minimum construction**	
		Knuckles	**Screws/hinge leaf**
100 x 70 x 3	≤ 30	3	3
100 x 80 x 3.5	≤ 50	5	4
130 x 50 x 3.4	≤ 75	Interfold	3

2.4 DOOR HANGING SYSTEMS

General

General: Provide sliding door tracks in conformance with 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 DOOR CONTROLLERS

Standard

General: To AS 4145.5.

General

Performance: Provide door controllers, pivots, flow or overhead door closers, and automatic door operators, which are suitable for the door type, size, weight and swings required and the operating conditions, including wind pressure.

Closers

Hinged and pivot doors:

- Fire rated doors: Provide closers tested and certified for use as components of fire door assemblies:
  . Standard: To AS 1905.1.

2.7 ELECTRONIC CONTROL DEVICES

General

General: Provide electric strikes, electric locks, drop bolts, or similar devices to suit door construction and hardware.

Electromagnetic hold-open devices: To AS 1905.1 and AS 1670.1.

Fail-safe: Connect door control devices in a fail-safe mode to permit egress in the event of power failure.

Fail-secure: Connect door control devices in a fail-secure mode to prevent egress in the event of power failure.

Authorised products: Provide equipment listed in the ActivFire Register of Fire Protection Equipment.

Glass doors: Provide tumbler, drop bolts or magnetic holders.

Double leaf doors (solid frame): Provide an electric strike or lock on the fixed leaf, connected to the door frame by concealed flexible wiring.

Activation

Activation device: Provide keypads, card readers or other activation devices, and locate next to entry points.

External: Provide weatherproof (IP56) hoods or housings for external units.

Mounting height: 1200 mm from floor level.

2.8 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: Conform to the **Number of keys table**.

Group keying

Keying system: Provide a group keying system in conformance with the **Key codes schedule**.

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: 1m.

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.

Maintenance
Manual: Submit the manufacturer's published recommendations for use, care and maintenance of the hardware provided.

Product warranties
Warranty: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the manufacturer or distributor and the applicator.

4 SELECTIONS

4.1 SELECTION SCHEDULE

General door hardware requirements
Product: Refer to architectural drawings.

4.2 PADLOCK SCHEDULE

Padlock schedule

Property	Room or space group 1	Room or space group 2	Room or space group 3
Room or space type			
Security			
Keying security			
Durability			
Corrosion resistance			

4.3 KEYING SCHEDULE

Keying requirements
Requirement: Provide door hardware and keys based on the **Key codes schedule**.

Key codes schedule

Door no.	Door stamping	Room name	Level/ Area	Lock type	Cylinder type	Cam type	Key head colour		Comments
							Key no.	Qty	

0457 EXTERNAL SCREENS

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Provide external screens that are:

- Plumb, level, straight and true within the building tolerances of the structural system.
- Undamaged and free of surface defects or distortions.
- Fixed or fastened to the building structure.
- Able to resist wind and other actions without vibration or permanent distortion.

Selections: As documented.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.

1.3 STANDARDS

General

Aluminium framed sunscreens, awnings and shutters:

- Stress analysis of members: To AS/NZS 1664.1 or AS/NZS 1664.2.

Horizontal screen loadings: To AS/NZS 1170.1 Table 3.2.

Electrically operated external louvres and blinds:

- Drive motors: To AS/NZS 60335.2.97.

Access for maintenance: To AS 1657.

Glazing

Glass type and thickness: To AS 1288, if no glass type or thickness is nominated.

Other glazing materials: To AS 1288.

Installation: To AS 1288.

Quality requirements for cut-to-size and processed glass: To AS/NZS 4667.

1.4 INTERPRETATION

Abbreviations

General: For the purposes of this worksection the following abbreviations apply:

- BMS: Building Management Systems.
- PVC: Polyvinylchloride.

Definitions

General: For the purposes of this worksection, the following definitions apply:

- Screen: Includes sunscreens, trafficable sunscreens, external louvres and blinds, shutters, awnings and pergolas fixed to building facades or openings to control sunlight and/or provide privacy, to screen plant and equipment, or to provide an architectural feature. It applies to fixed, adjustable, operable and automatically controlled types.
- Louvres:
  - . Horizontal: Louvres that span between frames stiles, mullions or vertical supports.
  - . Vertical: Louvres that span between frame heads and sills, or horizontal supports.
  - . Continuous: Louvres that run continuously past, and are supported by, concealed framing or brackets.
- Membrane: A thin and flexible sheet of fabric material.

- Shade cloth: A knitted or woven fabric designed for external use with a weave designed to provide a specified amount of shade.
- Tensioned membrane: A thin cloth or sheet that is held in a predetermined 2- or 3-dimensional shape under permanent tension. 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.

1.5 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Completion of installation.

2 PRODUCTS

2.1 MATERIALS GENERALLY

Structural steel

Design and materials: To AS 4100.

Welding: To the AS/NZS 1554 series.

Galvanizing: To AS/NZS 4680.

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.

Materials: Stainless steel Grade 316 or galvanized steel.

Fabric

Supply: Supply fabric by a single manufacturer as part of a single batch.

Inspection: Check each roll of material for flatness, faults in the woven fabric and the coatings, where present, by visual inspection in directional sunlight at a distance of 4 m and by passing the membrane over a uniformly illuminated surface.

Stitching: Use UV stabilised polyester thread with a minimum tensile strength of 180 N. Use lock type stitching with a twin needle machine.

Perimeter reinforcing: Reinforce the perimeter of each with UV stabilised polyester, coated with PVC and incorporating pockets for the tension cables.

2.2 FINISHES

Surface preparation

Standard: To AS 1627.

Anodised

Standard: To AS 1231.

Thickness: ≥ 15 microns to 20 microns.

Hot-dip galvanizing

Coating mass/thickness minima: To AS/NZS 4680.

Powder coating

Standard for architectural coating applications: To AS 3715.

2.3 FIXED PANEL TYPE SCREENS

General

Requirement: Provide weatherproof infill panel materials mounted in a metal perimeter frame or subframe which will:

- Withstand imposed actions and wind actions for the location without failure or permanent distortion, and without panel flutter.
- Shed water without pooling.

Expansion joints
Requirement: Provide for expansion and contraction in continuous sections at spacings not exceeding the manufacturer's recommendations, or 6 m, whichever is the lesser.

Fixing: Provide a fixing system appropriate to the panel material that will retain the panel without distortion or dislocation.

Framing materials
Requirement: Provide frames fabricated from solid or hollow metal sections. Fix to fastener brackets or arms mounted on the face of the building, and brace as necessary with stays, including tensile elements such as wire cables and turnbuckles.

3 EXECUTION

3.1 FABRICATION

Aluminium fabrication and construction
Standard: To AS/NZS 1664.1 or AS/NZS 1664.2.

Fasteners
Requirement: Provide fasteners of sufficient strength and quality to perform their required function.

Joints
Requirement: Make accurately fitted tight joints by methods such that neither fasteners nor fixing devices such as pressure indentations are visible on exposed faces. Where heads of fasteners are unavoidably visible, finish them to match the adjacent finished surface.

Protection
Corrosion protection: Provide protection against corrosion which may be caused in metals by products or processes normally employed on a building site or by normal atmospheric or other ambient conditions and by-products including rainwater, potable and non potable water, airborne salt and airborne pollution.

Durability: Provide materials resistant to exposure to weather and UV radiation so that their colour, surface finish, flexibility and water resistance are maintained.

Temporary measures: Do not use adhesive tape, film or paper, or applied coatings liable to bond to the substrate, when exposed to sunlight or weather, as temporary measures to protect screen components during the course of the works. If temporary measures are used, remove all traces, particularly from contact mating surfaces before joining up.

Operation
Requirement: Provide moving parts which operate freely and smoothly, without vibration, rattling, binding or sticking, and at correct tensions or operating forces. Lubricate 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, and in conformance with the **Fastener fixing schedule**:

- Fasteners cast into the concrete of the building structure. Do not displace reinforcement, when locating embedded items.
- Chemical fixings, expanding bolt sockets.
- Bolting or welding to brackets or structural framing.

Submission: If other methods of fixing (e.g. preformed pockets or explosive tools) are proposed, submit details.

Standard for embedment

For concrete: To AS 3600.

For masonry: To AS 3700.

Fixing brackets

Requirement: 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.

Tolerance on placement

Fasteners generally:

- Maximum deviation from correct position: ± 13 mm.

Fastener channels embedded parallel or perpendicular to the edge of a concrete structural member:

- Minimum length of embedded anchor: 200 mm.
- Minimum distance from the concrete edge to the nearest part of the anchor: 100 mm.

3.4 INSTALLATION

Installation tolerance limits

Alignment:

- Maximum deviation of any member from its true alignment (plumb, level, or line of slope): 1 mm per metre of member length, up to a maximum of 9 mm in a continuous run of members in one direction.
- Maximum misalignment between adjoining members: 1 mm.

Position:

- Maximum deviation of any part from its true position: 9 mm

Marking

Requirement: Before the separate parts of the screens are delivered to the site, provide suitable and sufficient marks or other means for identifying each part, and for showing its correct location and orientation, when installed.

Reference lines and marks

Requirement: Provide on each floor, in agreed locations, accurate perimeter offset reference lines, plumb with corresponding lines on other floors, and height benchmarks.

Cleaning

Requirement: During erection, promptly remove foreign matter from the screens without damage to finishes. Do not use abrasive cleaners or acid.

3.5 COMPLETION

Cleaning

Method: Clean all visible surfaces with soft clean cloths and clean water or approved cleanser, finishing with a clean cloth. Do not use abrasive or alkaline materials.

Maintenance manual

Requirement: Submit the screen manufacturer’s recommendations for operation, care and maintenance.

Warranties

Screens: Submit the manufacturer’s published product warranties.

0461B GLAZING

1 GENERAL

1.1 RESPONSIBILITIES

General
General: Provide glazing as documented.

Design
Certification: Submit an engineers' certificate confirming conformance to AS 1288.

Performance
Thermal qualities: U value and Solar heat gain coefficient to Basix certificate.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following worksection(s):

- *General requirements*.

1.3 STANDARDS

Glazing
Glass type and thickness: To AS 1288, if no glass type or thickness is nominated.

Materials and installation: To AS 1288.

Insulating Glass Units: To AS/NZS 4666.

Quality requirements for cut-to-size and processed glass: To AS/NZS 4667.

Roof glazing: To AS 1288 Section 6.

2 PRODUCTS

2.1 GENERAL

Heat soaking
Requirement: All toughened glass products.

Standard: To EN 14179-1.

Heat strengthening
Requirement: Heat strengthen all glass that requires extra strength and thermal resistance.

2.2 GLASS

Glass types and quality
Standard: To AS 1288 and AS/NZS 4667.

Glass and glazing materials
Glass and glazing materials generally: Free from defects which detract from appearance or interfere with performance under normal conditions of use.

Glazing plastics: Free from surface abrasions, and warranted by the manufacturer for 10 years against yellowing or other colour change, loss of strength and impact resistance, and general deterioration.

Safety glasses
Standard: To AS/NZS 2208.

Certification: Required.

Certification provider: An organisation accredited by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ).

Type: Grade A to AS 1288 when used in curtain walls.

Insulating glass units (IGUs)
Manufacture and installation: To AS/NZS 4666.

Glass thickness selection: To AS 1288.

2.3 GLAZING MATERIALS

General

Glazing materials (including putty, glazing compounds, sealants, gaskets, glazing tapes, spacing strips, spacing tapes, spacers, setting blocks and compression wedges): Appropriate for the conditions of application and the required performance.

Jointing materials

Compatibility: Provide recommended jointing and pointing materials which are compatible with each other and with the contact surfaces and non-staining to finished surfaces. Do not provide bituminous materials on absorbent surfaces.

Glazing tapes

Standards: To AAMA 800, Products coded 804.3, 806.3, or 807.3, as applicable.

Elastomeric sealants

General: Provide elastomeric sealants as required.

Sealing compound (polyurethane, polysulphide, acrylic):

- Single component: Type II, Class A.
- Multi component: To ASTM C920.

Sealing compound (silicone):

- Single component: Class A.
- Multi component: To ASTM C920.

Sealing compound (butyl): To ASTM C1311.

Glazing compounds: To AAMA 800 coded 802.3 (Types I or II), or 805.2, as applicable.

Narrow joint seam sealer: To AAMA 800, Products coded 803.3.

Exterior perimeter sealing compound: To AAMA 800.

Non drying sealant: To AAMA 800.

Expanded cellular glazing tape: To AAMA 800.

Very high bond pressure sensitive tapes: To ASTM D897, ASTM D1002, ASTM D3330M, ASTM D3652M, ASTM D3654M, or ASTM D3715M.

Pile weather strips

Standard: To AAMA 701/702.

Materials: Polypropylene or equivalent pile and backing, low friction silicone treated, ultra violet stabilised.

Finned type: A pile weather seal with a central polypropylene fin bonded into the centre of the backing rod and raised above the pile level.

Extruded gaskets and seals

Type: Non cellular (solid) elastopressive seals.

Material:

- Rubber products (neoprene, ethylene propylene diene monomer (EPDM) or silicone rubber): To BS 4255-1.
- Flexible polyvinyl chloride (PVC): To BS 2571, E type compounds, colour fastness grade B.

Priming

Compatibility: Apply the recommended primer to the surfaces in contact with sealant materials.

Control joints

Depth of elastomeric sealant: One half the joint width, or 6 mm, whichever is the greater.

Foamed materials (in compressible fillers and backing rods): Closed-cell or impregnated types which do not absorb water.

Bond breaking: Provide backing rods, and other back-up materials for sealants, which do not adhere to the sealant.

2.4 GLASS IDENTIFICATION

Safety glazing materials

Identification: Identify each piece or panel, to AS 1288.

Noise reducing glazed assemblies

Identification: Label each panel with a legible non-permanent mark, self-destroying when removed, stating and certifying the R_w rating, and identifying the testing authority. Remove when directed.

3 EXECUTION

3.1 GLASS PROCESSING

General

Processing: Perform required processes on glass, including cutting, obscuring, silvering and bending. Form necessary holes, including for fixings, equipment, access openings and speaking holes. Process exposed glass edges to a finish not inferior to ground arrised.

3.2 INSTALLATION

Glazing

General: Install the glass so that:

- Each piece is held firmly in place by permanent means which enable it to withstand the normal loadings and ambient conditions at its location without distortion or damage to glass and glazing materials.
- Building movements are not transferred to the glass.
- External glazing is watertight and airtight.

Temporary marking: Use a method which does not harm the glass. Remove marking on completion.

Toughened glass: Do not cut, work, or permanently mark after toughening. Use installation methods which prevent the glass making direct contact with metals or other non-resilient materials.

Heat absorbing glass: In locations exposed to direct sunlight, provide wheel cut edges free from damage or blemishes, with minimum feather.

Preglazing

Window assemblies and glazed doors: Supply inclusive of glazing, shop preglazed.

Curtain walls: Supply inclusive of glazing, shop preglazed.

3.3 COMPLETION

Trade clean

Method: Clean with soft clean cloths and clean water, finishing with a clean squeegee. Do not use abrasive or alkaline materials.

Extent: All frames and glass surfaces inside and out.

Warranties

General: Submit a warranty, signed by the glazing subcontractor, undertaking to repair or replace glass and glazing materials which, within the warranty period, become defective or prove unsuitable for the specified application; provided that the manufacturers' recommendations for the maintenance of the material have been followed during the warranty period.

Glass manufacturer's warranty: An undertaking, conditional only on compliance with the manufacturer's recommendation for installation and maintenance, to supply replacement glass units to the site for replacement of defective units defined as follows:

- IGU units: Units in which the hermetic seal has failed as evidenced by intrusion of foreign matter, or internal condensation at temperature above 2°C.
- Coated glass units (including coated SIG units): Units in which the metallic coating shows evidence of manufacturing defects, including but not necessarily limited to cracking or peeling, as determined in conformance with ASTM C1048.

Toughened glass warranty: The manufacturer's warranty certifying that toughened glass supplied for use in curtain walls has been subjected to a heat soaking process which has converted at least 95% of the nickel sulphide content to the stable beta-phase.

Maintenance manual
Requirement: Submit manufacturers' published recommendations for service use.

Cleaning
Requirement: Replace damaged glass and leave the work clean, polished, free from defects, and in good condition.

0467 GLASS COMPONENTS

1 GENERAL

1.1 RESPONSIBILITIES

General
General: Provide glass components in conformance with the **architectural drawings**.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following worksection(s):
- *General requirements*.
-

1.3 STANDARDS

General
Materials and installation: To AS 1288.
Quality requirements for cut-to-size and processed glass: To AS/NZS 4667.

1.4 INTERPRETATION

Definitions
General: For the purposes of this worksection the following definitions apply:
- Terminology for work on glass: To AS/NZS 4668.

1.5 INSPECTION

Notice
Inspection: Give notice so that the glass products may be inspected before they are installed.

1.6 SUBMISSIONS

Samples
Submit samples, each at least 200 x 200 mm, showing specified visual properties and the range of variation, if any, for each of the following types of glass or glazing plastics:
- Mirror glass.

Balustrade design
Certification: Submit a professional engineers' certificate confirming conformance with AS/NZS 1170.1 clause 3.6.

Shop drawings
Method of glazing, including the following:
- Rebate depth.
- Edge restraint.
- Clearances and tolerances.
- Glazing gaskets and sealant beads.
- Pocket fixing details for frameless glass balustrades.

Installation
Glazing: Submit statements from the fabricator, certifying that the method of glazing, the selection of sealant systems, and conditions next to the glass comply with the following:
- Will not be detrimental to the long term structural performance, weathering capabilities and visual qualities of the glass.
- Will not cause delamination or other impairment to laminated glass during the service life of the curtain wall system.

Sealant compatibility
Compatibility statements: Submit statements from all parties to the installation that certify the compatibility of sealants and glazing systems to all substrates.

2 PRODUCTS

2.1 GLASS

Glass and glazing materials
General: Free from defects which detract from appearance or interfere with performance under normal conditions of use.

Safety glasses
Standard: To AS/NZS 2208.

Certification: Identify each piece or panel to AS 1288.

Certification provider: An organisation accredited by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ).

Type: AS 1288 Grade A when used in curtain walls.

Heat soaking
Requirement: All toughened and heat strengthened glass products.

Standard: To EN 14179-1.

Glass tolerances
Size, squareness and flatness: To AS/NZS 2208.

Plate and sheet (i.e. not patterned):

- Roller wave: Maximum 0.15 mm.

2.2 GLAZING MATERIALS

General
Glazing materials (including putty, glazing compounds, sealants, gaskets, glazing tapes, spacing strips, spacing tapes, spacers, setting blocks and compression wedges): Appropriate for the conditions of application and the required performance.

Jointing materials
Compatibility: Provide recommended jointing and pointing materials which are compatible with each other and with the contact surfaces and non-staining to finished surfaces. Do not provide bituminous materials on absorbent surfaces.

Glazing tapes
Standards: To AAMA 800, Products coded 804.3, 806.3, 807.3, as applicable.

Elastomeric sealants
Sealing compound (polyurethane, polysulphide, acrylic):

- Single component: Type II, Class A.
- Multi component: To ASTM C920.

Sealing compound (silicone):

- Single component: Class A.
- Multi component: To ASTM C920.

Sealing compound (butyl): To ASTM C1311.

Glazing compounds: To AAMA 800 coded 802.3 (Types I or II), or 805.2, as applicable.

Narrow joint seam sealer: To AAMA 800, Products coded 803.3.

Exterior perimeter sealing compound: To AAMA 800.

Non drying sealant: To AAMA 800.

Expanded cellular glazing tape: To AAMA 800.

Very high bond pressure sensitive tapes: To ASTM D897, ASTM D1002, ASTM D3330M, ASTM D3652M, ASTM D3654M, or ASTM D3715M.

2.3 MIRRORS

Reflective surface

Type: Silver layer deposited on the glass or glazing plastic.

Protective coatings: Copper free coating, at least 5 µm thick, and 2 coats of mirror backing and edge sealing paint having a total dry film thickness of at least 50 µm.

Venetian silvered mirror (one way vision glass): 15 mm wide silvered strips alternating with 3 mm wide clear strips.

Safety mirror

Type to AS 1288: Vinyl backed Grade A safety mirror.

Safety compliance: To AS/NZS 2208.

Solid backed annealed glass mirrors

Backing: 9 mm waterproof plywood.

Adhesive fixing to backing: Non-acidic silicone adhesive at the rate recommended by the manufacturer.

Installation to backing: Clean the back of the glass panel and apply walnuts of adhesive together with double sided adhesive tape for temporary support and affix directly to the backing.

2.4 SHOWER SCREENS

Type

General: Proprietary system comprising frames of extruded aluminium, stainless steel, or PVC, assembled around safety glass to form fixed panels and sliding, hinged or pivoted doors.

Shower screen systems

General: Conform to the **finishes schedule**.

2.5 GLASS BALUSTRADES

Glass balustrade systems

General: Conform to the **Selections.**

3 EXECUTION

3.1 GLASS PROCESSING

General

Processing: Perform required processes on glass, including cutting, obscuring, silvering and bending. Form necessary holes, including for fixings, equipment, access openings and speaking holes. Process exposed glass edges to a finish not inferior to ground arrised.

3.2 INSTALLATION

General

General: Install the glass so that:

- Each piece is held firmly in place by permanent means which enable it to withstand the normal loadings and ambient conditions at its location without distortion or damage to glass and glazing materials.
- Building movements are not transferred to the glass.

Temporary marking: Use a method which does not harm the glass. Remove marking on completion.

Toughened glass: Do not cut, work, or permanently mark after toughening. Use installation methods which prevent the glass making direct contact with metals or other non-resilient materials.

Frameless installations: Join the vertical edges of adjacent glass panels with silicone jointing compound.

3.3 FIXING MIRRORS

Vinyl backed Grade A Safety mirrors and solid backed annealed glass mirrors

Screw fixing: Fix direct to wall plugs with dome-headed chromium-plated screws in each corner and at 900 mm maximum centres around perimeter. Provide polyethylene sleeves and washers to prevent contact between screw and glass. Do not over-tension the screws.

Frame fixing: Proprietary aluminium frames to mirror perimeter, corners mitred. If unbacked, bed glass edges in a continuous resilient gasket. Attach the frame to the substrate with concealed screw fixings. Seal the frame to the substrate with paintable sealant which will not react with the mirror coating. Do not allow the sealant to contact the mirror back.

Bead fixing: Rebated timber beads to mirror perimeter, corners mitred. If unbacked, bed glass edges in a continuous resilient gasket. Screw fix the beads to the substrate.

Clip fixing: Fix direct to wall plugs with chromium-plated fixed clip and spring clip fixings at 900 mm maximum centres around perimeter. If unbacked, provide polyethylene or cork washers to prevent contact between clips and mirror back.

3.4 GLAZED SHOWER SCREENS

Water shedding

Requirement: Provide an assembly which sheds water to the inside without retaining it on the frame surfaces. Seal the edge of the frame to adjoining surfaces with a resilient strip.

Sliding assemblies

Hanging: Hang the sliding sash on stainless steel or nylon sheaves on overhead channel track formed in the frame head, and fit nylon or equivalent bottom guides.

Hardware: Pull handles on both sides of sash, or of leading sash in multiple sash arrangements.

Fixing

Proprietary shower screens: To the manufacturer’s recommendations.

3.5 GLASS BALUSTRADES

Standard

Glass balustrades: To AS 1288, Section 7.

3.6 COMPLETION

Trade clean

Method: Clean with soft clean cloths and clean water, finishing with a clean squeegee. Do not use abrasive or alkaline materials.

Extent: All frames and glass surfaces inside and outside.

Warranty

Shower screens: Manufacturer’s warranty:

- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the manufacturer.

0471 INSULATION AND PLIABLE MEMBRANES

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Provide insulation and pliable membrane systems:

- Complete for their function.
- Conforming to the detail and location drawings.
- Firmly fixed in position.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.

1.3 INTERPRETATION

Definitions

General: For the purposes of this worksection the following definitions apply:

- Thermal insulation: To AS/NZS 4859.1.
- Pliable building membrane: To AS/NZS 4200.1 and equivalent to sarking-type materials as defined in the BCA.
- Fire hazard properties: To BCA A2.4.
- Fibre batts: Flexible insulation supplied as factory cut pieces and composed of mineral wool (glass and rock fibre) or polyester fibre.
- FBS-1 (fibre-bio-soluble) mineral wool: Insulation composed of bio-soluble glass or rock fibres.
- Vapour permeable (breathable) membrane: A flexible membrane material, normally used for secondary waterproofing that allows for the transmission of water vapour.
- Breathable (vapour permeable) membrane: A flexible membrane material, normally used for secondary waterproofing, that allows for the transmission of water vapour.

1.4 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the pliable membrane and insulation before they are covered up or concealed.

1.5 SUBMISSIONS

Fire hazard properties

General: Submit evidence of conformance to **INSULATION AND PLIABLE MEMBRANE MATERIALS**, **Fire hazard properties**.

Thermal properties

General: Submit evidence of conformance with AS/NZS 4859.1 for documented thermal properties.

2 PRODUCTS

2.1 INSULATION AND PLIABLE MEMBRANE MATERIALS

Fire hazard properties

Insulation: Fire hazard indices for all materials when tested in conformance with AS/NZS 1530.3:

- Spread of flame index: ≤ 9.
- Smoke developed index: ≤ 8 if spread of flame > 5.
- Materials with reflective facing: Test to AS/NZS 1530.3 and the recommendations of clause A6.

Pliable membranes: Flammability index < 5 when tested in conformance with AS 1530.2.

Insulation

Cellulosic fibre (loose fill): To AS/NZS 4859.1 Section 5.

Mineral wool blankets and cut pieces: To AS/NZS 4859.1 Section 8.

Polyester: To AS/NZS 4859.1 Section 7.

Polyisocyanurate (rigid cellular sheets RC/PIR): To AS 1366.2.

Polystyrene (extruded rigid cellular sheets RC/PS-E): To AS 1366.4.

Polystyrene (moulded rigid cellular sheets RC/PS-M): To AS 1366.3.

Polyurethane (rigid cellular sheets RC/PUR): To AS 1366.1.

Polyurethane (sprayed): To AS 1366.1 Table 2.

Wet processed fibreboard (including softboard): To AS/NZS 1859.4.

Wool: To AS/NZS 4859.1 Section 6.

Reflective thermal insulation: To AS/NZS 4859.1 Section 9.

Certification: Required.

Certification provider: An organisation accredited by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ).

Pliable membranes

Standard: To AS/NZS 4200.1.

Vapour barrier:

- Vapour barrier classification: High.

Sarking membrane (other than walls and gables):

- Water barrier classification: High.

Vapour permeable (breathable) membrane:

- Vapour resistance when tested to AS/NZS 4200.1.

Fasteners and supports

General: Metallic-coated steel.

Mesh support to roof insulation

Metallic-coated steel wire netting: To AS 2423 Section 4.

- Size: 45 mm mesh x 1 mm diameter.

Welded safety mesh: To AS/NZS 4389.

3 EXECUTION

3.1 GENERAL

Bulk insulation

Installation: To AS 3999 and BCA J1.2.

General: Make sure fibre blankets or batts are firmly butted with no gaps except as follows:

- Access openings and vents: Do not obstruct.
- Light fittings: To AS/NZS 3000 clause 4.5.
- Electrical cables: To AS 3999 clause 2.6.

Glass Wool and Rock Wool insulation: Conform to the ICANZ Industry Code of Practice.

Marking: Deliver mineral wool products to site in packaging labelled FBS-1 BIO-SOLUBLE INSULATION.

Pliable membrane

Installation: To AS/NZS 4200.2.

3.2 FLOOR INSULATION

Under suspended framed floors - bulk insulation

Product type: Fibre batts.

Installation: Fit tightly between framing members. If support is not otherwise provided, staple nylon twine to the framing and stretch tight.

Below concrete slab on ground

Product type: Rigid cellular extruded sheets.

Laying pattern: Stretcher bond, with edges tightly butted.

Damp proof membrane: Lay over insulation.

Over concrete slab on ground

Product type: Rigid cellular extruded sheets.

Substrate preparation: Make sure substrates are as follows:

- Clean and free of any deposit or finish which may impair adhesion or location of tiles.
- Excessive projections are removed.
- Voids and hollows > 10 mm with abrupt edges are filled with a cement:sand mix not stronger than the substrate or weaker than the bedding.

Laying pattern: Stretcher bond, with edges tightly butted.

Fixing: Adhesive fixed directly to the concrete floor slab.

Under suspended concrete slab – rigid insulation

Product type: Rigid cellular extruded sheets.

Joints: Apply reinforced foil tape to all joints.

Under suspended concrete slab – bulk insulation

Product type: Fibre batts.

Fixing: Mechanical fasteners and support mesh or nylon twine.

Pliable membrane

Fixing: Install as follows:

- To timber: Proprietary fixings or metallic-coated clouts or staples at 300 mm maximum centres.
- To steel: Hex head screws with either 20 mm diameter washers or fixed through hardboard strips.

Overlap (minimum): 150 mm and adhesive tape fix.

Support mesh: 300 x 150 mm mesh size of 2 mm wire gauge to AS/NZS 4389.

3.3 WALL INSULATION

Framed wall thermal break strips

Product type: Proprietary item.

Application: To steel or timber framing with lightweight external cladding.

R-value: ≥ 0.2.

Screw fixing: Button head screws at 1 m centres.

Adhesive fixing: Wallboard adhesive walnuts at 1 m centres.

Framed walls – bulk insulation

Product type: Fibre batts.

Installation: Friction fit between framing members. If other support is not provided, staple nylon twine to the framing and stretch tight.

Masonry veneer cavity walls

Product: Rigid cellular insulation board.

Application: To steel or timber framing.

Installation: Horizontally with the tongue to the top edge, pushed over prefixed wall ties and held firmly against the wall frame. Keep boards clean and 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 panels. Prevent entry of water behind the insulation boards.

Full masonry – cavity walls

Product: Rigid cellular insulation board.

Application: To the inner masonry skin.

Installation: Horizontally with the tongue to the top edge and firmly against the inner masonry skin. Keep boards clean and 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 panels. Prevent entry of water behind the insulation boards.

Full masonry walls – internal face

Product type: Rigid cellular extruded sheets.

Preparation of substrates: Conform to the following:

- Remove any deposit or finish which may impair adhesion.
- Hack off excessive projections and fill voids and hollows with plaster.
- Tolerance: 6 mm in 2400 mm.

Substrate correction: Skim plaster.

Installation: Apply boards horizontally with staggered vertical joints, all close butted and without crushing.

Fixing: Proprietary adhesive compatible with the insulation. Apply sufficient pressure to evenly distribute adhesive.

Vapour permeable (breathable) membrane

Application: Provide a vapour permeable membrane behind external facing material which does not provide permanent weatherproofing or which may be subject to condensation forming on the internal face, including the following:

- Boards fixed vertically or diagonally.
- Boards or planks fixed in exposed locations where wind driven rain can penetrate the joints.
- Unpainted or unsealed cladding.
- Behind external cladding in bushfire prone areas to AS 3959.
- Masonry veneer.

Installation: Run the vapour permeable membrane horizontally on the outer face of external wall framing, over the flashing, from the bottom plate up. Pull taught 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 to be 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 air tight layer, seal all joints with pressure sensitive adhesive tape.

Fixing: Install as follows:

- Timber frames: Metallic-coated clouts, 20 mm long 6-8 mm staples or punched multi-point metallic-coated steel brads.
- Steel or aluminium: Hex head screws, with either 20 mm diameter washers or through hardboard strips.
- Plywood: Alternatives:
  - . Metallic-coated clouts, 20 mm long 6-8 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 ROOF INSULATION

Mesh support to roof insulation

General

Location: The whole of the roof area including skylight shaft walls, except the following:

- Eaves, overhangs, skylights, vents and openings.
- Roofs to outbuildings, garages, and semi-enclosed spaces such as verandahs, porches and carports.

Mesh support to roof insulation

Locations: Provide support to the following:

- Sarking, vapour barrier or reflective thermal insulation membranes laid over roof framing members which are spaced at more than 900 mm centres.
- Blanket type thermal insulation laid over roof framing members as sound insulation to metal roofing.

Installing wire netting: Lay over the roof framing providing sufficient slack or sag between members to suit the application.

Fixing wire netting: Staple to timber frame, wire to steel frame.

Installing welded safety mesh: To AS/NZS 4389.

Pliable membranes

Sarking membrane:

- Location: Provide sarking under tile and shingle roofing.

Vapour barrier:

- Installation: Lay over the roof framing with sufficient sag to allow the bulk insulation to achieve its full thickness. Overlap all edges 150 mm and seal all joints with pressure sensitive adhesive tape.

Metal roofs – bulk insulation

Product: Fibre blankets or batts.

Installation:

- Batts: Fit tightly between framing members.
- Blanket for sound insulation: Install over the roof framing, reflective thermal insulation (if any), and mesh support, so that the blanket is in continuous contact with the underside of the metal roofing sheets.
- Combined blanket and reflective insulation: Lay facing reflective insulation face downwards over safety mesh.

Cathedral ceiling insulation – metal roofing and roofing tiles

Product type: Rigid cellular extruded sheets.

Application: Over ceiling lining that has been applied over rafters.

Installation: Lay insulation 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. Secure temporarily by occasional nailing to the rafters, the permanent fixing is provided by the nails used to secure the counter battens to the rafters. Cut boards and tightly fit to abutments and penetrations. Seal gaps with polyurethane foam.

Ceiling insulation – bulk insulation

Product type: Fibre batts.

Application: Over ceiling lining.

Installation: Fit tightly between framing members.

3.5 COMPLETION

Warranties

Insulation and pliable membranes: Submit the manufacturer’s published product warranties.

0511B LINING

1 GENERAL

1.1 RESPONSIBILITIES

General
General: Provide internal lining systems to the **architectural drawings.**

1.2 CROSS REFERENCES

General
Requirement: Conform to the following worksection(s):
- *General requirements*.

1.3 INSPECTION

Notice
Inspection: Give sufficient notice so that inspection may be made of substrate or framing before installation of linings.

1.4 TOLERANCES

Surface
Flatness, twist, winding and bow: ≤ 1.5 mm deviation from a 1.5 m straightedge placed in any position.

2 PRODUCTS

2.1 MATERIALS AND COMPONENTS

Plasterboard
Standard: To AS/NZS 2588.

Fibre cement
Standard: To AS/NZS 2908.2.

Wall and ceiling linings: Type B category 2.

Minimum thickness: 4.5 mm.

Plywood and blockboard
Interior use: To AS/NZS 2270.

Exterior use: To AS/NZS 2271.

Visible surfaces with a clear finish: Veneer quality A.

Other visible surfaces: Veneer quality B.

Back/face veneer: Veneer quality C or D.

Presealed plywood: Plywood pre-sealed both sides and edges with a machine applied sealer.

Wet processed fibreboard (including hardboard)
Standard: To AS/NZS 1859.4.
- Interior use generally: General purpose.
- Interior use heavy duty: Tempered (MR).
- Interior moisture area: Tempered (MR).
- Veneered hardboard: General purpose with a timber face veneer bonded to one side.
- Wet processed fibreboard (including softboard): To AS/NZS 1859.4.

Dry-processed fibreboard (including medium density fibreboard)
Standard: To AS/NZS 1859.2.

Melamine overlaid medium density fibreboard: Medium density fibreboard (STD MDF) overlaid on both sides with low pressure melamine.

Decorative overlaid wood panels
Standard: To AS/NZS 1859.3.

Certification
General: Brand panels under the authority of a recognised certification program applicable to the product. Locate the brand on faces or edges which will be concealed in the works.

High pressure decorative laminate sheet
Standard: To AS/NZS 2924.1.

Coated steel
Standard: To AS 1397.

- Coating class interior: Z275.
- Coating class exterior: Z450.

Fasteners
Steel nails: Hot dip galvanized.

Adhesives
For wallboards: Gunnable synthetic rubber/resin based mastic contact adhesive formulated for bonding flooring and wallboards to a variety of substrates.

Sealants
Fire rated sealant: Non-hardening sealant compatible with the materials to be sealed and having a fire rating equal to that of the partition it seals.

Acoustic sealant: Non-hardening sealant compatible with the materials to be sealed and having a specific gravity of not less than 1.5 gm/cubic centimetre and of 100% polyurethane mastic.

3 EXECUTION

3.1 CONSTRUCTION GENERALLY

Conditions
Commencement: Do not commence lining work until such time as the building or zone in question is enclosed and weathertight and all wet trades have been completed.

Substrates or framing
General: Before fixing linings check and, if necessary, adjust the alignment of substrates or framing.

Battens
General: Fix at each crossing with structural framing members, or direct to solid walls or ceilings. Provide wall plugs in solid substrates.

Ceiling linings
General: Do not install until at least 14 days after the timber roof structure is fully loaded.

Accessories and trim
General: Provide accessories and trim necessary to complete the installation.

Adhesives
General: Provide adhesives of types appropriate to their purpose, and apply them so that they transmit the loads imposed, without causing discolouration of finished surfaces.

3.2 PLASTERBOARD LINING

Supports
General: Install timber battens or proprietary cold-formed galvanized steel furring channels as follows:

- Where framing member spacing exceeds the recommended spacing.
- Where direct fixing of the plasterboard is not possible due to the arrangement or alignment of the framing or substrate.
- Where the lining is the substrate for tiled finishes.

Transverse walls: Locate noggings as follows:

- At least 150 mm from the horizontal joint.
- Ensure that noggings do not protrude beyond the face of studs.

Installation

Gypsum plasterboard and fibre reinforced gypsum lining: To AS/NZS 2589.

Multiple sheet layers

Application: Fire rated and acoustic rated walls.

Joints: Fill and flush up all joints and fixings in each layer and caulk up perimeters and penetrations before commencing succeeding layers. Stagger all sheet joints by minimum 200 mm.

Joints

Flush joints: Provide recessed edge sheets and finish flush using perforated paper reinforcing tape.

Butt joints: Make joints over framing members or otherwise provide back blocking.

External corner joints: Make joints over metallic-coated steel corner beads.

Dry joints: Provide square edged sheet and finish with a UPVC joining section.

Control joints: 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 LINING

Supports

General: Install timber battens or proprietary cold-formed galvanized steel furring channels as follows:

- Where framing member spacing exceeds the recommended spacing.
- Where direct fixing of the fibre cement is not possible due to the arrangement or alignment of the framing or substrate.
- Where the lining is the substrate for tiled finishes.

Installation

General: Run sheets across the framing members. In flush jointed applications, stagger end joints in a brick pattern and locate them on framing members, away from the corners of large openings. Provide supports at edges and joints.

Timber framed construction: Nail only or combined with adhesive.

Steel framed construction: Screw only or combined with adhesive.

Wall framing:

- Do not fix to top and bottom plates or noggings.
- In tiled areas: Provide an extra row of noggings immediately above wall-to-floor flashings. Fix sheet at 150 mm centres to each stud and around the perimeter of the sheet.

Masonry wall construction:

- Fix using adhesive direct to masonry, but do not fix direct to masonry as a substrate for tiled finish.
- Fix to furring channels using screw or screw and adhesive.

Ceilings: Fix using screw or screw and adhesive to ceiling furring members. Do not fix sheets to the bottom chords of trusses.

Wet areas: Do not use adhesive fixing alone.

Multiple sheet layers

Application: Fire rated and acoustic rated walls.

Joints: Fill and flush up all joints and fixings in each layer and caulk up perimeters and penetrations before commencing succeeding layers. Stagger all sheet joints by minimum 200 mm.

Joints

Flush joints: Provide recessed edge sheets and finish flush using perforated paper reinforcing tape.

External corner joints: Make joints over metallic-coated steel corner beads.

Dry joints: Provide square edged sheet and finish with a UPVC joining section.

Control joints: Provide control joints to coincide with structural control joints and as follows:

- Walls: ≤ 7.2 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 as required.

Joints in tiled areas: Bed perforated paper tape in bedding compound. Do not apply a topping coat.

- Control joints: ≤ 4.2 m centres and space to suit joints required in tiling.
- Internal corners: Reinforce with metallic-coated steel angles. In corners subject to continuous moisture, flash over the angle and under the sheeting with continuous bitumen coated aluminium flashing.

3.4 TRIM AND ACCESSORIES

General

General: 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 trim

Hardwood: AS 2796.1.

Cypress pine: AS 1810.

Softwood: To AS 4785.1.

- Grade: To AS 4785.2.

0551 JOINERY

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Fabricate and install joinery items to substrates undamaged, plumb, level, straight and free of distortion and to the **Tolerances table.**

Tolerances table

Property	Tolerance criteria
Plumb and level	1 mm in 800 mm
Offsets in flush adjoining surfaces	< 0.5 mm
Offsets in revealed adjoining surfaces	< 2 mm
Alignment of adjoining doors	< 0.5 mm
Difference in scribe thickness for joinery items centred between walls	< 2 mm
Doors centred in openings	zero
Joints in finished surfaces	zero

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.

1.3 INSPECTION

Notice

Inspection: Give sufficient notice so that inspection may be made of the following:

- Openings prepared to receive assemblies.
- Site erected assemblies on completion of erection, before covering up by cladding and encasing.
- Surfaces prepared for, and immediately before, site applied finishes.
- Completion of installation.

1.4 STANDARDS

General

Access for maintenance: To AS 1657.

Tactile indicators: To AS/NZS 1428.4.1.

2 PRODUCTS

2.1 JOINERY MATERIALS AND COMPONENTS

Visible work

Clear finished timber and veneer: Ensure all visible surfaces are free of branding, crayon or chalk marks and of blemishes caused by handling.

Joinery timber

Hardwood: To AS 2796.3.

Seasoned cypress pine: To AS 1810.

Softwood: To AS 4785.3.

Finished sizes: For milled timbers actual dimensions which are at least the required dimensions, except for dimensions qualified by a term such as nominal or out of to which industry standards for finished sizes apply.

Plywood

Interior use generally: To AS/NZS 2270.

Interior use, exposed to moisture: To AS/NZS 2271.

Visible surface with a clear finish: Veneer quality A.

Other visible surfaces: Veneer quality C or D.

Non-structural glued laminated timber

Standard: AS 5067.

Wet processed fibreboard (including hardboard)

Standard: To AS/NZS 1859.4.

Particleboard

Standard: To AS/NZS 1859.1.

Melamine overlaid particleboard: Particleboard overlaid on both sides with low pressure melamine.

Dry-processed fibreboard (including medium density fibreboard)

Standard: To AS/NZS 1859.2.

Melamine overlaid medium density fibreboard: Medium density fibreboard (STD MDF) overlaid on both sides with low pressure melamine.

Decorative overlaid wood panels

Standard: To AS/NZS 1859.3.

Certification

General: Brand panels under the authority of a recognised certification program applicable to the product. Locate the brand on faces or edges which will be concealed in the works.

High-pressure decorative laminate sheets

Standard: To AS/NZS 2924.1.

Class	Definition	Typical applications
CG (S or F)	Compact general purpose	High performance, self supporting vertical or horizontal surfaces
HD (S or F)	Horizontal heavy duty	High performance horizontal surfaces
HG (S or P)	Horizontal general purpose	General horizontal surfaces and high performance vertical surfaces
VG (S or P)	Vertical general purpose	General vertical surfaces and light duty horizontal surfaces
VL (S)	Vertical light duty	Light duty vertical surfaces

Thickness (minimum):

- For horizontal surfaces fixed to a continuous substrate: 1.2 mm.
- For vertical surfaces fixed to a continuous substrate: 0.8 mm.
- For post formed laminate fixed to a continuous substrate: 0.8 mm.
- For vertical surfaces fixed intermittently (e.g. to studs): 3.0 mm.
- For edge strips: 0.4 mm.

Stone facings

General: Provide stone or engineered stone slabs within the visual range of the approved samples. Repair mud veins or lines of separation that are integral to the selected pattern with resin fillers and back lining.

Vinyl and linoleum

Material: Desktop grade sheeting.

Fixing: Spray adhesives to flat surfaces and double-stick contact adhesive method to curved surfaces.

Splashbacks

Glass: 6 mm toughened colourback glass with a factory applied opaque coating to the back.

- Standard: To AS/NZS 2208.

Stainless steel: Grade 304, fine linished finish.

2.2 VENEERS

Timber veneer

Veneer quality: To AS/NZS 2270.

Grades (minimum requirement):

- Select grade, veneer quality A, for visible surfaces to have clear finish or to have no coated finish.
- General purpose grade, veneer quality B, for other visible surfaces.

Requirement: Provide veneers slip matched and flitch batched and falling within the visual range of the approved samples.

Vinyl veneer

Type: Proprietary unbacked vinyl fabric factory-bonded to the designated surface.

2.3 JOINERY ITEMS

General

Refer to documents as follows:

- Drawings: Joinery units and their location, indicative construction details, scribes and trims, materials, dimensions and thicknesses, and finishes.
- Drawings: Confirm on site all dimensions noted, after the completion of partitions.
- Finishes schedules or drawings: Finishes selections.
- Specification: Joinery hardware fittings and systems.

2.4 JOINERY ASSEMBLIES

Standard

General: To AS/NZS 4386.1.

Plinths

Material: Select from the following:

- Exterior general purpose plywood.
- High moisture resistant particleboard.
- High moisture resistant medium density fibreboard.

Thickness: 16 mm.

Fabrication: Form up with front and back members and full height cross members at not more than 900 mm centres.

Finish: High-pressure decorative laminated sheet.

- Fasteners: Conceal with finish.

Installation: Scribe to floor and secure to wall to provide level platform for carcasses.

Carcasses

Material: Select from the following:

- Overlaid high moisture resistant particleboard.
- Overlaid high moisture resistant medium density fibreboard.

Thickness: 16 mm.

Joints: Select from the following:

- Proprietary mechanical connections.
- Dowels and glue.
- Screws and glue.
- Proprietary joining plates and glue.

Adjustable shelves: Support on proprietary pins in holes bored at equal centres vertically.

- Spacing: 32 mm.

Fasteners: Conceal with finish.

Installation: Secure to walls at not more than 600 mm centres.

Drawer fronts and doors

Material: Select from the following:

- Melamine overlaid high moisture resistant particleboard.
- Melamine overlaid high moisture resistant medium density fibreboard.

Thickness: 16 mm.

Maximum door size: 2400 mm high, 900 mm wide, 1.5 m^2 on face.

Drawer fronts: Rout for drawer bottoms.

Drawer backs and sides

Material: PVC film wrapped particleboard.

Thickness: 12 mm.

Installation: Mitre corners leaving outer skin of foil intact, finish with butt joints, glue to form carcass and screw to drawer front. Rout for drawer bottoms.

Drawer bottoms

Material: PVC film laminated hardboard.

Thickness: 3 mm.

Drawer and door hardware

Hinge types: Concealed metal hinges with the following features:

- Adjustable for height, side and depth location of door.
- Self closing action.
- Hold open function.
- Nickel plated.

Piano hinges: Chrome plated steel, extending full height of doors.

Slides: Metal runners and plastic rollers with the following features:

- 30 kg loading capacity.
- Closure retention.
- White thermoset powder coating or nickel plated.

Full height doors

Flaps and pull-out shelves

2.5 WORKING SURFACES

Laminated benchtops

Finish: High-pressure decorative laminated sheet.

Exposed edges: Extend laminate over shaped nosing, finishing > 50 mm back on underside. Splay outside corners at 45°.

Balance underside: Extend laminate to the undersides of benchtops.

Installation: Scribe to walls. Fix to carcass at least twice per 600 mm length of benchtop.

Joint sealing: Fill joint with sealant matching finish and clamp with proprietary mechanical connectors.

3 EXECUTION

3.1 JOINERY

General

Joints: Provide materials in single lengths whenever possible. If joints are necessary make them over supports.

Framing: Frame and trim where necessary for openings, including those required by other trades.

Accessories and trim

General: Provide accessories and trim necessary to complete the installation.

Fasteners

Visibility: Do not provide visible fixings except in the following locations:

- Inside cupboards and drawer units.
- Inside open units in which case provide proprietary caps to conceal fixings.

Visible fixings: Where fastenings are unavoidable on visible joinery faces, sink the heads below the surface and fill the sinking flush with a material compatible with the surface finish. In surfaces which are to have clear or tinted finish provide matching wood plugs showing face (not end) grain. In surfaces which are to have melamine finish provide proprietary screws and caps finished to match.

Fix joinery units to substrates as follows:

- Floor mounted units: 600 mm centres max.
- Wall mounted units: To each nogging and/or stud stiffener.

Fixings: Screws with washers into timber or steel framing, or masonry anchors.

Adhesives

General: Provide adhesives to transmit the loads imposed and to ensure the rigidity of the assembly, without causing discolouration of finished surfaces.

Finishing

Junctions with structure: Scribe, plinths, benchtops, splashbacks, ends of cupboards, kickboards and returns to follow the line of structure.

Joints: Scribe internal and mitre external joints.

Edge strips: Finish exposed edges of sheets with edge strips which match sheet faces.

Matching: For surfaces which are to have clear or tinted finish, arrange adjacent pieces to match the grain and colour.

Hygiene requirements: To all food handling areas and voids at the backs of units to all areas, seal all carcass junctions with walls and floors, and to cable entries, with silicone beads for vermin proofing. Apply water resistant sealants around all plumbing fixtures and ensure the sealants are fit for purpose.

Benchtops

Installation: Fix to carcass at least twice per 600 mm length of benchtop.

Joint sealing: Fill joints with sealant matching the finish colour and clamp with proprietary mechanical connectors.

Edge sealing: Seal to walls and carcasses with a sealant, which matches the finish colour.

Splash backs

Glass: Fix with non-acidic silicone adhesive. Apply at the rate recommended by the manufacturer.

Installation: Clean the back of the glass panel and apply wallnuts of adhesive together with double sided adhesive tape for temporary support, and affix directly to the substrate.

Labelling

General: Permanently mark each unit of furniture with the manufacturer's name, on an interior surface.

3.2 DELIVERY AND STORAGE

General

General: Deliver joinery units to site in unbroken wrapping or containers and store so that its moisture content is not adversely affected. Do not store in areas of wet plaster. Keep storage to a minimum by delivering items only when required for installation.

Concealed surfaces: Prime surfaces concealed by substrates.

Deficiencies: Examine joinery units for completeness and remedy deficiencies.

Acclimatisation

General: Acclimatise the joinery items by stacking it in the in-service conditions with air circulation to all surfaces after the following construction operations are complete:

- Air conditioning operational.
- Lighting operational.
- Site drainage and stormwater works are complete.

- Space fully enclosed and secure.
- Wet work complete and dry.

Substrate
General: Damp clean and vacuum substrate surfaces that will be permanently concealed.

3.3 TIMBER STAIRS

Set out
General: Set out stair rod to give uniform risers and uniform treads respectively in each flight.

Fabrication
Closed strings: Trench for treads and risers.

Cut strings: Profile for treads and risers. Mitre riser ends.

Treads: Arris nosings to a pencil round. Return nosings at cut strings. Groove for riser tongue in closed rise stair. Set rise 19 mm back from nosing.

Top tread: Flush with finished floor, otherwise to match stair treads. Provide similar tread section as nosing to floor edges around stairwell.

Risers: Tongue to tread. Mitre to string in cut string stairs.

Installation
General: Glue joints in internal work. In closed 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): 8 mm diameter mild steel, one at each end and one at centre of flight, transversely between strings. Draw strings tight against ends of treads.

Fascia: Of depth sufficient to overlap 19 mm below ceiling, 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.

3.4 TIMBER BALUSTRADES

General
General: Provide a balustrade to the stair and landing, consisting of newels, handrail, balusters, and associated mouldings.

Newels
General: Halve and bolt to strings. Turn tops to detail.

Handrails
General: On edge. Bullnose arrises 13 mm radius. Stub tenon to newels.

Balusters
General: At 100 mm centres. Stub tenon to handrail at top and to tread or floor at bottom.

3.5 COMPLETION

Maintenance manual
General: Submit manufacturer’s published recommendations for service use.

Protection
Timber treads: Provide full timber or plywood casing.

Cleaning
Temporary coatings: On or before completion of the works, or before joining up to other surfaces, remove all traces of temporary coatings used as a means of protection.

General: Remove all dust, marks and rubbish from all surfaces and internal spaces. Clean and polish all self finished surfaces such as anodised and powdercoated metals, sanitaryware, glass, tiles and laminates.

0552B METALWORK - FABRICATED

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Provide metal fixtures that are:

- Undamaged, plumb, level and straight.
- Free of surface defects or distortions.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.

1.3 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Steel surfaces prepared for, and immediately before, site applied finishes.

1.4 SUBMISSIONS

Tests

Stainless steel: Before fabrication commences, submit satisfactory evidence that relevant procedure test plates have passed the tests specified in AS/NZS 1554.6.

Materials

Stainless steel: For each batch of stainless steel supplied to the works, submit the certificate of compliance or test certificate specified in the applicable standard.

1.5 STANDARDS

General

Access for maintenance: To AS 1657.

Tactile indicators: To AS/NZS 1428.4.1.

2 PRODUCTS

2.1 MATERIALS AND COMPONENTS

Metals and components

Performance: Provide metals in sections of strength and stiffness suited to their required function, finish and method of fabrication.

3 EXECUTION

3.1 CONSTRUCTION GENERALLY

Aluminium structures

Standard: To AS/NZS 1664.1 or AS/NZS 1664.2.

Metals

Performance: Provide metals so that they transmit the loads imposed and ensure the rigidity of the assembly without causing deflection or distortion of finished surfaces.

Incompatible metals: Separate using concealed layers of suitable materials in appropriate thicknesses.

Fasteners

Performance: Provide non-galvanic corrosion fasteners.

Materials: Provide fasteners in materials of mechanical strength and corrosion resistance at least equal to that of the lowest resistant metal joined.

To copper and copper alloys: Provide copper or copper-alloy fixing devices only.

To aluminium and aluminium alloys: Provide aluminium alloy or non-magnetic stainless steel fixing devices only.

To stainless steel: Provide appropriate stainless steel materials only.

Fabrication

Workshop: Fabricate and pre-assemble items in the workshop wherever practicable.

Edges and surfaces: Keep clean, neat and free from burrs and indentations. Remove sharp edges without excessive radiusing.

Tube bends: Form bends in tube without visibly deforming the cross section.

Colour finished work: Match colours of sheets, extrusions and heads of fasteners.

Thermal movement: Accommodate thermal movement in joints and fastenings.

Fabrication tolerances

Structural work generally: ± 2 mm from design dimensions.

Joints

General: Fit joints to an accuracy appropriate to the class of work. Finish visible joints made by welding, brazing or soldering using grinding, buffing or other methods appropriate to the class of work, before further treatment.

Self-finished metals: Free of surface colour variations, after jointing.

Joints: Fit accurately to a fine hairline.

Marking

General: Provide suitable and sufficient marks or other means for identifying each member of site-erected assemblies, and for their correct setting out, location, erection and connection. Mark bolted connections to show the bolting category. Do not mark stainless steel by notching.

Splicing

General: Provide structural members in single lengths.

3.2 WELDING AND BRAZING

General

Quality: Provide finished welds which are free of surface and internal cracks, slag inclusion, and porosity.

Site welds: Avoid site welding wherever possible. If required locate site welds in positions for down hand welding.

Butt weld quality level: Not inferior to the appropriate level recommended in AS 1665 Appendix A.

Brazing

General: Ensure brazed joints have sufficient lap to provide a mechanically sound joint. Do not used butt joints relying on the filler metal fillet only.

3.3 STAINLESS STEEL FABRICATION

Welding stainless steel

Certification of welders: To AS 1796.

Riveting

General: Riveting may be used only to join stainless steel sheet or strip less than 1 mm thick. Drill (not punch) the rivet hole, and drive the rivet cold. On completion, clean and passivate the riveted assembly.

Soldering

General: Do not solder stainless steel.

3.4 METAL FIXTURES

General

General: Provide metal fixtures noted on drawings as follows:

- Components and their location, indicative construction details, scribes and trims, materials, dimensions and thicknesses, and finishes shall be as detailed.

- Confirm on site all dimensions noted on drawings.
- Finishes selections as documented.
- Hardware and equipment.

3.5 PIPE RAIL BALUSTRADES

Fabrication
Method: Welding.

Joints: Produce smooth unbroken surfaces at joints. Scribe the joints between posts and rails. Make end-to-end joints over an internal sleeve.

Bends: Make changes of direction in rails by evenly curved pipe bends.

Free ends: Seal the free ends of pipes with fabricated or purpose-made end caps.

Fixing to structure
General: Provide fabricated predrilled or purpose-made brackets or post bases, and attach the piping to the building structure with fixings, including bolts into masonry anchors, and coach screws or bolts into timber, of metal compatible with the piping.

Galvanizing
General: If possible, complete fabrication before galvanizing; otherwise apply a zinc-rich primer to affected joint surfaces

3.6 CORNER GUARDS

Guards
General: Where salient corners of the structure are required to be protected from mechanical damage, provide metal corner guards as follows:

- Consisting of rolled angle sections or sections fabricated from metal sheet bent to the radius or angle of the corner.
- Fitting close to adjoining surface finishes.
- Solidly grouted up at the back as necessary to eliminate voids.
- Securely fixed by a method which does not cause distortion in the guard surface, and consists of either concealed built in lugs, or flush countersunk head fixings into masonry anchors.

3.7 COMPLETION

Maintenance manual
General: Submit manufacturer’s published recommendations for service use.

Cleaning
Temporary coatings: On or before completion of the works, or before joining up to other surfaces, remove all traces of temporary coatings used as a means of protection.

0581B SIGNS AND DISPLAY

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Provide signage systems as documented and as follows:

- Appropriately secured.
- Located within a clear line of vision.
- To contrast with the background.
- With clean, well defined edges or arises, and free from blemishes.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.

1.3 STANDARDS

Signs

Safety signs - design and use: To AS 1319.

Signs and graphics for disabled access: AS/NZS 1428.1 and AS 1428.2.

2 PRODUCTS

2.1 MATERIALS

Materials standards

Aluminium:

- Plate for engraving: Alloy and temper designation 6063-0.
- For casting: To AS 1874.

Stainless steel: Surface finish designation 4 (general purpose polished).

Plastics:

- PVC-U sheet: Semi-rigid sheet.
- Rigid cellular polystyrene: To AS 1366.3, class VH for cut-out shapes.

3 EXECUTION

3.1 WORKMANSHIP

Production

General: Form graphics items accurately with clean, well defined edges or arises, free from blemishes.

Engraving to two layer plastic laminate: Lettering excavated to expose the lower laminate.

Engraved and filled: Lettering precision excavated and filled colouring material. Clean faces of all filling material.

Casting: Produce shapes free of pits, scale, blow holes or other defects, hand or machine finished if necessary.

Laser cut: Individual vinyl letters with self adhesive backing.

Printed lettering: Lettering and graphic images screen / digitally printed on:

- Film with self adhesive backing.
- Acrylic sheet.
- Aluminium plate.

- Stainless steel plate.

Large format digital printing: Lettering and graphic images screen printed film with self adhesive backing.

Signwriting: Lettering and graphic images hand painted direct to the background by a tradesman with recognised qualifications and demonstrated experience.

Fabricated: Three dimensional, formed as follows:

- Laser cutting from solid material and hand finished as necessary.
- Moulding: Individual plastic hollow three dimensional characters and shapes formed by:
  . Injection moulding.
  . Vacuum forming.
- Built-up individual shapes by fabricating the faces and edges from separate pieces neatly and securely joined.

Installation

General: Install signage level and plumb, securely mounted, with concealed theft-resistant fixings. Fix self adhesive signs free of bubbles and creases.

4 SELECTIONS

4.1 GENERAL SIGNS

Refer to architectural drawings.

4.2 STATUTORY SIGNS

Required fire door and required smoke door

Position	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	FIRE SAFETY DOOR – DO NOT OBSTRUCT– DO NOT KEEP OPEN
Message if door discharging from a fire isolated exit	FIRE SAFETY DOOR – DO NOT OBSTRUCT
Letter height (minimum)	20 mm
Sign type	Printed acrylic sheet adhesive fixed
Compliance	BCA D2.23

Non-required stair, ramp or escalator

Position	Outside the shaft near all doors opening to the shaft
Message	DO NOT USE THIS STAIRWAY IF THERE IS A FIRE (or) Do not use this stairway if there is a fire
Letter height (minimum)	20 mm (upper case) 16 mm (lower case)
Sign type	Printed acrylic sheet adhesive fixed
Compliance	BCA Spec D1.12

Exit signs, Class 2, in lieu of illuminated exit signs

Position	On, above, or adjacent every door in BCA clause E4.5

Message	EXIT
Letter height (minimum)	25 mm
Sign type	Printed acrylic sheet adhesive fixed
Compliance	BCA E4.5 and BCA E4.7

Fire exit offence notice (NSW)

Position	Adjacent door providing access to (but not within) a fire exit stair, passage or ramp
Message	OFFENCE RELATING TO FIRE EXITS It is an offence under the *Environmental Planning and Assessment Act 1979:* (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 (rest)
Sign type	Printed acrylic sheet adhesive fixed
Compliance	Environmental Planning and Assessment Regulation 2000 clause 183

Fire exit offence notice (ACT)

Position	Adjacent door providing access to (but not within) a fire exit stair, passage or ramp
Message	OFFENCES RELATING TO FIRE STAIRS Under the Emergencies Act 2004 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 (rest)
Sign type	Engraved and filled in contrasting colours
Compliance	BCA ACT- D1.101

Fire hose reels and fire hydrants

Position	Cupboard door or adjacent the FHR
Message	FIRE HOSE REEL (and/or) FIRE HYDRANT
Letter height (minimum)	External cabinets: 75 mm Internal cabinets: 50 mm
Sign type	White adhesive backed vinyl
Compliance	AS 2441 AS 2419.1 BCA E1.3 and BCA E1.4

Fire brigade booster assembly cabinet location sign

Position	Cabinet doors
Message	FIRE HYDRANT BOOSTER, or FIRE HYDRANT AND SPRINKLER BOOSTER, or COMBINED FIRE HYDRANT AND SPRINKLER BOOSTER, as appropriate. If a feed fire hydrant is enclosed in the cabinet, add the symbol FH within a 100 mm circle of thickness and colour to match lettering.
Letter height (minimum)	50 mm
Sign type	Adhesive backed vinyl
Compliance	AS 2419.1 clause 7.10.1

Fire brigade booster assembly – Notice of pressure

Position	Adjacent or within the cabinet or recess
Message	(Boost pressure and test pressure in kilopascals)
Letter height (minimum)	25 mm
Sign type	
Compliance	AS 2419.1 clause 7.10.1

Fire brigade relay pumps

Position	At each pump location
Message	FIRE BRIGADE RELAY PUMP
Letter height (minimum)	75 mm
Sign type	
Compliance	AS 2419.1 clause 7.7

Boosters in series with pumps

Position	Adjacent 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 TRUE BOOST PRESSURE AT THE FIXED ON-SITE PUMP DISCHARGE
Letter height (minimum)	25 mm
Sign type	
Compliance	AS 2419.1 clause 7.6

Termite protection

Position	In or near meter box or similar
Message	Indicate: The method of protection The date of installation The life expectancy of a chemical barrier as listed on the National Registration Authority label The installer's recommendation for inspections
Sign type	Laminated page(s)
Compliance	BCA 3.1.3.2(b), BCA B1.4(i)(ii)

	AS 3660.1 Appendix A

Regulatory carpark signs: Low clearance

Position	Entry to overhead obstruction where clearance is: 3 m or less – car and light van use only 4.6 m – all other cases
Message	LOW CLEARANCE 2.2 m
Letter height (minimum)	As prescribed AS/NZS 2890.1 clause 4.3.4 (a)
Sign type	AS 1742.2 W4-8
Compliance	AS/NZS 2890.1 clause 4.3.4

Regulatory carpark signs: Stop and Give Way

Position	As required for traffic control
Message	Graphic nominated AS/NZS 2890.1 clause 4.3.4(b)
Sign type	AS 1742.2 R1-1, R1-2
Compliance	AS/NZS 2890.1 clause 4.3.4

Regulatory carpark signs: Speed limit

Position	As required for traffic control
Message	Graphic nominated AS/NZS 2890.1 clause 4.3.4(c)
Sign type	AS 1742.2 R4-1
Compliance	AS/NZS 2890.1 clause 4.3.4

Regulatory carpark signs: Road hump warning

Position	As required for traffic control
Message	Graphic nominated AS/NZS 2890.1 clause 4.3.4(d)
Sign type	AS 1742.2 W5-10
Compliance	AS/NZS 2890.1 clause 4.3.4

Regulatory carpark signs: Steep descent warning

Position	As required for traffic control
Message	Graphic nominated AS/NZS 2890.1 clause 4.3.4(e)
Sign type	AS 1742.2 W5-12
Compliance	AS/NZS 2890.1 clause 4.3.4

Regulatory carpark signs: Disabled persons parking facilities

Position	Designated car space
Message	Graphic nominated AS/NZS 2890.1 clause 3.1 figure 3.1
Sign type	Pavement marking paint.
Compliance	AS/NZS 2890.6 clause 3.1

Non-accessible pedestrian entrance

Position	At each non-accessible pedestrian building entrance.
Message	Signage incorporating the international symbol of access to direct a person to the location of the nearest accessible pedestrian entrance

Letter height	AS 1428.2 clause 17, Table 2.
Symbol size	AS 1428.2 clause 16, Table 1.
Sign type	Printed acrylic sheet adhesive fixed
Compliance	AS/NZS 1428.1 BCA D3.6

Main switchboard - main entry, excluding Class 1 dwellings

Position	Each entry that may be used by emergency services or at fire indicator panel
Message	Indicate location of main switchboard. Incorporate the term Main Switchboard into notice.
Letter height (minimum)	
Sign type	Printed acrylic sheet adhesive fixed
Compliance	AS/NZS 3000 clause 2.9.2.4

Main switchboard - room or enclosure, excluding Class 1 dwellings

Position	The room or enclosure containing the main switchboard.
Message	MAIN SWITCHBOARD
Letter height (minimum)	
Sign type	Printed acrylic sheet adhesive fixed
Compliance	AS/NZS 3000 clause 2.9.2.4

0611 RENDERING AND PLASTERING

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Provide plaster finishes as follows:

- Resistant to impacts expected in use.
- Free of irregularities.
- Consistent in texture and finish.
- Firmly bonded to substrates for the expected life of the application.
- As a suitable substrate for the nominated final finish.

Selections: Conform to the **architectural drawings** and **finishes schedule.**

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.

1.3 INTERPRETATION

Abbreviations

General: For the purposes of this worksection the following abbreviations apply:

- 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 following definitions apply:

- Plastering: The process of coating the framing or solid surfaces of a building with a plastic material which hardens and then may be decorated or remain self-finished.
- Substrate: The surface to which a material or product is applied.
- Base coat: A plaster coat applied before the application of the finish coat.
- Bonding treatment: A treatment of a substrate which improves adhesion of a plaster system.
- Finish coat: The final coat of a coating system.
- Finishing treatment: The treatment applied to a finish coat which may include processes and results as follows:
  - . Wood float: Plaster laid on with a trowel and finished with a dry wood float as soon as the wet sheen has disappeared from the surface.
  - . Sponge: Plaster laid on thinly with a trowel, floated up with a wood float and lightly finished with a sponge.
  - . Smooth (dado) finish: Cement based plaster laid on with a trowel, skimmed with a wood float and trowelled down. Surface is trowelled to a smooth, dense finish as the plaster stiffens and no water applied during trowelling.
  - . Ornamental: Patterned surfaces achieved by working the hardening plaster with a trowel or other tool.
  - . Sprayed: Textured surfaces achieved by projecting plaster onto a substrate using a purpose-designed machine. Also known as tyrolean.
  - . Stippled: Textured surfaces achieved by working the hardening plaster with a stiff brush.

. Thrown: Rough surfaces achieved by throwing plaster onto a substrate or pebbles onto a plastic plaster base.

- Plaster: A mixture of binders, aggregate and water which are applied to substrates in a plastic state and dry and cure to a hard surface which may subsequently be decorated:
  . Cement plaster: Contains Portland cement as the principal binder.
  . Gypsum plaster: Contains hydrated or anhydrous calcium sulfate as the principal binder.
- Plastering system: One or more coats of plaster and associated treatments comprising some or all of the following in sequence:
  . Base coat 1 or 2.
  . Bonding treatment.
  . Finish coat.
  . Finishing treatment.
- Render, rendering: Plaster, plastering, usually single coat and usually cement:lime:sand.

1.4 INSPECTION

Notice

Inspection: Give notice so inspection may be made of the following:

- Substrates immediately before applying base coats.
- Finish treatments before decoration.

2 PRODUCTS

2.1 MATERIALS AND COMPONENTS

Accessories

Beads: Provide metal proprietary sections manufactured to be fixed to substrates and/or embedded in the plaster to form and protect plaster edges and junctions.

Lath: Provide a proprietary product manufactured from raised expanded metal for use with plaster:

- Mass/unit area: ≥ 1.84 kg/m^2.
- Material thickness: ≥ 0.70 mm.
- Mesh size: 9.5 x 28.6 mm.

Metallic-coatings: For beads or lath in cement plaster: To the **Corrosion resistance and durability table**.

Admixtures

Plasticizers or workability agents: Do not use in cement plasters.

Aggregates

Sand: Fine, sharp, well-graded sand with a clay content between 1% and 5%, and free from efflorescing salts.

Sand grading for base coat plaster: To the **Sand gradation table**.

Sand gradation table

Sieve size	**Percent passing**	
	Minimum	**Maximum**
4.75 mm	100	100
2.36 mm	90	100
1.18 mm	60	90
600 µm	35	70
300 µm	10	30
150 µm	0	5
75 µm	0	3

Plaster for autoclaved aerated concrete
General: Provide a proprietary product manufactured for use with the wall system.

Bonding products
General: Provide proprietary products manufactured for bonding cement-based plaster to solid substrates.

Cement
Standard: To AS 3972.

Type: GP.

Colouring products
General: Provide proprietary products manufactured for colouring cement plaster.

Integral pigment proportion: ≤ 5% by mass of cement.

Cornice cement
General: Provide a proprietary product manufactured for use with the cornice.

Corrosion resistance and durability
Compliance: Conform to the **Corrosion resistance and durability table(s)** or provide proprietary products with metallic and/or organic coatings of equivalent corrosion resistance and as follows:

- Galvanize: To AS/NZS 4680.

Corrosion resistance and durability table – Atmospheric corrosivity category - A and B to AS/NZS 2312

Situation	**Metal lath, beads and embedded items**	**Minimum cement content (mix type) above damp-proof course**
Internal	Galvanize after fabrication 300 g/m^2 Metallic-coated sheet Z275/AZ150	CRW
External	Galvanize after fabrication 300 g/m^2 Stainless 316	CRW
	Powder-coated aluminium	CRM

Corrosion resistance and durability table – Atmospheric corrosivity category - C to AS/NZS 2312

Situation	**Metal lath, beads and embedded items**	**Minimum cement content (mix type) above damp-proof course**
Internal	Galvanize after fabrication 300 g/m^2 Metallic-coated sheet Z275/AZ150	CRM
External	Stainless 316 Powder-coated aluminium	CRM

Corrosion resistance and durability table– Atmospheric corrosivity category - D and F to AS/NZS 2312

Situation	**Metal lath, beads and embedded items**	**Minimum cement content (mix type) above damp-proof course**
Internal	Galvanize after fabrication 300 g/m^2 Metallic-coated sheet Z275/AZ150	CRW
External	Stainless 316	CRS

Situation	Metal lath, beads and embedded items	Minimum cement content (mix type) above damp-proof course
	Powder-coated aluminium	
[1] Avoid organic coating in Category F zones.		

Curing products

General: Provide proprietary products manufactured for use with the plaster system.

Lime

Limes for building: To AS 1672.1.

Lime putty

General: Prepare lime putty as follows:

- Stand dry hydrate of lime to AS 1672.1 and water for 24 hours or more without drying out.
- Stand quicklime and water for 14 days or more without drying out.

Metal lath

Internal: Expanded metal to AS 1397 coating class Z350.

External: Stainless steel or PVC.

Mixes

General: Select a mix ratio to suit the conditions of application in conformity with the **Mixes table**.

Measurement: Measure binders and sand by volume using buckets or boxes. Do not allow sand to bulk by absorption of water.

Plaster mixing: Machine mix ≥ 3 < 6 minutes.

Strength of successive coats: Make sure successive coats are no richer in binder than the coat to which they are applied.

Mixes table – Cement render

Mix type		Substrate	Upper and lower limits of proportions by volume		
			Cement	Lime	Sand
- Single or multi-coat systems with integral finishing treatments - Base coats in multi-coat systems with cement or gypsum finishes	CRS	Dense and smooth concrete and masonry	1 1	0 0.5	3 4.5
-	CRM	Regular clay or concrete masonry	1 1	0.5 1	4.5 6
-	CRW	Lightweight concrete masonry and other weak substrates	1 1	1 2	6 9
Second coat - Internal	CRF	Cement render base coats	1 1	1 2	6 9
Second coat - External	CRF	Cement render base coats	1 1	1 2	5 6

Mix table – Gypsum finish coat, by volume

Mix type		Substrate	Upper and lower limits of proportions by volume			
			Gypsum	Cement	Lime putty	Sand
Gypsum finish coats	GPF	Cement render base coats	1 1	- -	1.5 2	- -

Mix table – Gypsum finish coat, by weight

Gypsum plaster (kg)	Lime putty (kg)
17	25
34	50
51	75

Control joint products

General: Provide proprietary products manufactured for use with the plastering system and to accommodate the anticipated movement of the substrates and/or the plaster.

Water

General: Clean and free from any deleterious matter.

3 EXECUTION

3.1 PREPARATION

Substrates

General: Provide substrates as follows:

- Clean and free from any deposit or finish which may impair adhesion of plaster.
- If framed or discontinuous, support members in full lengths without splicing.
- If solid or continuous, remove excessive projections hacked off and fill voids and hollows with plaster stronger than the first coat and not weaker than the substrate.

Absorbent substrates: If suction is excessive, control it by dampening without over-wetting, and do not plaster substrates showing surface moisture.

Dense concrete: If not sufficiently rough to provide a mechanical key, roughen by scabbling or the like to remove 2 mm of the laitance and expose the aggregate before applying a bonding treatment.

Painted surfaces: Remove paint and hack the surface at close intervals.

Untrue substrates: If the substrate is not sufficiently true to ensure conformity with the thickness limits for the plaster system, or has excessively uneven suction resulting from variations in the composition of the substrate, apply additional coats without exceeding the thickness limits for the substrate or system.

Beads

Location: Fix beads as follows:

- Angle beads: At all external corners.
- Drip beads: At all lower terminations of external plaster.
- Beads for control of movement: At all control joints.
- Stop beads: At all terminations of plaster and junctions with other materials or plaster systems.

Joints in beads: Provide dowels to maintain alignment.

Mechanical fixing to substrate: ≤ 300 mm centres.

Bonding treatment

General: If bonding treatment is required, throw a wet mix onto the substrate as follows:

- Cement plaster: 1 part cement to 2 parts sand.
- Gypsum plaster: 1 part gypsum to 2 parts sand.

Curing: Keep continuously moist for 5 days or more and allow to dry before applying plaster coats.

Thickness: From ≥ 3 < 6 mm.

Lath

Location: Provide lath as follows:

- Chases: If chases or recesses are 50 mm wide or greater, fix metal lath extending 75 mm or more beyond each side of the chase or recess.
- Metal and other non-porous substrates: Fix metal lath to provide a key.

Installation: Fix lath as follows:

- General: Run the long way of the mesh across supports with strands sloping downwards and inwards from the intended face of the plaster.
- Fixing: Mechanically fix at centres of 150 mm or less.
- Laps: Tie with 1.25 mm galvanized wire at centres of 150 mm or less. Do not stop edges of sheets at corners but bend around.
- On solid substrates: Space the lath 5 mm or more clear of the substrate.
- Support spacing: ≤ 400 mm.

3.2 APPLICATION

Plastering

Base coats: Scratch-comb each base coat in two directions when it has stiffened.

Metal lath: Press the plaster through the apertures of expanded metal lath and wings of beads.

Finishing treatments

Plain:

- Bag: Rub the finish coat when set firm.
- Carborundum stone: Rub the finish coat when set hard with a carborundum stone to achieve a finish free from sand.
- Foam float: Float finish coat on application with a wood or plastic float to an even surface and finish with a foam float to achieve a fine sand textured finish.
- Steel trowel: Steel trowel finish coat to a smooth dense surface which is not glass-like and is free from shrinkage cracks and crazing.
- Wood or plastic float: Float the finish coat on application to an even surface with a wood or plastic float.

Incidental work

General: Return plaster into reveals, beads, sills, recesses and niches. Plaster faces, ends, and soffits of projections in the substrate, such as string courses, sills, pilasters and corbels. Run neatly finished throating on soffits of external projections. Trim around openings. Plaster exposed internal surfaces of built-in cupboards.

Joining up

General: If joining up is required, make sure joints are imperceptible in the finished work after decoration.

Control joints

General: Provide joints in the finish to coincide with control joints in the substrate. Make sure that the joint in the substrate is not bridged during plastering.

Size:

- Depth: Extend the joint right through the plaster and reinforcement to the substrate.
- Width: 3 mm, or the same width as the substrate joint, whichever is greater.

Damp-proof courses: Do not continue plaster across damp-proof courses.

Plastering on metal lath: Provide control joints to divide the plastering area into rectangular panels of 10 m^2 or less.

V-joints: Provide V-joints, cut right through the plaster to the substrate, at the following locations:

- Abutments with metal door frames.
- Abutments with other finishes.
- Junctions between different substrates.

Cornices
General: Accurately cut and mitre corners. Match and align ornament. Do not make butt joints in the length of a cornice unless required, or full lengths are not available.

Installation: Butter edges, mitres and joins for the full length of the cornice with adhesive.

Mechanical fixing: If cornice projects across a ceiling 400 mm or more, provide additional mechanical fixing:

- Fixing centres: ≤ 600 mm.

Plaster thickness
General: Conform to the **Plaster thickness table**.

Plaster thickness table

Substrate	Cement render, total thickness of single or multi-coat work (mm)	Gypsum/lime plaster (mm)
Dense concrete walls	15 max	3 max
Dense concrete ceilings	9 max	3 max
Brickwork and blockwork	12 min	3 max
Lightweight concrete and blocks	12 min	3 max
Metal lath measured from the face of the lath.	18 min	3 max

Temperature
General: If the ambient temperature is 10ºC or less or 30ºC or more make sure that the temperature of mixes, substrates and reinforcement at the time of application are between 5ºC and 35ºC.

3.3 TOLERANCES

General
Tolerances: Conform to the **Tolerances table**.

Tolerances table

Description	Alignment	Tolerance
Walls and other vertical structures	Vertical	6 mm in 2400 mm
Reveals sides	Vertical	3 mm in 1800 mm
Reveals head up to 1800 mm	Horizontal	3 mm in 1800 mm
Reveals head over 1800 mm	Horizontal	5 mm max
Reveals, piers, beams, wall stop ends up to 300 mm	Square	3 mm max
Reveals, piers, beams, wall stop ends over 300 mm	Square	5 mm max
Radius of corners	Round	Should not vary by more than ± 10% over the length of the arris.

3.4 COMPLETION

Cornices
General: Accurately cut and mitre corners. Match and align ornament. Unless required, or full lengths are not available, do not make butt joints in the length of a cornice.

Installation: Butter edges, mitres and joins for the full length of the cornice with adhesive:

Mechanical fixing: If a cornice projects across a ceiling 400 mm or more, provide additional mechanical fixing:

- Fixing centres: ≤ 600 mm.

Curing

General: Prevent premature or uneven drying out and protect from the sun and wind.

Keeping moist: If a proprietary curing agent is not used, keep the plaster moist as follows:

- Base coats and single coat systems: Keep continuously moist for 2 days and allow to dry for 5 days before applying further plaster coats.
- Finish coats: Keep continuously moist for 2 days.

0612B CEMENTITIOUS TOPPINGS

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Provide cementitious toppings in conformance with **architectural drawings** and as follows:

- If floating, without edge curl.
- If bonded, without drummy areas.
- Without obvious shrinkage cracks.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.

1.3 TOLERANCES

General

Thickness: Deviation from the stated thickness:

- Thickness < 15 mm: 2 mm.
- Thickness ≥ 15 < 30 mm: 5 mm.
- Thickness ≥ 30 mm: 10 mm.

Flatness deviation: Measured under a 3000 mm straightedge laid in any direction on a plane surface:

- Class A: < 3 mm.
- Class B: ≥ 3 < 5 mm.

2 PRODUCTS

2.1 PRODUCTS

Admixtures

Standard: To AS 1478.1.

Aggregates

Standard: To AS 2758.1.

Coarse aggregate: Nominal single size ≤ 1/3 topping thickness.

Fine aggregate: Fine, sharp, well-graded sand with a low clay content and free from efflorescing salts.

Bonding products

General: Provide proprietary products manufactured for bonding cement-based toppings to concrete substrates.

Cement

Standard: To AS 3972.

- Type: SL.

Colouring products

General: Provide proprietary products manufactured for colouring cement toppings.

Integral pigment proportion: ≤ 10% by mass of cement.

Concrete

Standard: To AS 1379.

Reinforced topping:

- Class: Normal.

Reinforced topping: Conform to the **Reinforced topping table**.

Reinforced topping table

Exposure location	Strength grade	Cover to reinforcement
Internal + External > 50 km inland and non-industrial and non-tropical	N25	20 mm
External > 50 km inland and tropical + External near coastal > 1 km < 50 km	N32	30 mm
External coastal < 1 km but not in the splash zone	N40	35 mm

Reinforcement

Standard: To AS/NZS 4671.

Mesh sizes for joint spacing as follows:

- SL 42: Up to 3 m internal, 2 m external.
- SL 62: Up to 6 m internal, 4 m external.

Curing products

General: Provide proprietary products manufactured for use with cement-based toppings and with the floor finish to be laid on the toppings.

Mixes

General: Provide topping as follows or select mix proportions to the **Mixes table**:

- Air entrainment: ≤ 3%.
- Nominal coarse aggregate size: ≤ 0.3 x topping thickness.
- Slump: 80 mm.
- Standard strength grade: N25.

Water quantity: The minimum necessary to achieve full compaction and prevent excessive water being brought to the surface during compaction.

Mixes table

Mix type	Thickness (mm)	Upper and lower limits of proportion by weight		
		Cement	Fine aggregate	Coarse aggregate
Bonded – cement and sand	35	1 1	3 4.5	0 0
Bonded – fine concrete	40	1 1	3 3	1 2
Floating – fine concrete	100	1 1	3 3	1 2
Granolithic	Floors: 25 Skirtings: 13	1	2	1, of 2 mm - 3mm
Separated – fine concrete	70	1 1	3 3	1 2

Slip-resistance products

General: Provide proprietary products manufactured to improve the wet-slip resistance of toppings.

- Silicon carbide granules:
  - . Granule size: ≥ 300 < 600 µm.
- Silicon carbide two-part resin:
  - . Granule size: ≥ 300 µm.

Surface treatment products

General: Provide proprietary products manufactured for use with cement- based toppings to change the characteristics of the surface of the finished topping.

Water
General: Clean and free from any deleterious matter.

2.2 CONTROL JOINTS

Control joint materials
Control joint strip: A proprietary expansion joint consisting of a neoprene filler sandwiched between plates with lugs or ribs for mechanical keying. Set flush with the finished surface.

Proprietary slide plate divider strip: An arrangement of interlocking metal plates grouted into pockets formed in the concrete joint edges.

Sealant: One-part self-levelling non-hardening mould resistant, silicone or polyurethane sealant applied over a backing rod. Finish flush with the terrazzo surface.

Floors: Trafficable, shore hardness > 35.

Backing rod: Compressible closed cell polyethylene foam with a bond-breaking surface.

3 EXECUTION

3.1 PREPARATION

Substrates
General: Provide substrates as follows:
- Clean and free from any deposit which may impair adhesion of monolithic or bonded toppings.
- Remove excessive projections and voids and fill hollows with a mix not stronger than the substrate or weaker than the topping.
- Roughen hardened concrete by scabbling or the like to remove 2 mm of the laitance and expose the aggregate.

Bonded toppings
General: Before laying topping wash the substrate with water and provide a bonding product, or treat as follows:
- Keep wet for 2 hours or more.
- Remove surplus water and brush on neat cement or a clean slurry of cement and water.
- Place the topping while the slurry is wet.

3.2 APPLICATION

Laying
General: Spread the mix and compact. Strike off, consolidate and level surfaces to finished levels.

Monolithic toppings: Lay while concrete subfloor is plastic and the surface water is no longer visible.

Toppings over 50 mm thick:
- Lay in two layers of equal thickness.
- Place a layer of reinforcement between the layers of toppings. Lap reinforcement 200 mm and tie. Do not create four way laps.

3.3 SURFACE FINISHES

Finishing methods – primary finish
Machine float finish:
- After levelling, consolidate the surface using a machine float.
- Cut and fill and refloat immediately to a uniform, smooth, granular texture.
- Hand float in locations inaccessible to the machine float.

Steel trowel finish: After machine floating finish as follows:
- Produce a smooth surface relatively free from defects.
- When the surface has hardened sufficiently, use steel hand trowels to produce the final consolidated finish free of trowel marks and uniform in texture and appearance.

Wood float finish: After machine floating produce the final consolidated finish free of float marks and uniform in texture and appearance using wood or plastic hand floats.

Broom finish: After machine floating draw a broom or hessian belt across the surface to produce a coarse even-textured slip-resistant transverse-scored surface.

Scored or scratch finish: After screeding, give the surface a coarse scored texture using a stiff brush or rake drawn across the surface before final set.

Sponge finish: After machine floating, obtain an even textured sand finish by wiping the surface using a damp sponge.

Finishing methods – supplementary finish

Abrasive blast: After steel trowelling, abrasive blast the cured surface to provide texture or to form patterns without exposing the coarse aggregate using fine, hard, sharp, graded abrasive particles.

Coloured applied finish: Apply a proprietary liquid or dry shake material to a steel trowel finished surface in conformance with the manufacturer's written requirements.

Stamped and coloured pattern paved finish: A complete proprietary finishing system.

Burnished finish: Continue steel trowelling until the concrete surface attains a polished or glossy appearance.

Exposed aggregate: After steel trowelling, grind the cured surface of the concrete to expose coarse aggregate.

Surface finishes

General: Provide surface finishes in conformance with the **finishes schedule**.

Slip resistant treatment

Surface treatment: Apply silicon carbide granules after floating and before the topping surface has set, and trowel into the surface so that the granules remain exposed.

Application rate: 1 kg/m^2 evenly distributed.

Slip resistant treatment to stair treads

Slip-resistance treatment: Form two grooves and fill with a silicon carbide two-part resin.

- Dimensions: 10 mm deep, 15 mm wide, length width of tread less 100 mm.
- Position:
  - . First groove: Centre 35 mm from tread nose.
  - . Second groove: Centre 60 mm from step nose.

Surface colouring

General: Apply the colouring product after floating and before the topping surface has set and trowel into the surface so that it is even in colour.

Surface treatment

General: Apply the surface treatment after floating and before the topping surface has set.

Temperature

General: Make sure that the temperature of mixes, substrates and reinforcement are, at the time of application, ≥ 5ºC or ≤ 35ºC.

Severe temperature: If the ambient shade temperature is greater than 38°C, do not mix topping.

3.4 CONTROL OF MOVEMENT

General

General: Provide control joints to the **Control joints schedule** and as follows:

- 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 topping-finished areas into bays.
- At abutments with the building structural frame and over supporting walls or beams where flexing of the substrate is anticipated.

Control joints to divide topping into bays: Provide joints using one of the following methods:

- Form in situ using square edge steel forms and trowelling a 3 mm radius to edges.

- Form a groove, extending at least one quarter the depth of the section, either by using a grooving tool, by sawing, or by inserting a premoulded strip.
- Install a control joint product.

Depth of joint: Right through to the substrate.

Depth of elastomeric sealant: One half the joint width, or 6 mm, whichever is the greater.

Topping joints: Provide joints to divide toppings into bays as follows:

- Form in situ using square edge steel forms and trowelling a 3 mm radius to edges.
- Form a groove, extending at least one quarter the depth of the section, either by using a grooving tool, by sawing, or by inserting a premoulded strip.
- Install a control joint product.

Bay sizes:

- Area: ≤ 15 m².
- Length to width ratio: ≤ 1:1.5.

3.5 JOINT ACCESSORIES

Weather bars

General: Provide a corrosion resistant metal weather bar under hinged external doors. Locate under the centres of closed doors.

Floor finish dividers

General: Finish cementitious toppings at junctions with differing floor finishes with a corrosion resistant metal dividing strip suitable fixed to the substrate, with top edge flush to the finished floor. If changes of floor finish occur at doorways make the junction directly below the closed door.

3.6 COMPLETION

Curing

General: Prevent premature or uneven drying out and protect from the sun and wind.

Curing: Use a curing product or, as soon toppings have set sufficiently, keep them moist by covering with polyethylene film for seven days.

Joint sealant

General: If required, seal joints as follows:

- Formed joints ≤ 25 mm deep: With filler and bond-breaker.
- Sawn joints: Full depth of cut.

Protection

General: Protect finished work from damage during building operations.

Slip resistance

Field test of completed surface: To AS/NZS 4663.

0621 WATERPROOFING – WET AREAS

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Provide wet area waterproofing systems which:

- Are graded to floor wastes to dispose of water without ponding.
- Prevent moisture entering the substrate or adjacent areas.

Selections: As documented.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.

1.3 STANDARDS

Wet areas

Standard: To AS 3740.

1.4 INTERPRETATION

Definitions

General: For the purposes of this worksection the definitions given in AS 3740 and the following apply:

- Substrates: The surface to which a material or product is applied.
- Bond breaker: A system preventing a membrane bonding to the substrate, bedding or lining.
- Membranes: Impervious barriers to liquid water which may be:
  - . Installed below floor finishes.
  - . Installed behind the wall sheeting or render and termed External.
  - . Installed to the face of the wall sheeting or render and termed Internal.
  - . Applied in liquid or gel form and air cured to form a seamless film.
  - . Applied in sheet form with joints lapped and sealed.
- Preformed shower base: A preformed, prefinished vessel (including integral upstands) installed as the finished floor of a shower compartment, and provided with a connection point to a sanitary drainage system.
- Shower tray: An internal or external liquid or sheet membrane system used to waterproof the floor and the wall/floor junctions of a shower area.
- Waterproof (WP): The property of a material that does not allow moisture to penetrate through it.
- Waterproofing systems: Combinations of membranes, flashings, drainage and accessories which form waterproof barriers and which may be:
  - . Loose-laid.
  - . Bonded to substrates.
- Water resistant (WR): The property of a material that restricts moisture movement and will not degrade under conditions of moisture.
- Wet area: An area within a building supplied with a floor waste.

1.5 INSPECTION

Notice

Inspection: Give notice so inspection may be made of the following:

- Substrate preparation completed.
- Secondary layers preparation completed.

- Before membranes are covered up or concealed.

1.6 SUBMISSIONS

Execution records
Placing records: Photographically record the application of membranes and information as follows:
- Date.
- Portion of work.
- Substrate preparation.
- Protection provided from traffic.

Products documentation
General: Submit copies of product manufacturers:
- Product technical data sheets.
- Material safety data sheets (MSDS).
- Type tests certificates verifying conformance to AS/NZS 4858.

2 PRODUCTS

2.1 PRODUCTS

Membranes
Standard: To AS/NZS 4858.

Membrane systems
Requirement: Proprietary membrane systems suitable for the intended wet area waterproofing.

Shower tray
General: Purpose-made jointless shower tray, with wall upstands at least 50 mm higher than the hob upstands. Set hob masonry on the inside of the tray upstands.

Water stop angles
Material: Rigid, corrosion resistant angles compatible with the waterproof membrane system.

Bond breakers
Requirement: Compatible with the flexibility class of the membrane to be used.

Material: Purpose made bond breaker tapes and closed cell foam backing rods or fillets of sealant.

Flashings
Requirement: Flexible waterproof flashings compatible with the waterproof membrane system.

Liquid membrane reinforcement
Requirement: Flexible fabric compatible with the waterproof membrane system.

Sealants
Requirement: Waterproof, flexible, mould-resistant and compatible with host materials.

Adhesives
Requirement: Waterproof and compatible with host materials.

3 EXECUTION

3.1 PREPARATION

Substrates
General: Make sure substrates are as follows:
- Clean and free of any deposit or finish which may impair adhesion of membranes.
- If walls are plastered, remove loose sand.
- If walls or floors are framed or discontinuous, support members are in full lengths without splicing.
- If floors are solid or continuous:
  . Excessive projections are removed.
  . Voids and hollows > 10 mm with abrupt edges are filled with a cement:sand mix not stronger than the substrate nor weaker than the bedding.

. Depressions < 10 mm are filled with a latex modified cementitious product with feathering eliminated by scabbling the edges.

. Cracks in substrates wider than 1.5 mm are filled with a filler compatible with the membrane system.

External corners: Round or arris edges.

Moisture content

Concrete substrates: Cure for > 21 days.

Moisture content: Verify that the moisture content of the substrate is compatible with the water vapour transmission rate of the membrane system by testing to AS/NZS 2455.1 Appendix B.

Test type:

- Hygrometer test: Seal a hygrometer to the substrate for > 16 hours and measure the relative humidity of the air between the instrument and the slab.
- Electrical resistance test: Connect a resistance meter to the slab and read the moisture content.

Falls

Substrate: If the membrane is directly under the floor finish ensure the fall in the substrate conforms to the fall nominated for the finish.

Sheet substrate fastening

Requirement: Fasten or adequately fix to the supporting structure.

Control joints

Finishes: Align control joints in finishes and bedding with control joints or changes in materials in the substrate.

Water stop angles

Requirement: Provide water stop angles at door thresholds and shower enclosures to support the waterproof membrane at junctions between waterproofed and non-waterproofed areas.

Sizing: Size the vertical leg of the water stop angle to conform to the requirements of AS 3740.

Corners: Cut the horizontal leg and bend the vertical leg at corners instead of forming vertical joints between separate lengths of angle.

Fixing: Fix water stop angles to the substrate with compatible sealant or adhesive and corrosion-resistant countersunk or wafer head screws.

Priming

General: If required by the membrane manufacturer, prime the substrates with a primer compatible with the membrane system.

Bond breakers

Requirement: After the priming of surfaces, provide bond breakers at all wall/floor, hob/wall junctions and at control joints where the membrane is bonded to the substrate.

Sealant fillet bond breakers:

- Application: Form a triangular fillet or cove of sealant to internal corners within the period recommended by the membrane manufacturer after the application of the primer.
- Widths: 5 mm x 5 mm to vertical corners. 6 mm x 6 mm – 9 mm x 9 mm to horizontal corners.

Backing rod bond breakers: Retain in position with continuous length of tape pressed firmly in place against the surfaces on each side of the rod.

3.2 APPLICATION

Protection

General: Protect membrane from damage during installation and for the period after installation until the membrane achieves its service characteristics that resist damage.

Extent of waterproofing

Waterproof or water resistant surfaces: To the requirements of BCA F1.7.

Sheet membrane joints

Bituminous sheet membranes:

- Side laps > 75 mm.
- End laps > 100 mm.

Synthetic rubber membranes:

- Factory-vulcanized laps > 40 mm.
- Field side laps > 50 mm for side laps.
- Field end-laps > 100 mm for end laps.

PVC membranes:

- Factory welded laps > 30 mm.
- Field–welded laps > 75 mm.

Vertical membrane terminations

Upstands: At least 150 mm above the finished tile level of the floor or 25 mm above the maximum retained water level, whichever is the greater.

Anchoring: Secure sheet membranes along the top edge.

Edge protection: Protect edges of the membrane.

Flashings

Junctions between waterproof surfaces: Provide a bond breaker at internal corners behind flashings.

Junctions between waterproof surfaces and other surfaces: Provide a bead of sealant at the following junctions:

- Waterproof and water-resistant surfaces.
- Water-resistant and water-resistant surfaces.
- Water-resistant and non water-resistant surfaces.

Perimeter flashings: Provide continuous flashings to the full perimeter of waterproof areas at wall/floor junctions and to water stop angles.

Vertical flashings: Provide vertical corner flashings continuous across wall/wall junctions to at least 1800 mm above finished floor level.

Vertical liquid applied flashings:

- Return legs at least 40 mm on each wall.
- Overlap the vertical termination of the floor waterproofing membrane at least 20 mm.

Vertical sheet flashings:

- Return legs at least 50 mm on each wall.
- Overlap shower tray upstands at least 50 mm.
- Do not penetrate flashing with wall lining fasteners.

Reinforcement: At coves, corners and wall/floor junctions with gaps greater than 3 mm reinforce liquid applied membranes with reinforcement fabric tape recommended by the membrane manufacturer. Fold the tape in half lengthways and imbed it in the first flashing coat of membrane with one half of the tape on each side of the corner or joint. Apply a second coat of liquid membrane to seal the fabric.

Door jambs and architraves

Requirement: If the bottom of doorjambs and architraves do not finish above the floor tiling, waterproof their surfaces below tile level to provide a continuous seal between the perimeter flashing to the wall/floor junction and the water stop angle.

Drainage connections

Floor wastes: Provide floor wastes of sufficient height to accommodate the thickness of floor finishes and bedding at the outlet position. Position drainage flange to drain at membrane level. Turn membrane down 50 mm minimum into the floor waste drainage flanges, and adhere to form a waterproof connection.

Floor wastes in shower trays: Provide drainage of the tile bed and a waterproof connection between the tray and the drain.

Preformed drainage channels with continuous drainage flanges: Provide a continuous waterproof connection between the membrane and the channel.

Preformed drainage channels without drainage flanges: Provide continuous waterproofing under the channel and terminate the membrane at a floor waste with a recessed drainage flange.

Enclosed showers with hobs

General: Construct from masonry, concrete or corrosion-resistant metal. Fix securely to the floor, seal against walls and make flush all gaps, joints and intersections before applying the membrane.

Autoclaved aerated concrete hobs: Do not use for external membrane systems. Prime before applying the membrane.

Internal membranes: Extend membrane over the hob and into the room at least 50 mm.

External membranes (hob located inside membrane tray): Dress membrane up outside of hob and finish at the underside of tiles capping the top of the hob.

Enclosed showers with step-downs

Levels: Conform to AS 3740 Figure 3.5 and as follows:

- Finish the highest level of the shower area at a level at least 15 mm below the finished floor level outside the shower.
- Extend the membrane at least 10 mm above the maximum retained water level in the area outside the shower or 150 mm above the finished floor level of the shower area, whichever is the greater.

With framed shower screens: Terminate the membrane directly below the floor tiles below the shower screen sill mounted on the upper level of the step-down. Support and adhere the membrane to a water stop angle fixed securely to the upper level substrate.

With frameless shower screens: Install the shower screen with the inside face flush with the step-down. Terminate the membrane outside the shower screen at least 1500 mm from the shower rose outlet on the wall. Support and adhere the membrane to a water stop angle fixed securely to the substrate. Finish membrane flush with the underside of tiles.

Enclosed hobless showers with framed shower screens

Requirement: Conform to AS 3740 Figure 3.6 and as follows:

- Turn the membrane up against a water stop angle fixed securely to the substrate directly below the shower screen sill.
- Size the angle so that the vertical leg finishes at least 5 mm above the level of the tiles.

Support and adhere the membrane to the angle and finish it flush with the top of the vertical leg.

Enclosed hobless showers with trench drain located below screen

With framed or frameless shower screens: Install a water stop angle where the outer edge of the trench drain to the perimeter of the shower will be installed. Size the angle so that the vertical leg finishes at the underside of the tiles. Support and adhere the membrane over the water stop angle and terminate the membrane at floor wastes as described in **Drainage connections**. Install the trench drain with the shower screen located vertically above it.

Unenclosed showers

Requirement: Extend membrane at least 1500 mm into the room from the shower rose outlet on the wall.

Preformed shower bases

Support: Fully support shower bases without causing distortion or cracking.

Junction with walls for bases with integral perimeter upstands: Conform to AS 3740 Figure 3.1 and as follows:

- Recess shower base into walls or batten off wall lining sufficiently to allow water-resistant wall finishes to overlap the integral upstands along the top edge of the shower base.
- Maintain the structural integrity of walls that are rebated.

Baths and spas

Junction of walls with baths: Conform to AS 3740 Figure 3.2 and as follows:

- Baths with integral upstands: Recess bath edges into walls or batten off wall lining sufficiently to allow water-resistant wall finishes to overlap the bath's integral perimeter upstands. Maintain the structural integrity of walls that are rebated.
- Baths without integral upstands or with showers over – rendered masonry walls: Form or chase a rebate in the render to receive the bath edge. 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.
- Baths without integral upstands or with showers over – framed and lined walls: Form a rebate in the wall lining with a corrosion-resistant lipped channel to receive the bath edge. 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: Conform to AS 3740 Figure 3.2 and as follows:

- 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, outside of the enclosure and plinth top, 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.

Taps and spouts

Requirement: Waterproof penetrations for taps and spouts with proprietary flange systems or a sealant.

Provision for servicing: Install taps in a manner that allows tap washers or ceramic discs to be serviced without damaging the waterproofing seal.

Recessed soap holders

Construction: Support all faces of the recess and line with the same sheet material as the adjacent wall. Fall base of recess towards the shower area. Flash all junctions and waterproof all surfaces.

Membrane horizontal penetrations

Sleeves: Provide a flexible flange for all penetrations, bonded to the penetration and to the membrane.

Membrane vertical penetrations

Pipes, ducts, and vents: Provide separate sleeves for all pipes, ducts, and vents and have fixed to the substrate.

Curing of liquid applied systems

General: To the manufacturers instructions.

Curing: Allow membrane to fully cure before tiling.

Overlaying finishes on membranes

Requirement: Protect waterproof membranes with compatible water-resistant surface materials that do not cause damage to the membrane.

Suitable materials: Conform to AS 3740.

Bonded or partially bonded systems: If the topping or bedding mortar is required to be bonded to the membrane, provide sufficient control joints in the topping or bedding mortar to reduce the movement over the membrane.

3.3 FLOOD TEST

General

Application: Perform a flood test before the installation of surface finishes.

Moisture measurement method: Conform to AS/NZS 2455.1 Appendix B.

Set-up:

- Measure the wall/floor junction of adjacent spaces and the floor soffit below for dryness.
- Record the result for each area.
- Dam the doorway(s) and seal floor wastes and drainage outlets to allow 50 mm water level.
- Fill space with clean water and leave overnight.

Evaluation:

- Make a visual inspection of the wall/floor junction of adjacent spaces and of the floor soffit below for obvious water or moisture.
- Test the same areas for dryness and compare the results to the measurements taken prior to flooding.

Compliance:

- Evidence of water from the visual test: Failure.
- No visual evidence of water: Proceed with moisture measurements.
- Test results indicating an increase in moisture before and after flooding: Failure.

Records:

- Submit records of all flood tests.

3.4 COMPLETION

Protection

General: Keep traffic off membrane surfaces until bonding has set or for 24 hours after laying, whichever period is the longer.

Reinstatement: Repair or replace faulty or damaged work. If the work cannot be repaired satisfactorily, replace the whole area affected.

Warranty

Waterproofing: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the supplier and the applicator.

- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the supplier.

0631B CERAMIC TILING

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Provide tiling systems to walls, floors and other substrates as documented and as follows:

- Consistent in colour and finish.
- Firmly bonded to substrates for the expected life of the installation.
- Set out with joints accurately aligned in both directions and wall tiling joints level and plumb.
- To direct all water flowing from supply points to drainage outlets without leakage to the substrate or adjacent areas.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.

1.3 STANDARDS

Tiling

General: Comply with the recommendations of those parts of AS 3958.1 which are referenced in this worksection.

Slip resistance

Classification: To AS/NZS 4586 for the classifications noted in **finishes schedule**.

Slip resistance measurement of existing installations: To AS/NZS 4663.

1.4 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Substrate immediately before tiling.
- Trial set-outs before execution.

1.5 TOLERANCES

Completed tiling

Standard: To AS 3958.1 clause 5.4.6.

1.6 SUBMISSIONS

Samples

General: Submit labelled samples of tiles, including fittings, accessories, grout and sealants, illustrating the range of variation in colour and finish.

Tests

Type tests: Submit results, as follows:

- Type test slip resistance of tiles to AS/NZS 4586.

Site tests: Submit results, as follows:

- Site slip resistance test of completed surface to AS/NZS 4663.

2 PRODUCTS

2.1 MARKING

Identification

General: Deliver materials to the site in the manufacturer’s original sealed containers legibly marked to show the following:

- Manufacturer's identification.
- Product brand name.
- Product type.
- Dimensions and quantity.
- Product reference code and batch number.
- Date of manufacture.
- Material composition and characteristics such as volatility, flash point, light fastness, colour and pattern.
- Handling and installation instructions.

2.2 UNDERLAY

Acoustic underlay
General: Provide proprietary product recommended by the manufacturer as being intrinsic to and compatible with the tiling system.

2.3 TILES AND ACCESSORIES

Tiles
Standard: To AS 4662.

Tactile ground surface indicators: To AS/NZS 1428.4.1.

Coves, nosings and skirtings: Provide matching stop-end and internal and external angle tiles moulded for that purpose.

Exposed edges: Purpose-made border tiles with the exposed edge (whether round, square or cushion) glazed to match the tile face. If such tiles are not available, mitre tiles on external corners.

Accessories
General: Provide tile accessories to the **as required** which match the composition, colour and finish of the surrounding tiles.

2.4 ADHESIVES

General
Standard: To AS 2358 and AS 4992.1.

Type
General: Provide adhesives to the **finishes schedule** and compatible with the materials and surfaces to be adhered.

Prohibited uses: Do not provide the following combinations:

- Cement-based adhesives on wood, metal, painted or glazed surfaces, gypsum-based plaster.
- Organic solvent-based adhesives on painted surfaces.
- Organic PVC-based adhesives and organic natural rubber latex adhesives in damp or wet conditions.
- PVA (polyvinyl acetate) based adhesives in wet areas or externally.

2.5 MORTAR

Materials
Cement type to AS 3972: GP.

- White cement: Iron salts content ≤ 1%.
- Off-white cement: Iron salts content ≤ 2.5%.

Lime: To AS 1672.1.

Sand: Fine aggregate with a low clay content selected for grading, sharp and free from efflorescing salts.

Measurement of volume: Measure binders and sand by volume using buckets or boxes. Do not allow sand to bulk by absorption of water.

Bedding mortar
Proportioning: Select proportions from the range 1:3 – 1:4 cement: sand (by volume) to obtain satisfactory adhesion. Provide minimum water.

Terra cotta tiles: Use proprietary polymer modified mortar.

Mixing: To AS 3958.1 clause 2.15.

Water
General: Clean and free from any deleterious matter.

2.6 GROUT

Type
Cement based proprietary grout: Mix with water. Fine sand may be added as a filler in wider joints.

Terra cotta tiles: Use proprietary polymer modified grout.

General purpose cement based grout: Mix with fine sand. Provide minimum water consistent with workability.

- For joints < 3 mm: 1 cement: 2 sand (by volume).
- For joints ≥ 3 mm: 1 cement: 3 sand (by volume).

Pigments
Pigments for coloured grout: Provide colourfast fillers compatible with the grout material. For cement-based grouts, provide lime-proof natural or synthetic metallic oxides compatible with cement.

2.7 CONTROL JOINTS

Control joint materials
Control joint strip: A proprietary expansion joint consisting of a neoprene filler sandwiched between plates with lugs or ribs for mechanical keying. Set flush with the finished surface.

Proprietary slide plate divider strip: An arrangement of interlocking metal plates grouted into pockets formed in the concrete joint edges.

Sealant: One-part self-levelling non-hardening mould resistant, silicone or polyurethane sealant applied over a backing rod. Finish flush with the finished surface.

- Floors: Trafficable, shore hardness > 35.

Backing rod: Compressible closed cell polyethylene foam with a bond-breaking surface.

3 EXECUTION

3.1 SUBSTRATES

Drying and shrinkage
General: Before tiling, allow at least the following times to elapse (for initial drying out and shrinkage) for these substrates:

- Concrete slabs: 42 days.
- Concrete blockwork: 28 days.
- Toppings on slabs and rendering on brick or blockwork: A further 21 days.
- Rendering on swimming pool shell: A further 28 days minimum.

3.2 PREPARATION

Standard
Preparation: To AS 3958.1 Section 4.

Ambient temperature
General: If the ambient temperature is < 5 or > 35°C, do not lay tiles.

Substrates without wet area membranes
General: Ensure substrates are as follows:

- Clean and free of any deposit or finish which may impair adhesion or location of tiles.
- If framed or discontinuous, support members are in full lengths without splicing.
- If solid or continuous:

. Excessive projections are removed.
. Voids and hollows > 10 mm with abrupt edges are filled with a cement:sand mix not stronger than the substrate or weaker than the bedding.
. Depressions < 10 mm are filled with a latex modified cementitious product with feathering eliminated by scabbling the edges.

Absorbent substrates: If suction is excessive, control it by dampening but avoid over-wetting and do not apply mortar bedding to substrates showing surface moisture.

Dense concrete: If not sufficiently rough to provide a mechanical key, roughen by scabbling or the like to remove 3 mm of the surface and expose the aggregate; then apply a bonding treatment.

Substrates with wet area membranes

General: Ensure substrates are as follows:

- Clean and free of any deposit or finish which may impair adhesion or location of tiles.
- Compatible with all components of the floor system.

3.3 FIXING UNDERLAY

Underlay fixed on joists

Installation: Lay the length of the sheets at right angles to the supports. Stagger the end joints and locate them centrally over joists. If panels are not tongue and grooved provide noggings or trimmer joists to support the edges.

Fixing centres: Maximum 300 mm on each support.

- Fibre-cement flooring: Fix sheeting to the supports with adhesive and non-corrosive countersunk screws. Fill the screw holes with sealant before fixing. After fixing, stop the screw heads with the same sealant, finished slightly below the sheet surface.
- Particleboard and plywood flooring: Fix sheeting to the supports with adhesive and nail.

Membranes: If sheet flooring is the substrate for a wet area membrane, fix with stainless steel countersunk head screws.

3.4 TILING GENERALLY

Sequence

General: Fix wall tiles before floor tiles.

Cutting and laying

Cutting: Cut tiles neatly to fit around fixtures and fittings and at margins where necessary. Drill holes without damaging tile faces. Cut recesses for fittings such as soap holders. Rub edges smooth without chipping.

Laying: Return tiles into sills, reveals and openings. Butt up to returns, frames, fittings, and other finishes. Strike and point up beds where exposed. Remove tile spacers before grouting.

Variations

General: Distribute variations in hue, colour, or pattern uniformly, by mixing tiles or tile batches before laying.

Protection

Floor tiles: Keep traffic off floor tiles until the bedding has set and attained its working strength.

Cleaning: Keep the work clean as it proceeds and protect finished work from damage.

Floor finish dividers

General: Finish tiled floors at junctions with differing floor finishes with a corrosion-resistant metal dividing strip fixed to the substrate. If changes of floor finish occur at doorways, make the junction directly below the closed door.

Bath ventilation

General: Ventilate the space below fully enclosed baths with at least 2 vermin proofed ventilating tiles.

3.5 SETTING OUT

Tile joints

Joint widths: Set out tiles to give uniform joint widths within the following limits:

- Floors:
  . Dry pressed tiles: 3 mm.

  . Extruded tiles: 6 mm.
  . Vitrified: 3 to 5 mm.
  . Quarry tiles: 6 to 12 mm.
  . Chemical resistant epoxy jointed tiling: 5 to 6 mm.
- Large and/or irregular floor tiles: 6 to 12 mm.
- Mounted mosaics: To match mounting pattern.
- Walls:
  . Dry pressed tile: 1.5 mm.
  . Extruded tile: 6 mm.

Joint alignment: Set out tiling with joints accurately aligned in both directions and wall tiling joints level and plumb.

Joint position: Set out tiles from the centre of the floor or wall to be tiled.

Margins

General: Provide whole or purpose-made tiles at margins where practicable, otherwise set out to give equal margins of cut tiles. If margins less than half a tile width are unavoidable, locate the cut tiles where they are least conspicuous.

Fixtures

General: If possible position tiles so that holes for fixtures and other penetrations occur at the intersection of horizontal and vertical joints or on the centre lines of tiles. Continue tiling fully behind fixtures which are not built in to the tiling surface. Before tiling ensure that fixtures interrupting the tile surfaces are accurately positioned in their designed or optimum locations relative to the tile layout.

3.6 FALLS AND LEVELS

Grading

General: Grade floor tiling to even and correct falls to floor wastes and elsewhere as required. Make level junctions with walls. Where falls are not required lay level.

Fall, general: 1:100 minimum.

Fall, in shower areas: 1:60 minimum.

Change of finish: Maintain finished floor level across changes of floor finish including carpet.

3.7 BEDDING

Standard

Cement mortar: To AS 3958.1 clause 5.5.

Adhesive: To AS 3958.1 clause 5.6.

Preparation of tiles

Adhesive bedding: Fix tiles dry; do not soak.

Mortar bedding: Soak porous tiles in water for half an hour and then drain until the surface water has disappeared.

Terra cotta tiles: Use pre-sealed tiles or apply a breathable sealer and lay dry. If a final sealed finish is selected, use a compatible laying sealer.

Bedding

General: Use bedding methods and materials which are appropriate to the tile, the substrate, the conditions of service, and which leave the tile firmly and solidly bedded in the bedding material and adhered to the substrate. Form falls integral with the substrate.

Thin adhesive beds

General: Provide only if the substrate deviation is less than 3 mm when tested with a 3 m straight edge. Cover the entire tile back with adhesive when the tile is bedded.

Thickness: 1.5 – 3 mm.

Thick adhesive beds

General: Provide on substrates with deviations up to 6 mm when tested with a 3 m straight edge, and with tiles having deep keys or frogs.

Nominal thickness: 6 mm.

Adhesive bedding application

General: Apply adhesive by notched trowel to walls and floors and direct to tiles if required, to provide evenly distributed coverage after laying as follows:

- Domestic internal walls: > 65%.
- Domestic internal floors: > 80%.
- Other wall and floors: > 90%.
- Wet areas and bench tops: 100%.

Pattern of distribution of adhesive: As described in AS 3958.1 clause 5.6.4.3. Verify by examining one tile in ten as work proceeds.

Wall tile spacers: Do not use spacer types that inhibit the distribution of adhesive.

Curing: Allow the adhesive to cure for the period nominated by the manufacturer prior to grouting or allowing foot traffic.

Mortar beds

For floor tiles: Either lightly dust the screeded bed surface with dry cement and trowel level until the cement is damp, or spread a thin slurry of neat cement, or cement-based thin bed adhesive, on to the tile back. Do not provide mortar after initial set has occurred.

- Nominal thickness: 20 to 40 mm.

Thick reinforced beds: Place mortar bed in two layers, and incorporate the mesh reinforcement in the first layer.

3.8 CONTROL OF MOVEMENT

General

General: Provide control joints carried through the tile and the bedding to AS 3958.1 clause 5.4.5 and as follows:

- Floor location:
  - . Over structural control joints.
  - . To divide complex room plans into rectangles.
  - . Around the perimeter of the floor.
  - . At junctions between different substrates.
  - . To divide large tiled areas into bays.
- At abutments with the building structural frame and over supporting walls or beams where flexing of the substrate is anticipated.
- Wall location:
  - . Over structural control joints.
  - . At junctions with different substrate materials when the tiling is continuous.
  - . At vertical corners in shower compartments.
- Depth of joint: Right through to the substrate.
- Sealant width: 6 – 25 mm.
- Depth of elastomeric sealant: One half the joint width, or 6 mm, whichever is the greater.

3.9 GROUTED AND SEALANT JOINTS

Grouted joints

General: Commence grouting as soon as practicable after bedding has set. Clean out joints as necessary before grouting.

Face grouting: Fill the joints solid and tool flush. Clean off surplus grout. Wash down when the grout has set. When grout is dry, polish the surface with a clean cloth.

Edges of tiles: Grout exposed edge joints.

Epoxy grouted joints: Ensure that tile edge surfaces are free of extraneous matter such as cement films or wax, before grouting.

Mosaic tiles

Grouting mosaics: If paper faced mosaics are to be bedded in cement mortar, pre-grout the sheeted mosaics from the back before fixing. After fixing, rub grout into the surface of the joints to fill any voids

left from pre-grouting. Clean off surplus grout. When grout has set, wash down. If necessary use a proprietary cement remover.

Sealant joints

General: Provide joints filled with sealant and finished flush with the tile surface as follows:

- Where tiling is cut around sanitary fixtures.
- At all vertical and horizontal 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 suitably fixed to the substrate, with top edge flush with the finished floor. Where changes of floor finish occur at doorways make the junction directly below the closed door.

Stepping: Less than 5 mm.

Adjustments

If the floor finish divider was installed by the wet area waterproof membrane applicator check that the height is sufficient for the topping and tile thickness. Adjust as required with a matching flat bar adhesive fixed to the divider angle.

Weather bars

General: Provide a corrosion resistant metal weather bar under hinged external doors. Locate under the centres of closed doors.

3.11 COMPLETION

Spare tiles

General: Supply spare matching tiles and accessories of each type for future replacement purposes. Store the spare materials on site.

Quantity: At least 1% of the quantity installed.

Cleaning

General: Clean tiled surfaces using an appropriate tile cleaning agent, and polish.

Operation and maintenance manuals

General: Submit a manual describing care and maintenance of the tiling, including procedures for maintaining the slip-resistance grading stating the expected life of the slip-resistance grade.

0652B CARPETS

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Lay carpet to substrates as follows and/or to the **finishes schedule**:

- To remain secured for the warranty life of the carpet.
- To remain consistently smooth for the warranty life of the carpet.
- To form the pattern required.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.

1.3 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Subfloor prepared to receive the carpet installation.
- Fixings, edge strips, and underlay installed ready to lay carpet.
- Completed carpet after cleaning and before covering for protection.

1.4 SUBMISSIONS

Samples

General: Submit labelled production run samples illustrating the range of colour, pattern, texture and pile yarn available in the required carpet types.

Sample size: Submit the following:

- Carpet: Manufacturer's standard swatch.
- Underlay: Submit one labelled sample at least 600x600 mm.

2 PRODUCTS

2.1 GENERAL

Critical radiant flux

Standard: to AS ISO 9239.1.

Smoke development rate

Standard: To AS ISO 9239.1.

Floor finishes in non-sprinklered buildings: 750 percent-minutes.

2.2 CARPET

Tolerances

Standard: To AS/NZS 1385.

Batching

General: Carpet laid in a single area and of a single specified type, quality, colour and design, must come from one manufacturing batch and dye lot.

Insect resistance

Insecticide: Provide carpets and underlays composed entirely of materials either inherently resistant to insect attack, or treated against insect attack, including by moth and carpet beetle, by application of insecticide to the yarn during the dyeing or scouring process.

Electrical resistance
General: Provide carpet which is within the range of surface resistance specified in AS 2834 clause 2.1.2, when tested to AS 4155.6.

VOC limits
Total VOC limit:

- Generally: 0.5 mg/m^2.
- Compliance: To the Environmental Classification Scheme operated by the Carpet Institute of Australia.

2.3 UNDERLAYS

Standard
General: To AS/NZS 2455.1.

Fibre cement underlay
Thickness: 5 mm minimum.

Wet processed fibreboard (hardboard) underlay
Standard: To AS/NZS 1859.4.

Classification: General purpose medium board, manufactured specifically as flooring underlay.

Thickness: 5.5 mm.

Soft underlay
Standard: To AS 4288.

2.4 ADHESIVES AND TAPES

Standard
General: To AS/NZS 2455.1.

Adhesives
General: Compatible with the floor covering material, and suitable for bonding it to the subfloor.

Friction compound: Suitable for holding tiles in position without permanent sticking.

Hot-melt adhesive tapes
General: Commercial grade glass fibre and cotton thermoplastic adhesive coated tape 60 mm wide on a 90 mm wide metal foil base and backed with silicon-coated release paper.

2.5 STRIPS

Preformed gripper strips
General: Commercial grade plywood carpet gripper strip with 3 rows of rust-resistant angled pins of length appropriate to the carpet type.

Size (minimum): 33 mm wide x 7 mm thick.

Location: At edges, except where edge strips are used. Provide double gripper strips to edges where recommended.

Edge strips
Type: Heavy duty edge strip appropriate to the floor covering type (tackless or adhesive fixed), capable where necessary of accommodating different levels of adjacent floor finishes.

Form: Metal moulding or extrusion, with vinyl inserts.

Location: At exposed edges of the carpet, and at junctions with differing floor finishes or finishes of a different thickness. Where edge strips occur at doorways, locate the junctions directly below the closed door.

3 EXECUTION

3.1 SUBSTRATE

Substrates
General: Ensure substrates conform to the **Substrate tolerance table** and are as follows:

- To AS/NZS 2455.1 or AS/NZS 2455.2, as appropriate.

- Clean and free of any deposit or finish which may impair adhesion or location and functioning of control joints.

Substrate tolerance table

Property	Length of straight edge laid in any direction	Max. deviation under the straight edge
Flatness	3 m	6 mm
Smoothness	150 mm	1 mm

Concrete substrate correction: Remove projections and fill voids and hollows with a levelling compound compatible with the adhesive.

Timber substrate correction: Remove projections. If conformance to the **Substrate tolerance table** cannot be achieved, fix an underlay in brick pattern with joints avoiding substrate joints.

Moisture content: Do not commence installation unless:

- Concrete: The moisture content of the concrete has been tested to AS/NZS 2455.1 Appendix B and the values in AS/NZS 2455.1 clause 2.4.2 (c) have been obtained.
- Plywood: The moisture content of battens/joists or plywood substrate has been tested to AS/NZS 1080.1 and values obtained as follows:
  . Air conditioned buildings: 8 to 10%.
  . Intermittently heated buildings: 10 to 12.5%.

Fixtures: Remove door stops and other fixtures, and refix in position undamaged on completion of the installation.

3.2 LAYING CARPET

Standard

General: To AS/NZS 2455.1.

Setting out

General: Lay the carpet in continuous lengths without cross joins in the body of the area. If unavoidable cross joins occur at doorways, locate the joins directly below the closed doors.

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.

Fixing underfelt

To timber floors: Secure underfelt with staples at 100 mm centres at edges and joints, in parallel lines 600 mm apart.

To concrete floors: Glue continuously at edges and joints with a 100 mm wide strip to each piece, and at 600 mm centres both ways with 150 mm diameter patches.

Seaming methods

Woven carpet: Machine or hand sew. Do not provide glued taped seams.

Tufted carpet: Seam with hot-melt adhesive tape.

Carpet installation

Gripper system: To AS/NZS 2455.1 clause 3.5.

Direct stick system: To AS/NZS 2455.1 clause 3.6.

Double bond system: To AS/NZS 2455.1 clause 3.7.

Pre applied underlay adhesive system: To AS/NZS 2455.1 clause 3.8.

Hook and loop system: To AS/NZS 2455.1 clause 3.9.

Cutting laid carpet

Method: Make penetrations through laid carpet are necessary for electrical, telephone or other outlets, cut the carpet either by cross cutting or by cutting rectangular or circular openings.

Cutting holes in concrete floors: Protect the carpet and remove concrete particles and dust on completion. Replace the cut carpet over the opening without any signs of fraying or other damage, and fix with a peel-up adhesive, or resew.

3.3 STAIRS

Installation

General: To AS/NZS 2455.1 clause 3.10.

Concrete stairs

Fixing: Adhesive method.

Laying method: Apply the floor covering continuously to the treads and risers.

Timber stairs

Closed rise types: Tackless method, with a gripper strip in each angle between treads and risers.

Open rise types: Adhesive fixing.

Laying method:

- Closed rise types: Apply the floor covering continuously to the treads and risers.
- Open rise types: 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 nosing type

Refer to finishes schedule.

3.4 COMPLETION

Warranties

General: Submit the manufacturers published product warranties.

Cleaning

General: Progressively clean the work. Remove waste, excess materials and adhesive.

Final cleaning: When the installation is complete, clean the carpet as necessary to remove extraneous matter, marks and soiling and to lift the pile where appropriate.

Protection: Provide fabric drop sheets. Do not use plastic sheeting. If wheeled traffic is to follow carpet installation, protect with hardboard sheets butted and fixed with adhesive tape.

0654 ENGINEERED PANEL FLOORING

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Provide floating flooring systems to substrates, as documented and as follows:

- Appropriately smooth and flat for the intended use.
- Form the pattern required.
- With the timber content of the panel at its equilibrium moisture content.

Selections: As documented.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.

1.3 INTERPRETATION

Definitions

General: For the purposes of this worksection the following definitions apply:

- Acoustic underlay: A resilient underlay providing acoustic isolation.
- Equilibrium moisture content (EMC): For given conditions of humidity and temperature, the moisture content which timber approaches at which it neither gains nor loses moisture while the conditions of its environment are maintained.
- Feature: Any natural variation or colour which affects timber appearance, including gum/resin veins, borer marks, checks and knots. The grade will determine the level of feature present.
- Flooring:
  - . Continuously-supported: Flooring which is supported by, and directly fixed to, continuous supporting surfaces, including concrete slabs and sheet flooring or underlay subfloors.
  - . Sprung floor: A floating floor engineered to absorb shocks, usually fixed on resilient pads.
  - . Engineered floor panels: Manufactured flooring with wearing and decorative surfaces of timber or plastic laminated to supporting layers of plywood usually with tongues and grooves along the lengths of the boards.
  - . Floating floor: Any manufactured flooring panel system not fixed to the substrate.
- Moisture content (Timber): The percentage by mass of water present in the timber.
- Substrate: The surface to which a material or product is applied.
- Underlay: A non-structural layer of sheet material or an in situ levelling material on the subfloor to provide a smooth and level surface.

1.4 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Substrate: Immediately before flooring.
- Trial set-out: Before execution.

1.5 TOLERANCES

Tolerances

Maximum deviation of the finished floor surface: 3 mm under a 3 m straight edge laid in any direction.

1.6 SUBMISSIONS

Product samples
General: Submit samples of each timber flooring product illustrating the range of variation in colour and figure in conformance with the **Samples table**.

Samples table

Item	Sample size	Number
Timber flooring.	600x600	1

Laying instructions
General: Submit floor product manufacturer's detailed laying instructions.

Tests
On-site tests: Submit results of the **Moisture content alignment of flooring and subfloor**.

Fire hazard properties: Submit evidence of conformance to **PRODUCTS**, **GENERAL, Critical radiant flux** and **Smoke development rate**.

2 PRODUCTS

2.1 GENERAL

Moisture protection
Vapour barrier: Polyethylene film minimum 200 µm thick laid over the concrete substrate, turned up behind the skirting, and lapped and taped.

Adhesive
General: Provide adhesives, as documented and as follows:

- Compatible with the substrate and flooring to be adhered.
- Alkali resisting.
- Solvent and water content: ≤ 40%.
- Shear strength when cured (average): ≥ 1.47 MPa.
- Elasticity: Sufficient to withstand continuous expansion and contraction of boards.
- Will not break down under service.

Ventilation: Provide adequate ventilation appropriate for moisture curing.

Acoustic underlay
General: Resilient underlay fixed with compatible adhesive.

Critical radiant flux
Standard: To AS ISO 9239.1.

Flooring system: Conform to the values of critical radiant flux, as documented.

Smoke development rate
Standard: To AS ISO 9239.1.

Floor finishes in non-sprinklered buildings: 750 percent-minutes.

2.2 PRODUCTS

Flooring panels
General: Provide the proprietary flooring system nominated in the **Engineered panel floor schedule**.

Recycled timber: Re-sawn and finished to eliminate weathering stains and expose fresh timber.

Floating floor underlay
General: Provide the proprietary closed cell foam sheeting that is integral to the flooring system.

Sprung floor components
Underlay: Layered plywood panel system as nominated by the flooring system supplier.

Resilient pads: Closed cell pads as spaced and nominated by the flooring system supplier.

Ventilated skirting: Vermin proof, as documented or as supplied by the flooring system supplier.

Accessories
Ramped threshold gradients: 1 in 8 maximum.

3 EXECUTION

3.1 PREPARATION

Storage
General: Deliver panel flooring to site in unbroken wrapping or containers and store so that its moisture content is not adversely affected. Do not store on the substrate until the moisture content of the substrates is suitable for the installation of the floor. Do not store in areas with wet plaster.

Substrates
General: Make sure substrates are as follows:

- Clean and free of any deposit or finish which may impair adhesion or location and functioning of control joints.
- If solid or continuous, excessive projections are removed and voids and hollows are filled with a levelling compound compatible with the flooring including any adhesive.
- Existing timber flooring substrates: Remove cupping, rough material and surface finishes by rough sanding.

Flatness: Not greater than 3 mm deviation of the surface under a 3 m straight edge laid in any direction with no abrupt variations greater than 1 mm over 250 mm.

Moisture content
General: Do not commence installation of flooring unless:

- Concrete substrate: The moisture content of the concrete has been tested to AS/NZS 2455.1 Appendix B and the values in clause 2.4.2 (c) have been obtained.
- Plywood underlays or timber flooring products: The moisture content has been tested to AS/NZS 1080.1 and values obtained as follows:
  . Air conditioned buildings: 8 to 10%.
  . Intermittently heated buildings: 10 to 12.5%.
  . Unheated buildings: 12 to 15%.

Conformance: Confirm that the moisture content of the timber flooring products, as delivered, matches the moisture content of the subfloor as measured on site. If not, allow for acclimatisation.

Acclimatisation
General: Acclimatise the flooring by stacking it in the in-service conditions for a minimum period of two weeks with air circulation to all surfaces, after the following construction operations are complete:

- Air conditioning operational.
- Lighting operational.
- Site drainage and stormwater works are complete.
- Space fully enclosed and secure.
- Wet work complete and dry.

Vapour barrier: Lay 200 µm high-impact resistant polyethylene film. Lap 300 mm, seal the laps with pressure-sensitive tape and return up the vertical surfaces and trim at the level of the flooring.

3.2 LAYING

Room environment
General: During fixing and stabilising, operate the heating system of radiant heated or air conditioned rooms at 1.5°C above normal maximum temperature.

Trial set-out
General: Prepare a trial panel set-out to each area, as follows to:

- Maximise the size of equal margins of cut panels.
- Locate control joints.

Laying instructions
Performance for adhesive fixing: Spread adhesive and lay boards to achieve the following:

- Contact between panel and adhesive: 75%. Verify by lifting and examining 1 panel in 20.
- Clamp starting and finishing rows to prevent sideways movement.
- Avoid clusters of end joints.
- Make sure adhesive does not bleed through at joints.
- Remove excess adhesive progressively before initial cure.
- Hold down in contact with the adhesive over night to achieve a complete cure.
- If pins or nails are used as well as adhesive for panels, punch below the surface without bruising. Fill holes to match the panels.

Control joints

General: Provide control joints as follows:

- Against vertical building elements: 12 mm wide, cork filled.
- To divide floors into maximum dimensions of 6 m: 4 mm wide silicone sealant filled.

Room environment

General: During fixing and stabilising, operate the heating system of radiant heated or air conditioned rooms at 1.5°C above normal maximum temperature.

3.3 COMPLETION

Protection

General: Provide protection as follows:

- Floors: With used carpet taped at all joints. Do not cover with sheet plastic.
- Stair treads: Full timber or plywood casing.

Spare flooring products

General: Supply an extra 5% of flooring products, to be stored on site as spares.

0655 TIMBER FLOORING

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Provide timber flooring systems to subfloors, as documented and as follows:

- Appropriately secured.
- Appropriately smooth and flat for the intended use.
- Form the pattern as required.
- Structurally adequate.
- Suitable for the applied finish.
- At its equilibrium moisture content.

Selections: As documented.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.

1.3 INTERPRETATION

Definitions

General: For the purposes of this worksection the following definitions apply:

- Acoustic underlay: A resilient underlay providing acoustic isolation.
- Equilibrium moisture content (EMC): For given conditions of humidity and temperature, the moisture content which timber approaches at which it neither gains nor loses moisture while the conditions of its environment are maintained.
- Feature: Any natural variation or similar which affects timber appearance, including gum/resin veins, borer marks, checks and knots. The grade will determine the level of feature present.
- Flooring:
  - . Continuously-supported: Flooring which is supported by and directly fixed to a continuous supporting surface, including concrete slabs and sheet flooring or underlay subfloors.
  - . Fitted: Flooring fitted between the walls of each room i.e. not platform floors.
  - . Intermittently-supported: Flooring which is supported by, and spans across, beams, joists or battens.
  - . Strip flooring: Flooring made from machined timber with tongues and grooves along the length of the strips.
- Moisture content (timber): The percentage by mass of water present in the timber.
- Parquet: Timber mosaic parquet panels or wood block parquet bonded to a subfloor either directly or over an underlay.
  - . Wood block parquet: Rectangular blocks of timber with length a multiple of width (e.g. 260 x 65 mm) laid individually to produce a pattern.
  - . Mosaic parquet panels: Pre assembled timber finger modules held together to form tiles or panels.
- Subfloor: The structure that supports the flooring (e.g. concrete slabs, timber joists or battens, sheet flooring or underlay and light steel joists).
- Underlay: A non-structural layer of sheet material or an in situ levelling material on the subfloor to provide a smooth and level surface.

1.4 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Trial set out: Before execution.
- Completed installation before the application of coated finishes.

1.5 TOLERANCES

Tolerances

Maximum deviation of the finished floor surface: 3 mm under a 3 m straight edge laid in any direction.

1.6 SUBMISSIONS

Product samples

General: Submit samples of each timber flooring type illustrating the range of variation in colour and figure in conformance with the **Samples table**.

Samples table

Item	Sample size	Number
Timber flooring.	600x600	1

Verification

Certificate: Submit a supplier's certificate (which may be included on an invoice or delivery docket) verifying conformance to grading, species and board size and noting moisture content.

Inspection: If neither branding nor certification is adopted, submit a report by an independent inspecting authority verifying conformance.

Tests

Site tests: Submit results of the **Moisture content alignment of flooring and subfloor**.

Fire hazard properties: Submit evidence of conformance to **PRODUCTS**, **GENERAL, Critical radiant flux** and **Smoke development rate.**

2 PRODUCTS

2.1 GENERAL

Adhesive

General: Provide adhesives, as documented and as follows:

- Compatible with the subfloor and flooring to be adhered.
- Alkali resisting.
- Solvent and water content: ≤ 40%.
- Shear strength when cured (average): ≥ 1.47 MPa.
- Elasticity: Sufficient to withstand continuous expansion and contraction of boards.

Ventilation: Provide adequate ventilation appropriate for moisture curing.

Acoustic underlay

General: Resilient underlay fixed with compatible adhesive.

Critical radiant flux

Standard: to AS ISO 9239.1.

Flooring system: Conform to the values of critical radiant flux, as documented.

Smoke development rate

Standard: To AS ISO 9239.1.

Floor finishes in non-sprinklered buildings: 750 percent-minutes maximum.

2.2 SHEET UNDERLAY

Plywood

Standard: To AS/NZS 2269.0.

Plywood formaldehyde emission class to AS/NZS 2269.0: Class E1.

Grading:

- Surface grade: CD.
- Bond: Type A to AS/NZS 2754.1 (Int).

Particleboard

Particleboard: To AS/NZS 1860.1, Class 1.

Particleboard formaldehyde emission class to AS/NZS 1860.1: Class E1.

2.3 STRIP AND PARQUET FLOORING

Recycled timber

Standard: To FWPA PN06.1039.

- Grading: To Section 5.

New hardwood

Standard:

- Generally: To AS 2796.1.
- Grading: To AS 2796.2 clause 1.7.

New softwood

- Standard:
- Seasoned cypress pine: To AS 1810.
  - . Grade: 1.
- Softwood – pinus ssp: To AS 4785.2.
  - . Grade: Appearance.
- Softwood – other: To AS 4785.2.
  - . Grade: Select.

Identification

General: Identify timber using branding or certification.

- Branding: Brand timber under the authority of a recognised product certification or accreditation program applicable to the product. Locate the brand mark on faces or edges which will be concealed in the works.
- Provide certification from the recognised product certification or accreditation programs as appropriate:
  - . Flooring: The Australia Timber Flooring Association's (ATFA) Accredited Timber Flooring Manufacturers Program.
  - . Hardwoods: Australian Timber Industry Certification Quality Scheme.
  - . Milled radiata pine products: Plantation Timber Certification.
  - . Plywood and particleboard: Engineered Wood Products Association of Australia Quality Control and Product Certification Scheme.
  - . Sawn radiata pine boards: Plantation Timber Certification.

3 EXECUTION

3.1 PREPARATION

Storage

General: Deliver timber flooring to site in unbroken wrapping or containers and store so that its moisture content is not adversely affected. Do not store on the substrate until the moisture content of the substrate is suitable for the installation of the floor. Do not store in areas of wet plaster.

Subfloor

General: Make sure subfloors are as follows:

- Clean and free of any deposit or finish which may impair adhesion or location and functioning of control joints.
- If solid or continuous, remove excessive projections and fill voids and hollows with a levelling compound compatible with the flooring including any adhesive.

Flatness: Not greater than 3 mm deviation of the surface under a 3 m straight edge laid in any direction with no abrupt variations greater than 1 mm over 250 mm.

Moisture content alignment of flooring and subfloor

General: Do not commence installation of flooring unless:

- Concrete subfloor: The moisture content of the concrete has been tested to AS/NZS 2455.1 Appendix B and values in clause 2.4.2 (c) have been obtained.
- Plywood underlays or timber flooring products: The moisture content has been tested to AS/NZS 1080.1 and values obtained as follows:
  - . Air conditioned buildings: 8 to 10%.
  - . Intermittently heated buildings: 10 to 12.5%.
  - . Unheated buildings: 12 to 15%.

Conformance: Confirm that the moisture content of the timber flooring products, as delivered, matches the moisture content of the subfloor as measured on site. If not allow for acclimatisation.

Acclimatisation

General: Acclimatise the flooring by stacking it in the in-service conditions for a minimum period of two weeks with air circulation to all surfaces, after the following construction operations are complete:

- Air conditioning operational.
- Lighting operational.
- Site drainage and stormwater works are complete.
- Space fully enclosed and secure.
- Wet work complete and dry.

3.2 SUPPORT FIXING - UNDERLAY

Battens for sheet underlay on concrete slabs

Framing fixed direct: Fix seasoned battens to the concrete slab in conformance with the **Sheet underlay battens table** so that their top surfaces are aligned.

- Battens: 70 x 35 mm seasoned timber.
- Spacing of fasteners: < 900 mm.

Framing fixed on resilient pads: Fix seasoned battens on resilient pads to the concrete slab in conformance with the **Sheet underlay battens table** so that their top surfaces are aligned.

- Pad spacing: 400 mm centres.

Vapour barrier under battens: 200 µm high-impact resistant polyethylene film. Lap 300 mm, seal the laps with pressure-sensitive tape and return up the vertical surfaces and trim at the level of the flooring.

Sheet underlay battens table

Plywood stress grade	Plywood thickness mm	Batten spacing mm
F14	12.5	450
F11	18.5	600
F14	17	600

3.3 SUPPORT FIXING – STRIP FLOORING

Battens for strip flooring on concrete slabs

General: Make sure support members are in full lengths without splicing.

Framing fixed direct: Fix seasoned battens to the concrete slab in conformance with the **Strip flooring battens table** so that their top surfaces are aligned.

- Battens: 70 x 35 mm seasoned timber.
- Spacing of fasteners: < 900 mm.

Framing fixed on resilient pads: Fix seasoned battens on resilient pads to the concrete slab in conformance with the **Strip flooring battens table** so that their top surfaces are aligned.

- Pad spacing: 400 mm centres.

Vapour barrier under battens: 200 µm high-impact resistant polyethylene film. Lap 300 mm, seal the laps with pressure-sensitive 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.

Strip flooring battens table

Strip flooring timber (average species density)	Standard	Flooring thickness	Batten spacing for flooring type	
			Butt jointed	End matched
Cypress	AS 1810	20	450	450
Hardwood density 560 kg/m^3 or more	AS 2796.1	19	600	450
		25	600	450
		30	600	600
Hardwood density less than 560 kg/m^3	AS 2796.1	19	450	390
		25	600	450
		30	600	600
Softwood density 560 kg/m^3 or more	AS 4785.1	19	450	450
		35	600	450
Softwood density less than 560 kg/m^3	AS 4785.1	19	450	390
		35	600	450

3.4 FIXING UNDERLAY

Underlay batten fixed on concrete slabs

General: Fix underlay to the battens so that their top surfaces are aligned.

Installation: Lay the length of the sheets at right angles to the supports. Stagger the end joints and locate them centrally over supports. If sheets are not tongue and grooved provide noggings or trimmers to support the edges.

Orientation for parquet flooring: Fix at 45° to the direction of the flooring pattern.

Fixing to battens:

- Nailed only: 150 mm along ends, 300 mm on intermediate battens.
- Glued/nailed: Continuous 10 mm glue bead and nails at 300 mm.
- Glued only: To the adhesive manufacturer's recommendations with downward pressure during curing.

Underlay control joints: Provide joint widths as follows:

- Against vertical building elements: 10 mm.
- Between underlay sheets: 6 mm.
- Between tongue and groove sheets: Hand pressure assembly.

Underlay adhesive fixed on concrete slabs

Vapour barrier: A liquid applied membrane compatible with the adhesive system.

Plywood: Apply a sealant to the underside compatible with the adhesive.

Orientation for parquet flooring: Fix at 45° to the direction of the flooring pattern.

Orientation for strip flooring: Fix sheets in a stretcher bond or at 45° to the floor board direction.

Glue and nail fixing:

- Nail centres: 300 mm from edges and at 600 x 600 mm.
- Glue beads: 10 mm diameter and at 500 x 500 mm.

Glued only fixing: Apply adhesive with a notched trowel to the manufacturer's recommendations. Provide downward pressure during curing.

Underlay control joints: Provide joint widths as follows:

- Against vertical building elements: 10 mm.
- Between underlay sheets: 6 mm.
- Between tongue and groove sheets: Hand pressure assembly.

Underlay mechanically fixed on concrete slabs

Orientation for parquet flooring: Fix at 45° to the direction of the flooring pattern.

Orientation for strip flooring: Fix sheets in a stretcher bond or at 45 degrees to the floor board direction.

Nail fixing: 100 mm from edges and 550 mm centres along grain and 500 mm centres across grain.

Underlay control joints: Provide joint widths as follows:

- Against vertical building elements: 10 mm.
- Between underlay sheets: 6 mm.
- Between tongue and groove sheets: Hand pressure assembly.

Underlay 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: Maximum 300 mm on each support.

Particleboard and plywood underlay:

- Timber joists: Adhesive and nail fix.
- Steel joists: Fix with countersunk screws.

3.5 FLOOR FIXING

Room environment

General: During fixing and stabilising, operate the heating system of radiant heated or air conditioned rooms at 1.5°C above normal maximum temperature.

Adhesive

Strip flooring: Use a urethane elastomer adhesive in addition to nails as follows:

- Continuously supported flooring: 4 mm beads at 300 mm spacing at right angles to run of flooring.
- Intermittently supported flooring: 6 mm bead along each joist or batten.

Parquet and strip flooring fixed by direct adhesion: Spread adhesive over subfloor in conformance with manufacturer's recommendations.

Nailing

General: Ensure the boards are in contact with the subfloor at the time of nailing, particularly where boards are machine nailed. Skew nail in a uniform pattern. If nails are to be less than 12 mm from ends of boards, pre-drill nail holes 0 – 1 mm undersize.

Secret nailing: Do not use boards of more than 85 mm cover width, and use one nail or staple skewed at 45°. Do not cramp more than one board at a time.

Sinking: Punch nails 3 mm below finished surfaces and fill the sinking flush with a material tinted to match the flooring which is compatible with the floor finish.

Top nailing: For boards more than 65 mm cover width, use two nails skewed 10 degrees in opposite directions. Do not cramp more than 800 mm width of boards at one time.

Control joints

Perimeters: Provide 10 mm wide joints against vertical building elements.

Strip flooring:

- Floors less than 6 x 6 m: Partially cramp strip flooring to allow a 1 mm gap every 600 mm or 1.5 mm every metre.
- Floors greater than 6 x 6 m: Additionally, divide floors into maximum dimensions of 6 m with joints 4 mm wide filled with a flexible sealant compatible with the applied finish.

Parquet flooring: If joints are required in conspicuous locations, cut a 4 mm wide joint to the full depth of the parquet at maximum spacing of 6 m and fill with clear silicone sealant.

Strip flooring

General: Blend floor boards from more than one pack to distribute the colour range and grade features throughout the floor.

Installation: Lay in straight and parallel lines with each board firmly butted to the next and firmly in contact with the subfloor. Cramp sufficient only to bring the boards together and no more than 800 mm of flooring at any one time.

Fixing to softwood joists, battens or underlay: Apply adhesive in addition to nailing.

Strip flooring on sheet underlay:

- On joists or battens: Nail through underlay to joists or battens.
- Direct fix to concrete slab: Secrete nail only.

Set-out: Locate joints in boards so that they are evenly and symmetrically distributed and as follows:

- General: Staggered and at least 450 mm apart.
- Butt joints: Centrally on supports.
- End-matched joints: Not in adjacent boards.
- Minimum number of spans across supports: 2.

Strip flooring fixed by direct adhesion

Vapour barrier: A liquid applied membrane compatible with the adhesive system.

Installation:

- Lay in straight and parallel lines with each board firmly butted to the next and firmly bedded on the adhesive on the subfloor.
- Temporarily or permanently hold floor boards in position with pins or nails.
- Hold down in contact with the adhesive over night to achieve a complete cure.
- If pins or nails are used to permanently position floor boards, punch below the surface without bruising. Fill holes to match the floor boards.

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 each area to:

- Maximise the size of equal margins of cut parquet tiles or panels.
- Locate control joints.

Laying method: To the manufacturer’s flooring installation guide.

Performance: Spread adhesive and lay boards to achieve the following:

- Contact between block or panel and adhesive: 75%. Verify by lifting and examining 1 panel in 20.
- Clamp starting and finishing rows to prevent sideways movement.
- Avoid clusters of end joints.
- Make sure adhesive does not bleed through at joints.
- Remove excess adhesive progressively before initial cure.
- Hold down in contact with the adhesive over night to achieve a complete cure.
- Minimise trimming of parquet blocks.
- Avoid colour blocks.
- If block parquet is fixed directly to strip flooring, lay at 45° to joints between strip flooring.
- If pins or nails are used as well as adhesive for block parquet, punch below the surface without bruising. Fill holes to match the blocks.

3.6 COMPLETION

Protection

General: Provide protection as follows:

- Floors: With hardboard taped at all butt joints. Do not cover with sheet plastic.
- Stair treads: Full timber or plywood casing.

Spare flooring products

General: Supply an extra 5% of flooring products, to be stored on site as spares.

0656 FLOOR SANDING AND FINISHING

1 GENERAL

1.1 RESPONSIBILITIES

General
General: Provide floor sanding and finishing as documented.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following worksection(s):
- *General requirements*.

1.3 STANDARD

General
Standard: To AS 4786.2.

1.4 INTERPRETATION

Definitions
General: For the purposes of this worksection the following definitions apply:
- Coating system: Applied materials to enhance wear and protect the flooring material.
- Edge bonding: The tendency of some coating systems to glue the edges of strip flooring and parquetry panels which prevents an even distribution of movement gaps.
- Filling: Treatment to enhance the surface appearance by:
  - . Flood filling: To fill the pores of open-grained timber or minor cracks in parquetry.
  - . Stopping: To fill punched nail head cavities.
- Flooring:
  - . Hard flooring: Timber with a wearing surface not easily cut with an abrasive.
  - . Mild flooring: Timber with a wearing surface easily cut with an abrasive.
- Sanding:
  - . Basic sanding: Sanding procedures resulting in an even plane surface free of irregularities.
  - . Finish sanding: Sanding procedures resulting in a surface suitable for the application of the coating system.
- Sealing: Treatment to:
  - . Prevent excessive penetration of coating system.
  - . Prevent edge bonding by the coating system.
- Staining: Treatment to alter the colour of the timber surface.

1.5 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of the following:
- Before surface preparation of timber.
- Completion of finish sanding.
- After application of clear finishing coat.

1.6 SUBMISSIONS

Execution details
General: Submit statement of proposed methods for applying coating systems.

Materials
Product conformity: Submit evidence of conformity to the requirements of Appendix I Uniform Paint Standard to the Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP).

2 PRODUCTS

2.1 ABRASIVES

Grades

General: Select abrasives in conformance with the **Abrasives table**.

Abrasives table

Floor hardness	Basic sanding	Finish sanding		Sanding between finish coats of coating system
		Initial cuts	Final sand	
Hard	F24 to F30	F40 to F60	F80 to F120	F150 or finer
Mild	F36 to F40	F60 to F80	F100 to F120	F150 or finer
Soft	F60 to F80	F80 to F100 if necessary	F120	F150 or finer

Scratching: If scratching persists during the final sanding re-sand with a finer grade of abrasive.

2.2 FINISH

Filler

General: Non-oil based and compatible with the coating system.

Sealer

General: Refer to finishes schedule.

Coating system

Type: Provide the coating system as documented.

Quality: Provide premium quality lines.

Combinations:

- Do not combine clear finishes from different manufacturers in a coating system.
- Provide only the combinations of filler, stain and sealer recommended by the manufacturer of the top coats.

Delivery: Deliver all products to the site in the manufacturer's labelled and unopened containers.

3 EXECUTION

3.1 PREPARATION

Protection

Extent: Protect immediate area against damage during sanding and finishing.

Openings: Cover any openings such as general power outlets, switches and air grilles.

Lighting

General: Provide supplementary lighting to allow close examination of the entire process.

Substrate

General: Do not commence sanding until:

- Adhesives have cured.
- Floor heating has been switched off for 48 hours.
- Filler has dried as indicated by the colour fading.

Before finishing: Make sure substrates are clean and free of any deposit which may impair the following:

- Application of the coating system.
- Adhesion of resilient finishes.

Preparation
General: Punch nails 3 mm below the surface. Remove items protruding from floor such as staples, nails and tacks. Fill open grained timber with materials compatible with those used in subsequent finishing operations.

3.2 SANDING

Sanding procedure
Existing floor in good condition: Finish sanding only.

New floors and existing floors in poor condition:

- For use as flooring substrate: Basic sanding only.
- For use as finished surface: Basic sanding and finish sanding.

Basic sanding – general
General: Remove irregularities caused by cupping or mismatching of the flooring materials, with a drum type sanding machine and coarse abrasives.

Basic sanding – strip flooring
General: First cut at 45° to the length of the boards, second cut at 90° to the first cut, and third cut parallel to the length of the boards.

Boundary areas: Bring to the same surface condition as the main sanded area, using disc sanding.

Inaccessible areas: Hand scrape to produce an even, plane surface.

Stopping and filling
General: Select a colour to produce an average match with the final coated timber in tone, colour and texture.

Minor cracks: Fill and stop punched nails with a putty knife.

Deeper holes: Fill in layers > 6 mm allowing each fill to dry. Make sure cavities are filled slightly above the surface without air pockets.

Porous timber: Flood fill with the cloth application of water based filler diluted to a creamy consistency.

Finish sanding – general
General: Provide a clear finished surface free of scratch marks when observed under the design light level when standing.

Finish sanding – strip flooring
General: After basic sanding, cut twice parallel to the length of the boards using increasingly fine abrasives. If hard surfaces show excessive scratching apply an initial cut at 90° to the grain direction.

Boundary areas: Bring to the same surface condition as the main sanded area, using disc sanding.

Inaccessible areas: Hand scrape to produce the same surface condition as the main sanded area.

Water based coating system: Sand with a final grade of paper of minimum F220 screen back.

Cleaning
General: After each sanding operation remove all dust by all of the following:

- Removal from cracks by hand.
- Vacuum cleaning.
- Tack rag cleaning.

3.3 COATING SYSTEM

General
Finish: Provide coating system as follows:

- Consistent film thickness.
- Consistent level of gloss.

Wet paint warning
General: Place notices conspicuously and do not remove them until the coating system has cured and hardened.

Application
General: Apply the coating system in conformance with the manufacturer's recommendations. Maintain a wet edge throughout the whole area.

Sanding
General: Fine sand between coats only within the depth of the finish, and remove dust.

Timber floor coating system
Coating: If edge bonding of strip flooring is known to occur, apply a sealer compatible with the final coat.

Final coats: 2 coats of water based polyurethane applied with a continuous wet edge and to the manufacturer's recommendations.

3.4 COMPLETION

Cleaning
General: Vacuum clean the area and protect with fabric drop sheets. Do not use plastic sheeting.

0657 RESIN BASED SEAMLESS FLOORING

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Apply resin based floor finishes to substrates, as documented, that satisfy the product performance requirements for the stated warranty life.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.

1.3 INTERPRETATION

Definitions

General: For the purposes of this worksection the following definitions apply:

- Resin based seamless floor finish: Any combination of a resin based flooring system that combines two pack resins, with or without an aggregate, to provide a continuous floor coating without joints except those that may already exist in the substrate.
- Substrate: The surface to which a material or product is applied.

Abbreviations

General: For the purposes of this worksection the following abbreviations apply:

- MMA: Methyl methylacrylate.

1.4 INSPECTION

Notice

Inspection: Give sufficient notice so that inspection may be made of the following:

- Completion of substrate preparation.
- Completion of each coat in the flooring system.
- Completed application.

1.5 SUBMISSIONS

Samples

Resin based flooring generally: Build up a sample on a suitable base, showing the thickness of each coat, for each finish selected.

Resinous terrazzo: Provide 3 samples on a fibre cement base, showing the range of variation in aggregate arrangement for each colour selected.

Size: 300 x 300 mm minimum.

Identification

Labelling: Label each sample, giving brand, product name, and manufacturer's code reference (including the code for each coat of multi-coat work).

Prototype panels

Location: To be determined on site.

Size (mm): 1200x1200.

Tests

Test results: Submit the following:

- Slip resistance site test to completed surfaces to AS/NZS 4663.

Subcontractors

General: Submit names and contact details of proposed suppliers and applicators.

Materials and components
Manufacturer's data: Submit the manufacturer's published product data for each type of finish, and recommendations for its application in the project, including the following:

- Composition, thickness, finish and time between coats for multi-coat work.
- Material Safety Data Sheets.

2 PRODUCTS

2.1 GENERAL

Critical radiant flux
Standard: To AS ISO 9239.1.

Flooring system: Conform to the values of critical radiant flux nominated in **finishes schedule**.

Smoke development rate
Standard: To AS ISO 9239.1.

Floor finishes in non-sprinklered buildings: 750 percent-minutes.

2.2 MARKING

Identification
General: Deliver materials to the site in the manufacturer's original sealed containers legibly marked to show the following:

- Manufacturer's identification.
- Product brand name.
- Product type.
- Quantity.
- Product reference code and batch number.
- Date of manufacture.
- Material composition and characteristics such as volatility, flash point, light fastness, colour and pattern.
- Handling and installation instructions.

2.3 SEAMLESS FINISHES

General description

Finish type	Typical use	Typical resins	Coats	Aggregates	Thickness
Roller or spray applied	General floor coating	Epoxy or Polyurethane	2	None	300 – 500 dry µm
Spread and sprinkle	Non slip general floor coating	Epoxy or polyurethane	1 Primer, 1 or more topcoats, 1 or more layers of aggregate	Proprietary aggregates for non slip properties	400 – 1500 dry µm
Self levelling (self smoothing)	Smooth high gloss finish	Epoxy or polyurethane system with a fine filler	2 Primer, 1 resin system	None	2 – 4 mm
Trowel applied coating	Chemical resistant coating for food, beverage, and chemical handling/storage	Epoxy or polyester. Less common: MMA, polyurethane, and vinyl esters	Resin system glass or steel trowel applied. Seal surface to facilitate cleaning	Mixed into the resin system	4 – 8 mm
Slurry and broadcast	As for trowel applied, less labour intensive	Epoxy, MMA or polyester.	1. Surface may be sealed for non slip	Mixed and broardcast into the resin	3 – 6 mm

Finish type	Typical use	Typical resins	Coats	Aggregates	Thickness
			properties	system	
Synthetic terrazzo	Public spaces, e.g. Malls, Foyers.	Polyester or epoxy	1 trowel applied	Decorative marble mixed into the resin system	4 – 8 mm after grinding
Seamless flake flooring	Public spaces	Epoxy base coat, flake, 4 moisture cure or two pack polyurethane top coats	4 or more	Decorative vinyl paint flakes. Glass beads may be added for non-slip properties.	700 – 900 µm
Seamless flake flooring, low VOC	Schools, hospitals	Epoxy base coat, flake, and two 100%solid epoxy top coat with light blockers	2 or more	Decorative vinyl paint flakes. Glass beads may be added for non slip properties	700 – 900 µm

3 EXECUTION

3.1 SUBCONTRACTORS

General

General: Use specialist applicators recommended by the materials manufacturers.

3.2 PREPARATION

Substrates

General: Ensure substrates conform to the **Substrate tolerance table** and are clean and free of any deposit or finish which may impair adhesion or location and functioning of control joints.

Substrate tolerance table

Property	Length of straight edge laid in any direction	Max. deviation under the straight edge
Flatness Class A	3 m	3 mm
Smoothness	150 mm	1 mm
Projections	50 mm	0.5 mm

Cleaning concrete surfaces: Mechanically remove the following surface treatments:

- Sealers and hardeners.
- Curing compounds.

Concrete substrate correction: Remove projections and fill voids and hollows with a reinforced mortar or a polymer modified cementitious self smoothing and levelling compound recommended by the finish manufacturer as compatible with the seamless flooring system.

Moisture content: Do not commence installation unless:

- Concrete: The moisture content of the concrete has been tested to AS/NZS 2455.1 Appendix B and the values in clause 2.4.2 (c) have been obtained.

Substrate preparation

Roller or spray applied, spread and sprinkle, and flake flooring systems:

- High pressure water blasting and/or acid etching .
- Diamond grinding.

Self levelling, trowel applied, slurry and broadcast and synthetic terrazzo:

- Shot blasting.
- Scarifying.

- Diamond grinding.

Fixtures: Remove door stops and other fixtures, and refix in position undamaged on completion of the installation.

3.3 APPLICATION

Proprietary floor systems
Standard: To the product technical data sheets.

Working environment
General: Do not start work before the building is enclosed, wet work is complete and dry, and good lighting is available. Protect adjoining surfaces.

Temperature: Do not install seamless flooring when the temperature in the laying area is outside the range recommended by the floor system supplier.

3.4 JOINTS AND ACCESSORIES

Junctions
General: Finish junctions flush with adjoining surfaces. Where changes of floor finish occur at doorways locate the joint on the centreline of the closed door leaf.

Control joints
Location: Provide control joints in resin based seamless flooring as follows:

- Over structural control joints.
- At junctions between different substrates.

Flooring: Where possible carry the seamless finish material over the edges of the control joint in the substrate. Provide a sealant joint as follows:

- Sealant width: 6 – 25 mm.
- Sealant depth: One half the joint width, or 6 mm, whichever is the greater.
- Sealant: Two-pack self-levelling non-hardening mould resistant polyurethane sealant applied over a backing rod. Finish flush with the tile surface.
- Trafficable floors: Shore hardness > 35.
- Backing rod: Compressible closed cell polyethylene foam with a bond-breaking surface.

3.5 COMPLETION

Protection
General: Keep traffic off finished work for 60 hours or as indicated by the applicator, whichever is the greater.

Reinstatement
Extent: Repair or replace faulty or damaged work. If the work cannot be repaired satisfactorily, replace the whole area affected.

Warranty
Warranty: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the supplier and the applicator.

- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the supplier.

Maintenance manual
General: Submit manufacturer’s published use, care and maintenance requirements.

0671 DULUX PAINTING

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Provide DuluxGroup/Dulux coating systems to substrates as follows:

- Consistent in colour, gloss level, texture and dry film thickness.
- Free of runs, sags, blisters, or other discontinuities.
- Paint systems fully opaque.
- Clear finishes at the level of transparency consistent with the product.
- Fully adhered.
- Resistant to environmental degradation within the manufacturer's stated life span.

Selections: As documented.

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/architects-and-specifiers

1.3 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.

1.4 STANDARDS

Painting

General: Comply with the recommendations of those parts of AS/NZS 2311 which are referenced in this worksection.

1.5 MANUFACTURER'S DOCUMENTS

Technical manuals

Product Guide: www.dulux.com.au/specifier/product/product-selector

Duspec Product Data Sheets, MSDS, paint system selection: www.dulux.com.au/specifier/duspec

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.
- PDS: Product data sheet.
- PRN: Paint reference number.
- PSU: Primer sealer undercoat multipurpose combo product.
- WFT: Wet film thickness.

Definitions

General: For the purposes of this worksection the definitions given in AS/NZS 2310 and the following apply:

- Adhesion: The sum total of forces of attachment between a dry film and its substrate.
- Finish coat: The final coat of a coating system.
- Gloss: The optical property of a surface, characterised by its ability to reflect light specularly.

- 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, a surface with the following specular gloss reading are defined by AS 1580 and as follows:
  . Full gloss finish between 50 and 85 gloss units.
  . Semi gloss between 20 and 50 gloss units.
  . Low gloss between 5 and 20 gloss units (also known as low sheen).
  . Flat finish < 5 gloss units (also known as matt).
- Opacity: The ability of a paint to obliterate the colour difference of a substrate.
- Paint: A product in liquid form, which 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 painting system that helps bind subsequent coats to the substrate and which may inhibit its deterioration.
- Sealer: A product used to seal substrates to prevent:
  . Materials from bleeding through to the surface.
  . Reaction of the substrate with incompatible top coats.
  . Undue absorption of the following coat into the substrate.
- Sheen: Gloss which is observed on an apparently matt surface at glancing angles of incidence.
- Substrate: The surface to which the coating material is applied or is to be applied.
- Undercoat: An intermediate coat formulated to prepare a primed surface or other prepared surface for the finishing coat.

1.7 INSPECTION

Notice

Inspection: Give notice that ensures the timely inspection of the following:

- Painting stages:
  . Completion of surface preparation.
  . After application of final coat.
- Clear finishing stages:
  . Before surface preparation of timber.
  . Completion of surface preparation.
  . After application of final coat.

1.8 SUBMISSIONS

Clear finish coated samples

General: Submit pieces of timber or timber veneer matching the timber to be used in the works, prepared, puttied, stained, sealed and coated in conformance with the specified system, of sufficient size so that, each piece can be cut into 4 segments, marked for identification, and distributed as directed.

Paint

General: Dulux coatings systems have been selected for this project. Submit the manufacturer's details at least 3 weeks before the paint is required, as follows:

- Paint brand name and paint line quality statement.
- Material safety data sheets (MSDS) showing the health and safety precautions to be taken during application.
- The published recommendations for maintenance.

Tests

Fire retardant systems: Submit type test results to confirm minimum indices, when tested to AS/NZS 1530.3, on a substrate representative of the intended use, for paint systems specified as Low flame spread or Fire retardant:

- Spread of flame index: 3.
- Sum of Ignitability index and Heat evolved index: 7.

- Smoke developed index: 3.

Substrate acceptance

Applicator: Submit the applicator's certification of the acceptability of the paint finish substrate.

Timing: Before commencing installation.

Warranty

Material Warranty: Submit the manufacturer's material warranty as follows:

- Extent: Paintwork generally.
- Terms: Paint systems are suitable for their intended use.
- Warranty period: As defined by the manufacturer.

Material Performance Warranty: Submit an alternative performance warranty as follows:

- Terms: Submit the performance criteria as defined by the manufacturer.
- Measure: As defined by the manufacturer.
- Warranty period: As defined by the manufacturer.

Timing: Before the application of the paint system.

2 PRODUCTS

2.1 GENERAL

Product substitution

Other paint: Conform to **SUBMISSIONS**, **Substitutions** in the *General requirements* worksection.

2.2 PAINTS

Combinations

General: Dulux paint products and coating systems have been selected and specified for this project. Any unauthorised product substitution will void the Warranties.

Do not combine paints from different manufacturers in a paint system.

Clear timber finish systems: Provide only the combinations of putty, stain and sealer recommended by the manufacturer of the top coats.

Delivery

General: Deliver paints to the site in the original manufacturer's labelled and unopened containers.

Tinting

General: Provide only products which are colour tinted by the manufacturer or supplier.

Toxic ingredients

General: Comply with the requirements of Appendix I Uniform Paint Standard to the Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP).

Standards

Paint types: Conform to the Australian Standard as referenced in the **OCP/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.

^ 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.	AS/NZS 2311 PRN	Standard
Semi gloss solvent-	Dulux Super	DD0028	B3	AS 3730.5

Paint type	DuluxGroup/Dulux material description	Dulux PDS No.	AS/NZS 2311 PRN	Standard
borne: interior	Enamel Semi-Gloss			
Semi-gloss water-borne, interior /exterior trim (alt B8b)	Dulux Aquanamel Semi Gloss (low VOC)	DD1281	B41	NE
Gloss solvent-borne: aerosols	Dulux Spray Pak	DD0009	B4#	NE
Full gloss solvent-borne: exterior	Dulux Super Enamel Full Gloss	DD0145	B5a	AS 3730.6
Full gloss solvent-borne: interior	Dulux Super Enamel Full Gloss	DD0026	B5b	AS 3730.6
Full gloss water-borne interior/exterior trim (alt B9b)	Dulux Aquanamel Gloss (low VOC)	DD1282	B42	NE
Flat latex: exterior	Dulux Weathershield Matt Acrylic (low VOC)	DD1450	B6a	AS 3730.7
Flat latex: interior	Dulux Wash & Wear 101 Adv Flat Acrylic (low VOC)	DD1095	B6b	AS 3730.1
Flat latex: interior ceilings	Dulux White Ceiling Paint *eco choice* (low VOC)	DD1403	B6c	AS 3730.1
Flat latex: interior ceilings (tinted colours)	Dulux Professional EnvirO2 Tintable Ceiling Flat (low VOC)	DD1466	B6d	AS 3730.1
Low gloss latex: exterior	Dulux Weathershield Low Sheen Acrylic (low VOC)	DD0053	B7a	AS 3730.8
Low gloss latex: interior	Dulux Wash & Wear 101 Adv Low Sheen Acrylic (low VOC) Dulux Wash & Wear Kitchen & Bathroom Low Sheen (low VOC) (Mouldshield ® + Anti-Bacterial)	DD1096 DD1516	B7b	AS 3730.3
Semi gloss latex: exterior	Dulux Weathershield Semi Gloss Acrylic	DD0037	B8a	AS 3730.9
Semi gloss latex: interior	Dulux Wash & Wear 101 Adv Semi Gloss Acrylic (low VOC) Dulux Wash & Wear Kitchen &	DD1097 DD1521	B8b	AS 3730.2

Paint type	DuluxGroup/Dulux material description	Dulux PDS No.	AS/NZS 2311 PRN	Standard
	Bathroom Low Sheen (low VOC) (Mouldshield ® + Anti-Bacterial)			
Gloss latex: exterior	Dulux Weathershield Gloss Acrylic	DD0054	B9a	AS 3730.10
Gloss latex: interior	Dulux Wash & Wear 101 Adv Gloss Acrylic (low VOC) Dulux Aquanamel Gloss (low VOC)	DD1098 DD1282	B9b	AS 3730.12
Gloss water-borne interior/exterior trim (alt B9a/B9b)	Dulux Aquanamel Gloss (low VOC)	DD1282	B42	NE
Wood primer, solvent-borne	Dulux 1 Step Oil Based Primer Sealer Undercoat	DD1227	B10	AS 3730.13
Wood primer, latex	Dulux 1 Step Acrylic Primer Sealer Undercoat	DD1192	B10A	AS 3730.17
Metal primer for steel – solvent-borne	Dulux Quit Rust Cold Galv. Primer Dulux Luxaprime Zinc Phosphate Primer	DI1051 DI1136	B11	AS 3730.21
Metal primer, latex	Dulux Quit Rust All Metal (water based, low VOC)	DD1453	B11a#	AS 3730.15
Metal primer for zinc-coated surfaces, latex	Dulux Quit Rust All Metal (water based, low VOC)	DD1453	B12a	AS 3730.15
Etch primer for non ferrous metals	Dulux Quit Rust Etch Primer	DD0153	B13	AS 3730.17
Zinc-rich organic binder/primer for steel	Dulux Zinc Rich 1P Primer	DI0541	B14	AS 3730.9
Concrete and masonry sealer	Dulux Sealer Binder Dulux Acratex Acraprime 501/2	DD0074 DA0442	B15	AS 3730.22
Clear low viscosity paint for concrete	Dulux AquaTread Concrete Sealer (low VOC) Dulux DureSeal Acrylic Dust Sealer	DD1187 DI1118	B15a	NE
Moisture resistant plasterboard sealer binder	Dulux EnvirO2 Water Based Sealer Binder (low VOC)	DD1449	B15b	NE
Concrete and	Dulux Acrylic	DD1402	B16	

Paint type	DuluxGroup/Dulux material description	Dulux PDS No.	AS/NZS 2311 PRN	Standard
masonry, latex wallboard sealer, sealer/undercoat,	Sealer Undercoat *eco choice* (low VOC) Dulux 1 Step Acrylic Primer Sealer Undercoat (low VOC)	DD1192		
Undercoat, solvent-borne	Dulux 1 Step Oil Based Primer Sealer Undercoat	DD1227	B17	AS 3730.14
Undercoat, latex: exterior	Dulux 1 Step Acrylic Primer Sealer Undercoat (low VOC) Dulux Acratex Water Based 501/1	DD1192 DD0441	B17a	AS 3730.18
Undercoat, latex: interior	Dulux 1 Step Acrylic Primer Sealer Undercoat (low VOC) Dulux Acrylic Sealer Undercoat *eco choice* (low VOC)	DD1192 DD1402	B17a	AS 3730.18
Wood Stain - spirit	Feast Watson Prooftint	DW0729	B18a	NE
Wood Stain - oil	Cabot's Interior Stain Feast Watson Woodshield (int/ext)	DW0661 DW1248	B18b	
Wood Stain - latex	Cabot's Woodcraft Stain (interior) (low VOC) Intergrain Natural Stain (exterior) (low VOC)	DW0662 DW0758	B18c	NE
Interior clear varnish, solvent-based, one-pack	Cabot's Cabothane Gloss Cabot's Cabothane Satin Cabot's Stain & Varnish (Satin) Cabot's Stain & Varnish (Gloss) Feast Watson Floorclear (Satin) Feast Watson Floorclear (Gloss) Feast Watson Stain & Varnish (Satin) Feast Watson Stain & Varnish (Gloss) Feast Watson	DW0669 DW0668 DW1292 DW0664 DW0737 DW0736 DW1295 DW1294 DW0726 DW0727 DW0730	B19	AS 3730.25 or AS 3730.27 (for floors)

Paint type	DuluxGroup/Dulux material description	Dulux PDS No.	AS/NZS 2311 PRN	Standard
	Weatherproof Feast Watson Satinproof Feast Watson Flatproof			
Interior clear latex varnish, water-based, one-pack	Intergrain Ultraclear Interior Satin (low VOC) Intergrain Ultraclear Interior Gloss (low VOC) Cabot's Cabothane Water Based (gloss or satin) (low VOC)	DW0762 DW0761 DW1491 DW1490	B19a	AS 3730.27
Floor varnish, solvent based, clear (moisture cure)	Feast Watson Floorproof	DW0732	B20a	AS 3730.27
Floor Varnish, water-based, one-pack	Intergrain Enviropro Endure 1 Pack (matt, satin or gloss) (low VOC)	DW1420 DW1419 DW1418		
Floor varnish, clear or tinted, two-pack	Feast Watson EnviroMax (gloss, semi gloss or low sheen) (low VOC) Intergrain Enviropro Endure 2 Pack (gloss, satin or matt)	DW1312 DW1190 DW1038 DW1421 DW1422 DW1423	B20b	AS 3730.27
Exterior latex stain, semi-transparent	Intergrain NaturalStain (low VOC)	DW0758	B22	AS 3730.16
Fence stain, latex paints, opaque	Dulux Weathershield Garden Shades Cabot's Timbercolour	DD0055 DW0660	B22a	AS 3730.16
Exterior stain, solvent-borne, opaque	Cabot's Deck & Exterior Stain	DW1579	B23#	AS 3730.28
Exterior stain, solvent-borne, semi-transparent	Feast Watson Woodshield (Int/Ext) Feast Watson Decking Stain Cabot's Deck & Exterior Stain	DW1248 DW1247 DW1579	B23a	NE
Paving paint for concrete, solvent	Berger Jet Dry Paving Paint range	DD0081	B24	AS 3730.29
Paving paint for concrete, latex	Berger Jet Dry Aqua Tread Satin	DD1163	B24a	NE
Roofing paint, latex	Dulux AcraTex 962	DA1471	B25	

Paint type	DuluxGroup/Dulux material description	Dulux PDS No.	AS/NZS 2311 PRN	Standard
(Solar reflectance)	COOLROOF with InfraCOOL Technology™			
Intumescent paints	Refer to 0346 *DULUX Intumescent coatings in structural fire protection coatings*	N/A	B28#	NE
Epoxy paint, two-pack, solvent-borne topcoats, interior only	Dulux Luxepoxy T Enamel Finish Dulux Durebild STE 2 Pak Epoxy (high build & surface tolerant) Dulux Duremax GPE Zinc Phosphate Dulux Duremax GPE	DI1142 DI1109 DI1116 DI1115	B29	AS/NZS 3750.1
Epoxy paint, two-pack, solvent-borne topcoats, exterior & pools	Pool paints not available from Dulux	N/A	B29	AS/NZS 3750.1
Epoxy paint, two-pack, water based, interior only	Dulux Luxafloor ECO2 (low VOC)	DI1315	B29a	NE
High Build Recoatable two-pack, solvent-borne gloss polyurethane	Dulux Weathermax HBR	DI1156	B29c	NE
Stain sealer, solvent-borne for water soluble stains	Dulux PrepLock Oil Based Stain Blocker (low VOC) Dulux Preplock Shellac Stain Blocker	DD1308 DD1309	B30a	NE
Stain sealer, water based for oil stains	Dulux PrepLock Water Based Stain Blocker (low VOC)	DD1310	B30b	
Chalk sealer, surface conditioner	Dulux Sealer Binder Dulux Acraprime Solvent Based Primer	DD0074 DA0442	B31	NE
Anti-mould (treatment or wash for timber)	Intergrain TSS	DW0768	B32	NE
Water-repellent for masonry	Dulux AquaBan	DD0002	B33	NE
Creosote stain	No longer used	N/A	B35	NE
Paint remover, solvent-borne	Selleys Pollystrippa Paint Stripper	Poly	B36a	NE

Paint type	DuluxGroup/Dulux material description	Dulux PDS No.	AS/NZS 2311 PRN	Standard
Paint remover, chemical	Selleys Polystrippa Renovators' Choice	Poly	B36b	NE
Bituminous paints	No longer used	N/A	B37	NE
High build membrane or texture coatings for masonry and concrete: exterior	Dulux Acratex Range	Acratex	B38a	AS/NZS 4548.1 AS/NZS 4548.2 AS/NZS 4548.3 AS/NZS 4548.4
Texture finish latex coatings for masonry and plasterboard: interior only	Dulux Effects Range (interior)		B38b	NE
Clear or colourless coatings (waterborne) for timber, exterior	Intergrain UltraClear Exterior (gloss or satin) Note: not suitable for decking.	DW1401 DW1400	B39a	NE
Clear coatings (waterborne) for timber, interior	Intergrain Ultraclear Interior (gloss or satin) (low VOC) Cabot's Crystal Clear (gloss or satin)	DW0762 DW0761 DW0677 DW0678	B39b	NE
Clear or colourless coatings (waterborne) for timber, interior floors	Intergrain Enviropro Endure 1 Pack (matt, satin or gloss) (low VOC) Intergrain Enviropro Endure 2 Pack (gloss, satin or matt) Feast Watson EnviroMax 2 Pack (gloss, semi-gloss or low sheen)	DW1420 DW1419 DW1418 DW1421 DW1422 DW1423 DW1312 DW1190 DW1038	B39c	AS 3730.27
Sanding sealer	Cabot's Universal Sanding Sealer Feast Watson Sanding Sealer	DW0688 DW0744	B40	NE
Semi-gloss latex, interior trim (alt B8b)	Dulux Aquanamel Semi-Gloss (low VOC)	DD1281	B41	NE
Gloss or full gloss latex, interior trim	Dulux Aquanamel Gloss (low VOC)	DD1282	B42	NE
Penetrating Tung Oil type varnish for timber floors: interior	Feast Watson Floorseal Feast Watson China Wood Oil	DW0734 DW0733	B43a	NE
Penetrating Tung	Intergrain Nature's	DW0769	B43b	NE

Paint type	DuluxGroup/Dulux material description	Dulux PDS No.	AS/NZS 2311 PRN	Standard
Oil type varnish for timber floors: exterior	Timber Oil Feast Watson Decking Oil Intergrain ULTRADECK (low VOC)	DW1577 DW1285		
Gloss pigmented polyurethane	Dulux Luxathane R Dulux Weathermax HBR	DD1137 DI1156	B44	AS/NZS 3750.6
Powder coatings for non-ferrous metals	Dulux Powdercoat Range		B45a	AS 3715
Powder coatings for ferrous metals	Dulux Powdercoat Range (www.duluxpowders.com.au)		B45b	AS 4506

Low VOC Compliance Reference table

Green Star Office v3 Product Type	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 Professional Enviro$_2$ Interior Semi-Gloss	< 1
Walls and ceilings - Interior Semi-Gloss	16	Dulux Wash & Wear 101 Advanced Semi Gloss Dulux Wash & Wear Kitchen & Bathroom Semi Gloss	< 5 < 5
Walls and ceilings - Interior Low Sheen	16	Dulux Professional Enviro$_2$ Interior Low Sheen	< 1
Walls and ceilings - Interior Low Sheen	16	Dulux Wash & Wear 101 Advanced Low Sheen Dulux Wash & Wear Kitchen & Bathroom Low Sheen	< 5 < 5
Walls and ceilings Interior Flat-Washable	16	Dulux Professional Enviro$_2$ Interior Flat	< 1
Walls and ceilings Interior Flat-Washable	16	Dulux Wash & Wear 101 Advanced Flat	< 5
Ceilings - Interior Flat	14	Dulux Professional Enviro$_2$ Interior Flat	< 1
Ceilings - Interior Flat	14	Dulux White Ceiling Paint *eco choice*	< 5
Trim - Interior Gloss	75	Dulux Aquanamel Gloss	< 74
Trim - Exterior Gloss	75	Dulux Weathershield Gloss Acrylic	< 65
Trim - Interior Semi-gloss	75	Dulux Aquanamel Semi Gloss	< 74

Green Star Office v3 Product Type	**VOC Limits MAX g/litre**	**DULUX Products compared to the GBCA Specification**	**VOC g/litre Untinted**
Trim - Exterior Semi Gloss	75	Dulux Weathershield Semi Gloss Acrylic	< 60
Trim - Exterior Low Sheen	75	Dulux Weathershield Low Sheen Acrylic	< 55
Timber Primer	30	Dulux Professional Enviro$_2$ Acrylic Sealer Undercoat (ASU)	< 1
Timber Primer	30	Dulux Acrylic Sealer Undercoat *eco choice* Dulux Professional Enviro$_2$ Acrylic Sealer Undercoat (ASU)	< 5 < 1
Binding Primer	30	Dulux Professional EnvirO2 Water Based Sealer Binder	< 5
Latex primer for galvanised iron and zincalume	60	Dulux Galvanised Iron Primer	< 40
Latex primer for galvanised iron and zincalume	60	Dulux Quit Rust Galvanised Iron Primer	< 60
Interior Latex Undercoat	65	Dulux Professional Enviro$_2$ Acrylic Sealer Undercoat (ASU)	< 1
Interior Latex Undercoat	65	Dulux Acrylic Sealer Undercoat *eco choice*	< 5
Exterior Latex Undercoat	65	Dulux One Step Acrylic Primer Sealer Undercoat (PSU)	< 60
Interior Sealer	65	Dulux Professional Enviro$_2$ Acrylic Sealer Undercoat (ASU)	< 1
Interior Sealer	65	Dulux Luxafloor Eco2 (clear)	< 10
One and two pack performance coatings for floors	140	Dulux Luxafloor Eco2 Feast Watson EnviroMax Clear timber finish	< 10 < 100

3 EXECUTION

3.1 PREPARATION

Standards

General: To AS/NZS 2311 Sections 3.

Order of work

Other trades: Before painting, complete the work of other trades as far as practicable within the area to be painted, except for installation of fittings, floor sanding and laying flooring materials.

Clear finishes: Complete clear timber finishes before commencing opaque paint finishes in the same area.

Protection

Fixtures: Remove door furniture, switch plates, light fittings and other fixtures before starting to paint, and refix in position undamaged on completion of the installation.

Adjacent surfaces: Protect adjacent finished surfaces liable to damage from painting operations.

Wet paint warning

General: Place notices conspicuously and do not remove them until the paint is dry.

Repair

General: Clean off marks, paint spots and stains progressively and restore damaged surfaces to their original condition. Touch up new damaged decorative paintwork or misses only with the paint batch used in the original application.

Substrate preparation

General: Prepare all substrates to receive the painting systems in accordance with AS/NZS 2311 and the paint manufacturer's recommendations.

Cleaning: Clean down the substrate surface. Do not cause undue damage to the substrate or damage to, or contamination of, the surroundings.

Filling: Fill cracks and holes with fillers, sealants, putties or grouting cements as appropriate for the finishing system and substrate, and sand smooth.

Clear finish: Provide filler tinted to match the substrate.

Clear timber finish systems: Prepare the surface so that its attributes will show through the clear finish without blemishes, by methods which may involve the following:

- Removal of bruises.
- Removal of discolourations, including staining by oil, grease and nailheads.
- Bleaching where necessary to match the timber colour sample.
- Puttying.
- Fine sanding (last abrasive no coarser than 220 grit) to show no scratches across the grain.

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 and to the class specified in the specified protective treatment. Provide a surface roughness or profile appropriate for the specified treatment. Where steelwork to be abrasive cleaned includes irregular shapes allow for special equipment to achieve required abrasive cleaning.

Structural steel: All exposed fixings including bolts, screws and the like, are to be painted 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 twelve per cent.

Preparation

General: Prepare substrates to the manufacturer's recommendations.

Surface preparation info table

Duspec Info Sheet	Substrate group	Substrate title
PAL047	Aluminium for powdercoat	Aluminium for powdercoat
PAS028	Asbestos	Asbestos
PAC002	Autoclaved aerated concrete	Autoclaved aerated concrete
PBK019	Brick and blockwork	Brick/blockwork masonry
PCE007	Cement render/premixed render	Cement render/premixed render
PCT040	Ceramic tiles	Ceramic tiles un-glazed
PCC050	Compressed fibre cement sheeting	CFC sheet (Hardiflex, Hardiplank, CFC, Express wall, Villaboard)

Duspec Info Sheet	Substrate group	Substrate title
PCB031	Chip board	Chip board
PCF010	Concrete floors/paths	Concrete floors/paths – acid etch
PCF033	Concrete floors/paths	Concrete floors/paths – commercial and industrial
PCK032	Cork	Cork floor tiles
PTL017	Decorative tiles	Concrete tiles, slate tiles, terracotta tiles, ceramic tiles, terrazzo tiles
PTI022	Timber	Dressed timber
PFM056	Ferrous metals (mild steel, cast iron)	External mild steel – commercial/industrial preparation
PFM005	Ferrous metals (mild steel, cast iron)	Ferrous metals – minor domestic
PFM009	Ferrous metals (mild Steel, cast iron)	Ferrous metals industrial – power tool cleaning
PFC013	Fibre cement sheet (7.5 mm, 9 mm primed, 6 – 9 mm Villaboard)	Fibre cement sheet
PFG016	Fibreglass	Fibreglass surface
PFP021	Fibrous plaster, set plaster	Fibrous plaster
PBC030	Bituminous coatings	Flintkote Bituminous coatings
PGC015	Glass reinforced concrete	Glass reinforced concrete
PHB045	Hardboard, masonite	Hardboard, masonite
PFM069	Ferrous metals (mild steel, cast iron)	Internal mild steel – commercial/industrial prep Class2 Abrasive Blast Clean
PFE071	James Hardie Preprimed Fibre Cement Eave and Soffit Lining	James Hardie Preprimed Fibre Cement Eave & Soffit Lining
PLX034	Laminex	Laminex
PMD020	Medium density fibreboard	Medium density fibreboard
PFO036	Expanded polystyrene system	Meshclad E.I.F.S (External Insulated Finishing System)
PNF004	Non ferrous metals (aluminiums/alloys/brass/bronze/copper)	Non Ferrous Metal Surfaces Preparation
PCO018	Concrete (off form, tilt up, pre-cast)	Off form, tilt up, pre-cast
PPL008	Plaster products	Plaster products
PCS063	Pre-coated sheet steel (Colorbond®, etc)	Pre-coated sheet steel (Colorbond®, etc)
PTO058	Timber – previously oiled/stained	Previously oiled/stained exterior timber
PPP043	Previously painted masonry surface	Previously painted masonry surface
PEA072	Pebblecrete (exposed aggregate) masonry	Pebblecrete (exposed aggregate) masonry
PPC011	Plastics	Acrylic/polycarbonate/polystyrene /polyurethane/PVC
PTI026	Timber	Plyboard marine
PPM068	Powder coated metals	Powder coated metals for painting

Duspec Info Sheet	Substrate group	Substrate title
PPF073	Polyurethane foam (Spray Polyurethane Foam – SPF)	Previously painted spray polyurethane foam
PRT038	Roof tiles	Roof tiles clay
PRT037	Roof tiles	Roof tiles concrete
PRT039	Roof tiles	Roof tiles metal
PTI023	Timber	Rough sawn timber
PSB067	Sandstone and blockwork	Sandstone/brick/blockwork
PSL035	Slate flooring	Slate flooring
PTI003	Timber	Timber
PTI024	Timber	Timber flooring
PTI025	Timber	Timber joinery/furniture
PFC027	Fibre cement sheet (7.5 mm, 9 mm Primed, 6 – 9 mm with recessed edges)	Fibre cement sheet (7.5 mm, 9 mm with recessed edges)
PVR061	Vermiculite	Vermiculate
PWP041	Wallpaper	Wallpaper
PZC012	Zinc coated steel(galvanized iron, galvanized steel)	Zinc coated steel galvanized steel
PZS070	Zinc coated steel (zincalume, zincanneal, zincseal)	Zincanneal

3.2 PAINTING

Standard

General: To AS/NZS 2311 Section 6.

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 specified permanent artificial illumination conditions or 400 lux, whichever is the greater.

Drying

General: Use a moisture meter to demonstrate that the moisture content of the substrate is at or below the recommended maximum level for the type of paint and the substrate material.

Paint application

General: Apply the first coat immediately after substrate preparation and before contamination of the substrate can occur. Apply subsequent coats after the manufacturer's recommended drying period has elapsed.

Painting conditions

General: Do not paint in dusty conditions, or otherwise unsuitable weather as follows unless the paint is suitable and recommended for such conditions:

- Relative humidity: ≥ 85%.
- Surface temperature ≤ 10^{o}C or ≥ 35^{o}C.

Priming before fixing

General: Apply one coat of wood primer (2 coats to end grain) to the back of the following before fixing in position:

- External fascia boards.
- Timber door and window frames.
- Bottoms of external doors.
- Associated trims and glazing beads.
- Timber board cladding.

Spraying

General: If the paint application is by spraying, use conventional or airless equipment which does the following:

- Satisfactorily atomises the paint being applied.
- Does not require the paint to be thinned beyond the maximum amount recommended by the manufacturer.
- Does not introduce oil, water or other contaminants into the applied paint.

Paint with known health hazards: Provide personal protection, masking, ventilation and screening facilities generally to the standards set out for spray booths, AS/NZS 4114.1 and AS/NZS 4114.2.

Sanding

Clear finishes: Sand the sealer using the finest possible abrasive (no coarser than 320 grit) and avoid cutting through the colour. Take special care with round surfaces and edges.

Repair of galvanizing

General: For galvanized surfaces which have been subsequently welded, power tool grind to remove all rust and weld splatter. Remove all surface contaminants then immediately prime the affected area.

Primer: Organic zinc rich coating for the protection of steel is Dulux Zincannode 202. (AS/NZS 3750.9 Type 2).

Tinting

General: Tint each coat of an opaque coating system so that each has a noticeably different tint from the preceding coat where possible, except for top coats in systems with more than one top coat.

Services

General: If not embedded, paint new services and equipment including in plant rooms, except chromium, anodised aluminium, GRP, UPVC, stainless steel, non-metallic flexible materials and normally lubricated machined surfaces. Repaint proprietary items only if damaged. Seek advice from the manufacturer.

Windows

Operation: Ensure that opening windows function correctly after painting.

Door Leafs

General: Paint all surfaces of door leaf.

Drying: Leave doors fixed open to allow drying. Do not allow door hardware, accessories or the like to damage the door during the drying process.

Exclusions

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 specified 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, roads unless otherwise specified.
- 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, unless otherwise specified. Insides of bathroom cabinets are not excluded and shall be painted.
- Self finished surface such as glass and plastic laminates.
- Door hardware, including hinges.

4 SELECTIONS

4.1 PAINTING SCHEDULES GENERALLY

Paint system schedules

Requirement: Apply paint systems to the **Interior painting schedule** and the **Exterior painting schedule**.

General: Apply the paint system nominated for each substrate to the referenced manufacturer's Product Data Sheets (PDS) and Spec Sheets and include:

- 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 specified; or
- achieve a satisfactory opacity, in the specified or required colour.

Painting systems

Standards: The scheduled DuluxGroup/Dulux paint systems override AS/NZS 2311 as follows:

- New unpainted interior surfaces: To AS/NZS 2311 Table 5.1.
- New unpainted exterior surfaces: To AS/NZS 2311 Table 5.2.
- Specialised painting systems: To AS/NZS 2311 clause 5.2 for the following final coats:
- High build textured or membrane finishes (B38 to AS/NZS 2311).
- 2 pack gloss pigmented polyurethane (B44 to AS/NZS 2311).
- 2 pack epoxy (B29 to AS/NZS 2311).
- 2 pack water based epoxy (B29A to AS/NZS 2311).

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** (See **PRODUCTS**) and AS/NZS 2311 Appendix D.

4.2 INTERIOR PAINTING SCHEDULE

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 *eco choice* (B16)	Dulux Wash & Wear 101 Adv Flat (B6b)	Dulux Wash & Wear 101 Adv Flat (B6b)	SD 0001
Plasterboard (ceilings) (low VOC system)	Dulux Acrylic Sealer Undercoat *eco choice* (B16)	Dulux White Ceiling Paint *eco choice* (B6c)	Dulux White Ceiling Paint *eco choice* (B6c)	SD0010
Fibrous/set plaster	Dulux Sealer Binder (solvent based) (B15)	Dulux Wash & Wear 101 Adv Flat (B6b)	Dulux Wash & Wear 101 Adv Flat (B6b)	SD 2533
Fibrous/set plaster (with glancing light issues)	Dulux Professional Oil Based Undercoat (B15)	Dulux Professional Matt Acrylic (B6a)	Dulux Professional Matt Acrylic (B6a)	SD 2172
Fibre cement	Dulux Acrylic	Dulux Wash &	Dulux Wash &	SD 3174

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
products (low VOC system)	Sealer Undercoat *eco choice* (B16)	Wear 101 Adv Flat (B6b)	Wear 101 Adv Flat (B6b)	
Timber and veneers	Dulux 1 Step Acrylic Primer Sealer Undercoat (B10a)	Dulux Wash & Wear 101 Adv Flat (B6b)	Dulux Wash & Wear 101 Adv Flat (B6b)	SD 3147
Concrete (low VOC system)	Dulux Acrylic Sealer Undercoat *eco choice* (B16)	Dulux Wash & Wear 101 Adv Flat (B6b)	Dulux Wash & Wear 101 Adv Flat (B6b)	SD 1430
Cement render (low VOC system)	Dulux 1 Step Acrylic Primer Sealer Undercoat (B10a)	Dulux Wash & Wear 101 Adv Flat (B6b)	Dulux Wash & Wear 101 Adv Flat (B6b)	SD 3665
Vermiculite	Dulux Sealer Binder (solvent based) (B15)	Dulux White Ceiling Paint *eco choice* (B6c)	Dulux White Ceiling Paint *eco choice* (B6c)	SD 3505

Low gloss latex - Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Plasterboard (low VOC system)	Dulux Acrylic Sealer Undercoat *eco choice* (B16)	Dulux Wash & Wear 101 Adv Low Sheen (B7b)	Dulux Wash & Wear 101 Adv Low Sheen (B7b)	SD 0002
Fibrous/set plaster	Dulux Sealer Binder (solvent based) (B15)	Dulux Wash & Wear 101 Adv Low Sheen (B7b)	Dulux Wash & Wear 101 Adv Low Sheen (B7b)	SD 0813
Fibre cement products (low VOC system)	Dulux Acrylic Sealer Undercoat *eco choice* (B16)	Dulux Wash & Wear 101 Adv Low Sheen (B7b)	Dulux Wash & Wear 101 Adv Low Sheen (B7b)	SD 2971
Timber and veneers	Dulux 1 Step Acrylic Primer Sealer Undercoat (B10a)	Dulux Wash & Wear 101 Adv Low Sheen (B7b)	Dulux Wash & Wear 101 Adv Low Sheen (B7b)	SD 1528
Concrete (low VOC system)	Dulux Acrylic Sealer Undercoat *eco choice* (B16)	Dulux Wash & Wear 101 Adv Low Sheen (B7b)	Dulux Wash & Wear 101 Adv Low Sheen (B7b)	SD 0901
Cement render (low VOC system)	Dulux 1 Step Acrylic Primer Sealer Undercoat (B16)	Dulux Wash & Wear 101 Adv Low Sheen (B7b)	Dulux Wash & Wear 101 Adv Low Sheen (B7b)	SD 1128
MDF	Dulux 1 Step Acrylic Primer Sealer Undercoat (B10a)	Dulux Wash & Wear 101 Adv Low Sheen (B7b)	Dulux Wash & Wear 101 Adv Low Sheen (B7b)	SD 1041
Brick and masonry (low VOC system)	Dulux Acrylic Sealer Undercoat *eco choice* (B16)	Dulux Wash & Wear 101 Adv Low Sheen (B7b)	Dulux Wash & Wear 101 Adv Low Sheen (B7b)	SD 3284
Concrete blockwork (low VOC system)	Berger Gold Label Acrylic Block Filler (B15)	Dulux Wash & Wear 101 Adv Low Sheen (B7b)	Dulux Wash & Wear 101 Adv Low Sheen (B7b)	SD 1027

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 *eco choice* (B16)	Dulux Wash & Wear Kitchen & Bathroom Low Sheen (B7b)	Dulux Wash & Wear Kitchen & Bathroom Low Sheen (B7b)	SD 5013
Plasterboard (MR grade) (low VOC system)	Dulux Professional EnvirO2 Water Based Sealer Binder (B15)	Dulux Wash & Wear Kitchen & Bathroom Low Sheen (B7b)	Dulux Wash & Wear Kitchen & Bathroom Low Sheen (B7b)	SD 4611
Fibrous/set plaster	Dulux Sealer Binder (solvent based) (B15)	Dulux Wash & Wear Kitchen & Bathroom Low Sheen (B7b)	Dulux Wash & Wear Kitchen & Bathroom Low Sheen (B7b)	SD 5008
Fibre cement products (low VOC system)	Dulux Acrylic Sealer Undercoat *eco choice* (B16)	Dulux Wash & Wear Kitchen & Bathroom Low Sheen (B7b)	Dulux Wash & Wear Kitchen & Bathroom Low Sheen (B7b)	SD 4543
Concrete	Dulux Sealer Binder (solvent based) (B15)	Dulux Wash & Wear Kitchen & Bathroom Low Sheen (B7b)	Dulux Wash & Wear Kitchen & Bathroom Low Sheen (B7b)	SD 5009
Cement render (low VOC system)	Dulux 1 Step Acrylic Primer Sealer Undercoat (B16)	Dulux Wash & Wear Kitchen & Bathroom Low Sheen (B7b)	Dulux Wash & Wear Kitchen & Bathroom Low Sheen (B7b)	SD5010
MDF	Dulux 1 Step Acrylic Primer Sealer Undercoat (B10a)	Dulux Wash & Wear Kitchen & Bathroom Low Sheen (B7b)	Dulux Wash & Wear Kitchen & Bathroom Low Sheen (B7b)	SD5011
Brick and masonry (low VOC system)	Dulux Acrylic Sealer Undercoat *eco choice* (B16)	Dulux Wash & Wear Kitchen & Bathroom Low Sheen (B7b)	Dulux Wash & Wear Kitchen & Bathroom Low Sheen (B7b)	SD 5018
Concrete blockwork (low VOC system)	Berger Gold Label Acrylic Block Filler (B15)	Dulux Wash & Wear Kitchen & Bathroom Low Sheen (B7b)	Dulux Wash & Wear Kitchen & Bathroom Low Sheen (B7b)	SD 4856

Semi gloss latex: Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Plasterboard (low VOC system)	Dulux Acrylic Sealer Undercoat *eco choice* (B16)	Dulux Wash & Wear 101 Adv Semi Gloss (B8b)	Dulux Wash & Wear 101 Adv Semi Gloss (B8b)	SD 0003
Fibrous/set plaster	Dulux Sealer Binder (solvent based) (B15)	Dulux Wash & Wear 101 Adv Semi Gloss (B8b)	Dulux Wash & Wear 101 Adv Semi Gloss (B8b)	SD 0815
Fibre cement products (low VOC system)	Dulux Acrylic Sealer Undercoat *eco choice* (B16)	Dulux Wash & Wear 101 Adv Semi Gloss (B8b)	Dulux Wash & Wear 101 Adv Semi Gloss (B8b)	SD 0903
Timber and veneers	Dulux 1 Step Acrylic Primer Sealer Undercoat (B17a)	Dulux Wash & Wear 101 Adv Semi Gloss (B8b)	Dulux Wash & Wear 101 Adv Semi Gloss (B8b)	SD 3410

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Concrete (low VOC system)	Dulux Acrylic Sealer Undercoat *eco choice* (B16)	Dulux Wash & Wear 101 Adv Semi Gloss (B8b)	Dulux Wash & Wear 101 Adv Semi Gloss (B8b)	SD 1065
Cement render (low VOC system)	Dulux 1 Step Acrylic Primer Sealer Undercoat (B17a)	Dulux Wash & Wear 101 Adv Semi Gloss (B8b)	Dulux Wash & Wear 101 Adv Semi Gloss (B8b)	SD 1066
MDF (low VOC system)	Dulux 1 Step Acrylic Primer Sealer Undercoat (B17a)	Dulux Wash & Wear 101 Adv Semi Gloss (B8b)	Dulux Wash & Wear 101 Adv Semi Gloss (B8b)	SD 3615
Brick and masonry (low VOC system)	Dulux Acrylic Sealer Undercoat *eco choice* (B16)	Dulux Wash & Wear 101 Adv Semi Gloss (B8b)	Dulux Wash & Wear 101 Adv Semi Gloss (B8b)	SD 0678
Concrete blockwork (low VOC system)	Berger Gold Label Acrylic Block Filler (B15)	Dulux Wash & Wear 101 Adv Semi Gloss (B8b)	Dulux Wash & Wear 101 Adv Semi Gloss (B8b)	SD 2797

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 *eco choice* (B16)	Dulux Wash & Wear Kitchen & Bathroom Semi Gloss (B8b)	Dulux Wash & Wear Kitchen & Bathroom Semi Gloss (B8b)	SD 4848
Plasterboard (MR grade) (low VOC system)	Dulux Professional EnvirO2 Water Based Sealer Binder (B15b)	Dulux Wash & Wear Kitchen & Bathroom Semi Gloss (B8b)	Dulux Wash & Wear Kitchen & Bathroom Semi Gloss (B8b)	SD 4581
Fibrous/set plaster	Dulux Sealer Binder (solvent based) (B15)	Dulux Wash & Wear Kitchen & Bathroom Semi Gloss (B8b)	Dulux Wash & Wear Kitchen & Bathroom Semi Gloss (B8b)	SD 5014
Fibre cement products (low VOC system)	Dulux Acrylic Sealer Undercoat *eco choice* (B16)	Dulux Wash & Wear Kitchen & Bathroom Semi Gloss (B8b)	Dulux Wash & Wear Kitchen & Bathroom Semi Gloss (B8b)	SD4512
Concrete (low VOC system)	Dulux Acrylic Sealer Undercoat *eco choice* (B15)	Dulux Wash & Wear Kitchen & Bathroom Semi Gloss (B8b)	Dulux Wash & Wear Kitchen & Bathroom Semi Gloss (B8b)	SD 4522
Cement render (low VOC system)	Dulux 1 Step Acrylic Primer Sealer Undercoat (B17a)	Dulux Wash & Wear Kitchen & Bathroom Semi Gloss (B8b)	Dulux Wash & Wear Kitchen & Bathroom Semi Gloss (B8b)	SD 5015
MDF	Dulux 1 Step Acrylic Primer Sealer Undercoat (B17a)	Dulux Wash & Wear Kitchen & Bathroom Semi Gloss (B8b)	Dulux Wash & Wear Kitchen & Bathroom Semi Gloss (B8b)	SD 5016
Brick and masonry (low VOC system)	Dulux Acrylic Sealer Undercoat *eco choice* (B16)	Dulux Wash & Wear Kitchen & Bathroom Semi Gloss (B8b)	Dulux Wash & Wear Kitchen & Bathroom Semi Gloss (B8b)	SD 5017

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Concrete blockwork (low VOC system)	Berger Gold Label Acrylic Block Filler (B15)	Dulux Wash & Wear Kitchen & Bathroom Semi Gloss (B8b)	Dulux Wash & Wear Kitchen & Bathroom Semi Gloss (B8b)	SD 5019

Semi gloss water based enamel: Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Plasterboard	Dulux Acrylic Sealer Undercoat *eco choice* (B16)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	SD 2591
Plasterboard (MR grade)	Dulux Professional EnvirO2 Water Based Sealer Binder (B15b)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	SD 4672
Fibrous/set plaster	Dulux Sealer Binder (solvent based) (B15)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	SD 3428
Fibre cement products	Dulux Acrylic Sealer Undercoat *eco choice* (B16)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	SW 5020
Timber and veneers (low VOC system)	Dulux Acrylic Sealer Undercoat *eco choice* (B17a)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	SD 2295
Concrete	Dulux Acrylic Sealer Undercoat *eco choice* (B17a)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	SD 5021
Cement render	Dulux 1 Step Acrylic Primer Sealer Undercoat (B17a)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	SD 5022
MDF (low VOC system)	Dulux Acrylic Sealer Undercoat *eco choice* (B17a)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	SD 2294
Brick and masonry	Dulux Acrylic Sealer Undercoat *eco choice* (B16)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	SD 5026
Concrete blockwork	Berger Gold Label Acrylic Block Filler (B15)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	SD 5045
Zinc coated metals (incl. HD galvanized steel, zincalume, Galvabond, zincanneal, zincseal, zinc-primed steel) (low VOC system)	Dulux Quit Rust All Metal Primer (water based) (B12a)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	SD 5023
Shop primed or red oxide primed (ROZP) ferrous metal	Dulux Quit Rust All Metal Primer (water based) (B11a)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	SD 4576

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
(low VOC system)				
Non-ferrous metals (incl. aluminium, brass, copper, tin plate) (low VOC system)	Dulux Quit Rust Etch Primer (B17a)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	SD 5024
Plastics (solvent resistant types e.g. FRP, UPVC) (low VOC system)	Dulux PrepLock Water based Stain Blocker (B17a)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	SD 5025

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) (B17)	Dulux Super Enamel Semi Gloss (B3)	Dulux Super Enamel Semi Gloss (B3)	SD 0041
MDF	Dulux 1 Step Acrylic Based Primer Sealer Undercoat (B17a)	Dulux Super Enamel Semi Gloss (B3)	Dulux Super Enamel Semi Gloss (B3)	SD 1169
Zinc coated metals (incl. HD galvanized steel, zincalume, Galvabond, zincanneal, zincseal, zinc-primed steel)	Dulux Quit Rust All Metal Primer (water based) (B12a) # Apply 2 coats #	Dulux Super Enamel Semi Gloss (B3)	Dulux Super Enamel Semi Gloss (B3)	SD 1764
Shop primed or red oxide primed (ROZP) ferrous metal.	Spot Prime with Dulux Quit Rust All Metal Primer (B11)	Dulux Super Enamel Semi Gloss (B3)	Dulux Super Enamel Semi Gloss (B3)	SD 2171
Non-ferrous metals (incl. aluminium, brass, copper, tin plate)	Dulux Quit Rust Metal-Etch Primer (B13)	Dulux Super Enamel Semi Gloss (B3)	Dulux Super Enamel Semi Gloss (B3)	SD 3337
Plastics (solvent resistant types e.g. FRP, UPVC)	Dulux PrepLock Water based Stain Blocker (B17a)	Dulux Super Enamel Semi Gloss (B3)	Dulux Super Enamel Semi Gloss (B3)	SD 3340
Plastics (solvent sensitive types e.g. polystyrene)	Dulux PrepLock Water based Stain Blocker (B17a)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	SD 3356

Full gloss water based enamel: Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Plasterboard	Dulux Acrylic Sealer Undercoat *eco choice* (B16)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	SD 0990

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Plasterboard (MR grade)	Dulux Professional EnvirO2 Water Based Sealer Binder (B15b)	Dulux Aquanamel Gloss Acrylic (B42)	Dulux Aquanamel Gloss Acrylic (B42)	SD 4853
Fibrous/set plaster	Dulux Sealer Binder (solvent based) (B15)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	SD 2548
Fibre cement products	Dulux Acrylic Sealer Undercoat *eco choice* (B16)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	SD 5027
Timber and veneers (low VOC system)	Dulux Acrylic Sealer Undercoat *eco choice* (B17a)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	SD 2291
Concrete	Dulux Acrylic Sealer Undercoat *eco choice* (B16)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	SD 5028
Cement render	Dulux 1 Step Acrylic Primer Sealer Undercoat (B17a)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	SD 2263
MDF (low VOC system)	Dulux Acrylic Sealer Undercoat *eco choice* (B17a)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	SD 2290
Brick and masonry	Berger Gold Label Acrylic Block Filler (B15)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	SD 5046
Concrete blockwork	Berger Gold Label Acrylic Block Filler (B15)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	SD 3100
Zinc coated metals (incl. HD galvanized steel, zincalume, Galvabond, zincanneal, zincseal, zinc-primed steel) (low VOC system)	Dulux Quit Rust All Metal Primer (water based) (B12a)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	SD 5029
Shop primed or red oxide primed (ROZP) ferrous metal (low VOC system)	Dulux Quit Rust All Metal Primer (water based) (B11a)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	SD 4603
Non-ferrous metals (incl. aluminium, brass, copper, tin plate) (low VOC system)	Dulux Quit Rust Etch Primer (B17a)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	SD 5030
Plastics (solvent resistant types e.g. FRP, UPVC) (low VOC system)	Dulux PrepLock Water based Stain Blocker (B17a)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	SD 5031

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 (B17)	Dulux Super Enamel High Gloss (B5)	Dulux Super Enamel High Gloss (B5)	SD 0039
MDF (interior only)	Dulux 1 Step Acrylic Primer Undercoat (B17a)	Dulux Super Enamel High Gloss (B5)	Dulux Super Enamel High Gloss (B5)	SD 1168
Zinc coated metals (incl. HD galvanized steel, zincalume, Galvabond, zincanneal, zincseal, zinc-primed steel)	Dulux Quit Rust All Metal Primer (B12a) # Apply 2 coats #	Dulux Super Enamel High Gloss (B5)	Dulux Super Enamel High Gloss (B5)	SD 0381
Shop primed or red oxide primed (ROZP) ferrous metal.	Spot Prime with Quit Rust All Metal Primer (B11)	Dulux Super Enamel High Gloss (B5)	Dulux Super Enamel High Gloss (B5)	SD 1930
Non-ferrous metals (incl. aluminium, brass, copper, tin plate)	Dulux Quit Rust Etch Primer (B11)	Dulux Super Enamel High Gloss (B5)	Dulux Super Enamel High Gloss (B5)	SD 1085
Plastics (solvent resistant types e.g. FRP, UPVC)	Dulux PrepLock Water based Stain Blocker (B17a)	Dulux Super Enamel High Gloss (B5)	Dulux Super Enamel High Gloss (B5)	SD 0385
Plastics (solvent sensitive types e.g. polystyrene)	Dulux PrepLock Water based Stain Blocker (B17a)	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 (incl. HD Galvanized steel, zincalume, Galvabond, zincanneal, zincseal, zinc-primed steel)	Dulux Duremax GPE Zinc Phosphate to 125 microns DFT (B29)	Dulux Duraflex 2 High Gloss (B5)	Dulux Duraflex 2 High Gloss (B5)	SI 3371

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-	Dulux Duremax GPE Zinc Phosphate to 125 microns DFT (B29)	Dulux Duremax GPE to 100 microns DFT (B29)	Dulux Weathermax HBR to 75 microns DFT (B29c)	SI3359

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
primed steel)				

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 Internal Stain (B18b) & Cabot's Universal Sanding Sealer (B40)	Cabot's Cabothane (solvent based) (B19) Gloss or Satin	Cabot's Cabothane (solvent based) (B19) Gloss or Satin	SW 1219 (gloss) -or- SW 1202 (satin)
Timber and timber veneer (low VOC water based system)	Cabot's Woodcraft Stain (B18c)	Cabot's Cabothane Water Based (B19a) Gloss or Satin	Cabot's Cabothane Water Based (B19a) Gloss or Satin	SW 5000

Gloss level required: Refer to finishes schedule.

Clear coat 2 pack polyurethane - Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Timber (low VOC water based system)	Feast Watson EnviroMax Gloss (B20b)	Feast Watson EnviroMax Gloss (B20b)	Feast Watson EnviroMax Gloss (B20b)	SW 4102
Timber (low VOC water based system)	Feast Watson EnviroMax Low Sheen (B20b)	Feast Watson EnviroMax Low Sheen (B20b)	Feast Watson EnviroMax Low Sheen (B20b)	SW 1267
Timber (low VOC water based system)	Feast Watson EnviroMax Semi Gloss (B20b)	Feast Watson EnviroMax Semi Gloss (B20b)	Feast Watson EnviroMax Semi Gloss (B20b)	SW 1265

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)	Intergrain Ultraclear (B39b) Gloss or Satin Apply 10.8 m^2/litre	Intergrain Ultraclear (B39b) Gloss or Satin Apply 10.8 m^2/litre		SW 3925 (gloss) or SW 3927 (satin)
Timber and timber veneer (solvent based system)	Feast Watson Satinproof (solvent based) (B19)	Feast Watson Satinproof (solvent based) (B19)	(Optional) Feast Watson Satinproof (solvent based) (B19)	SW 1244

Two pack gloss pigmented polyurethane- Interior joinery

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Timber (all shop applied)	Dulux Luxepoxy 4 White Primer (B29B) to 50 microns DFT.	Dulux Luxathane R (B44) to 60 microns DFT.	Dulux Luxathane R (B44) to 60 microns DFT.	SD 1751

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		SW 1257
Timber	Feast Watson China Wood Oil (B43a) Apply 12-14 m^2/litre	Feast Watson China Wood Oil (B43a) Apply 12-14 m^2/litre		SW 1258

Tung oil (Semi gloss finish) - Interior (Timber floors)

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Timber (soft wood)	Toby Tung Oil Seal apply 8-9 m^2/litre	Toby Tung Oil Seal apply 8-9 m^2/litre	Toby Floor polish 50-80 m^2/litre	SW 1517
Timber (hardwood)	Toby Tung Oil Seal apply 10-11 m^2/litre	Toby Tung Oil Seal apply 10-11 m^2/litre	Toby Floor polish 50-80 m^2/litre	SW 1517

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 (B39c) Gloss, Satin or Matt	Intergrain Enviropro Endure 1 (B39c) Gloss, Satin or Matt	Intergrain Enviropro Endure 1 (B39c) Gloss, Satin or Matt	SW4012 (gloss) or SW4014 (satin) or SW4016 (matt)
Timber (floors)	Feast Watson Floorproof (solvent based) (B20a) Gloss or Satin	Feast Watson Floorproof (solvent based) (B20a) Gloss or Satin	Feast Watson Floorproof (solvent based) (B20a) Gloss or Satin	SW 1332

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 (B24)	Berger Jet Dry Non-Slip Paving Paint (B24)	Berger Jet Dry Non-Slip Paving Paint (B24)	SD 0643
Concrete (low VOC, water based system)	Berger Jet Dry Aqua Tread Satin (B24A)	Berger Jet Dry Aqua Tread Satin (B24A)		SD 1145

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)	Berger Jet Dry Aqua Tread Satin (B15a)	Berger Jet Dry Aqua Tread Satin (B15a)	Berger Jet Dry Aqua Tread Satin (B15a)	SD 1145
Concrete (commercial) (low VOC, water based system)	Dulux Luxafloor ECO2 (B29a)	Dulux Luxafloor ECO2 (B29a)		SI 3030
Concrete	Dulux 956/1	Dulux 956/1	(Optional)	SA 2589

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
(commercial) (water based system)	Acraglaze (B15a) (Interior only)	Acraglaze (B15a) (Interior only)	Dulux 956/1 Acraglaze (B15a) (Interior only)	
Concrete (commercial) (solvent based system)	Dulux Dureseal ACS (B15a)	Dulux Dureseal ACS (B15a)		SI 1574

4.3 EXTERIOR PAINTING SCHEDULES

Low gloss latex – Exterior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Weatherboard - hardboard cladding (Weathertex)	Dulux 1 Step Acrylic Primer Undercoat (B10a)	Dulux Weathershield Low Sheen Acrylic (B7a)	Dulux Weathershield Low Sheen Acrylic (B7a)	SD 5032
Weatherboard - fibre cement board cladding (Hardiboard)	Dulux Weathershield Low Sheen Acrylic (B7a)	Dulux Weathershield Low Sheen Acrylic (B7a)	Dulux Weathershield Low Sheen Acrylic (B7a)	SD 2539
Fibre cement products	Dulux Weathershield Low Sheen Acrylic (B7a)	Dulux Weathershield Low Sheen Acrylic (B7a)	Dulux Weathershield Low Sheen Acrylic (B7a)	SD 1333
Timber and veneers	Dulux 1 Step Acrylic Primer Undercoat (B10a)	Dulux Weathershield Low Sheen Acrylic (B7a)	Dulux Weathershield Low Sheen Acrylic (B7a)	SD 5033
Concrete (OFC, tilt slab or pre-cast)	Dulux Weathershield Low Sheen Acrylic (B7a)	Dulux Weathershield Low Sheen Acrylic (B7a)	(Optional) Dulux Weathershield Low Sheen Acrylic (B7a)	SD 0994
Concrete (OFC, tilt slab or pre-cast) (High-build performance coating system)	Dulux AcraPrime 501/1 Water Based Primer (B15)	Dulux AcraTex AcraShield 955 Low Gloss RollerRoller Finish (B38a)	Dulux AcraTex AcraShield 955 Low Gloss RollerRoller Finish (B38a)	SA 0770
Cement render (High-build performance coating system)	Dulux AcraPrime 501/1 Water Based Primer (B15)	Dulux AcraTex AcraShield 955 Low Gloss Roller Finish (B38a)	Dulux AcraTex AcraShield 955 Low Gloss Roller Finish (B38a)	SA 4029
Clay brick and masonry	Dulux Weathershield Low Sheen Acrylic (B7a)	Dulux Weathershield Low Sheen Acrylic (B7a)	Dulux Weathershield Low Sheen Acrylic (B7a)	SD 0312
Concrete blockwork	Berger Gold Label Acrylic Blockfiller (B15)	Dulux Weathershield Low Sheen Acrylic (B7a)	Dulux Weathershield Low Sheen Acrylic (B7a)	SD 1555
Concrete blockwork (High-build performance	Dulux AcraPrime 501/1 Water Based Primer (B15)	Dulux AcraTex AcraShield 955 Low Gloss Roller	Dulux AcraTex AcraShield 955 Low Gloss Roller	SA 2957

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
coating system)		Finish (B38a)	Finish (B38a)	
Zinc coated metals (incl. Zincalume, Galvabond, Zincanneal, zincseal, zinc-primed steel)	Dulux Weathershield Low Sheen Acrylic (B7a)	Dulux Weathershield Low Sheen Acrylic (B7a)	Dulux Weathershield Low Sheen Acrylic (B7a)	SD 3275
HD Galvanized steel or zinc-primed steel	Dulux Quit Rust Galvanised Iron Primer Plus (B12A)	Dulux Weathershield Low Sheen Acrylic (B7a)	Dulux Weathershield Low Sheen Acrylic (B7a)	SD 0313
Shop primed or red oxide primed (ROZP) ferrous metal.	Dulux Quit Rust All Metal Primer (B11)	Dulux Weathershield Low Sheen Acrylic (B7a)	Dulux Weathershield Low Sheen Acrylic (B7a)	SD 2915
Plastics (solvent resistant types e.g. FRP, UPVC) (low VOC)	Dulux PrepLock Water Based Stain Blocker (B17A)	Dulux Weathershield Low Sheen Acrylic (B7a)	Dulux Weathershield Low Sheen Acrylic (B7a)	SD 5047

Semi gloss latex – Exterior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Weatherboard hardboard cladding	Dulux 1 Step Acrylic Primer Undercoat (B10A)	Dulux Weathershield Semi Gloss Acrylic (B8a)	Dulux Weathershield Semi Gloss Acrylic (B8a)	SD 5035
Fibre cement products	Dulux Weathershield Semi Gloss Acrylic (B8a)	Dulux Weathershield Semi Gloss Acrylic (B8a)	(Optional) Dulux Weathershield Semi Gloss Acrylic (B8a)	SD 2034
Timber and veneers	Dulux 1 Step Acrylic Primer Undercoat (B10A)	Dulux Weathershield Semi Gloss Acrylic (B8a)	Dulux Weathershield Semi Gloss Acrylic (B8a)	SD 3424
Concrete (OFC, tilt slab or pre-cast)	Dulux Weathershield Semi Gloss Acrylic (B8a)	Dulux Weathershield Semi Gloss Acrylic (B8a)	Dulux (Optional) Weathershield Semi Gloss Acrylic (B8a)	SD 2577
Concrete (OFC, tilt slab or pre-cast) (High-build performance coating system)	Dulux AcraPrime 501/1 Water Based Primer (B15)	Dulux AcraTex AcraShield 955 Low Gloss Roller Finish (B38a)	Dulux AcraTex AcraShield 955 Low Gloss Roller Finish (B38a)	SA 0770
Cement render (High-build performance coating system)	Dulux AcraPrime 501/1 Water Based Primer (B15)	Dulux AcraTex AcraShield 955 Low Gloss Roller Finish (B38a)	Dulux AcraTex AcraShield 955 Low Gloss Roller Finish (B38a)	SA 4029
Clay brick and masonry	Dulux Weathershield Semi Gloss Acrylic (B8a)	Dulux Weathershield Semi Gloss Acrylic (B8a)	Dulux (Optional) Weathershield Semi Gloss Acrylic (B8a)	SD 2577
Concrete blockwork	Berger Gold Label	Dulux	Dulux	SD 3423

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
	Acrylic Blockfiller (B15)	Weathershield Semi Gloss Acrylic (B8a)	Weathershield Semi Gloss Acrylic (B8a)	
Concrete blockwork (High-build performance coating system)	Dulux AcraPrime 501/1 Water Based Primer (B15)	Dulux AcraTex AcraShield 955 Low Gloss Roller Finish (B38a)	Dulux AcraTex AcraShield 955 Low Gloss Roller Finish (B38a)	SA 2957
Zinc coated metals (incl. Zincalume, Galvabond, Zincanneal, zincseal, zinc-primed steel)	Dulux Quit Rust Galvanised Iron Primer (B12A)	Dulux Weathershield Semi Gloss Acrylic (B8a)	Dulux Weathershield Semi Gloss Acrylic (B8a)	SD 3411
HD Galvanized steel or zinc-primed steel	Dulux Quit Rust Galvanised Iron Primer (B12A)	Dulux Weathershield Semi Gloss Acrylic (B8a)	Dulux Weathershield Semi Gloss Acrylic (B8a)	SD 3411
Shop primed or red oxide primed (ROZP) ferrous metal.	Dulux Quit Rust All Metal Primer (B11)	Dulux Weathershield Semi Gloss Acrylic (B8a)	Dulux Weathershield Semi Gloss Acrylic (B8a)	SD 2158
Plastics (solvent resistant types e.g. FRP, UPVC) (low VOC system)	Dulux PrepLock Water Based Stain Blocker (B17A)	Dulux Weathershield Semi Gloss Acrylic (B8a)	Dulux Weathershield Semi Gloss Acrylic (B8a)	SD 5048

Gloss latex – exterior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Fibre cement products	Dulux Weathershield Gloss Acrylic (B9a)	Dulux Weathershield Gloss Acrylic (B9a)	Dulux (Optional) Weathershield Gloss Acrylic (B9a)	SD 2938
Timber and veneers	Dulux 1 Step Acrylic Primer Undercoat (B10A)	Dulux Weathershield Gloss Acrylic (B9a)	Dulux Weathershield Gloss Acrylic (B9a)	SD 1524
Concrete (OFC, tilt slab or pre-cast)	Dulux Weathershield Gloss Acrylic (B9a)	Dulux Weathershield Gloss Acrylic (B9a)	Dulux (Optional) Weathershield Gloss Acrylic (B9a)	SD 3096
Concrete (OFC, tilt slab or pre-cast) (High-build performance coating system)	Dulux AcraPrime 501/1 Water Based Primer (B15)	Dulux AcraTex AcraShield 955 Low Gloss Roller Finish (B38a)	Dulux AcraTex AcraShield 955 Low Gloss Roller Finish (B38a)	SA 0770
Cement render (High-build performance coating system)	Dulux AcraPrime 501/1 Water Based Primer (B15)	Dulux AcraTex AcraShield 955 Low Gloss Roller Finish (B38a)	Dulux AcraTex AcraShield 955 Low Gloss Roller Finish (B38a)	SA 4029
Clay brick and masonry	Dulux 1 Step Acrylic Primer Undercoat (B15)	Dulux Weathershield Gloss Acrylic (B9a)	Dulux Weathershield Gloss Acrylic (B9a)	SD 1086
Concrete blockwork	Berger Gold Label Acrylic Blockfiller (B15) (Optional)	Dulux Weathershield Gloss Acrylic (B9a)	Dulux Weathershield Gloss Acrylic (B9a)	SD 5050

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Concrete blockwork (High-build performance coating system)	Dulux AcraPrime 501/1 Water Based Primer (B15)	Dulux AcraTex AcraShield 955 Low Gloss Roller Finish (B38a)	Dulux AcraTex AcraShield 955 Low Gloss Roller Finish (B38a)	SA 2957
Zinc coated metals (incl. Zincalume, Galvabond, Zincanneal, zincseal, zinc-primed steel)	Dulux Quit Rust Galvanised Iron Primer (B12A)	Dulux Weathershield Gloss Acrylic (B9a)	Dulux Weathershield Gloss Acrylic (B9a)	SD 0391
HD galvanised steel or zinc-primed steel	Dulux Quit Rust Galvanised Iron Primer Plus (B12A)	Dulux Weathershield Gloss Acrylic (B9a)	Dulux Weathershield Gloss Acrylic (B9a)	SD 0391
Shop primed or red oxide primed (ROZP) ferrous metal.	Dulux Luxaprime Zinc Phosphate Primer (solvent based) (B11)	Dulux Weathershield Gloss Acrylic (B9a)	Dulux Weathershield Gloss Acrylic (B9a)	SI 1992
Plastics (solvent resistant types e.g. FRP, UPVC) (low VOC system)	Dulux PrepLock Water Based Stain Blocker (B17A)	Dulux Weathershield Gloss Acrylic (B9a)	Dulux Weathershield Gloss Acrylic (B9a)	SD 5051

Acrylic paint system for bagged masonry – Exterior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Brickwork and concrete – flush finish (bagged or sponged) – no texture	Dulux Sealer Binder (solvent based) (B15)	Dulux Weathershield Low Sheen Acrylic (B7a)	Dulux Weathershield Low Sheen Acrylic (B7a)	SD 1021
Brickwork and concrete – flush finish (bagged or sponged) – slight texture	Dulux AcraPrime 501/1 Water Based Primer (B17A)	Dulux Acratex AcraSand Acrylic (2nd coat Optional)	Dulux Acratex Acrashield (B7a)	SA 0754
Brickwork and concrete – flush finish – medium texture	Dulux AcraPrime 501/1 Water Based Primer (B17A)	Dulux Acratex Mediteranean Bag Finish (2 coats)	Dulux Acratex AcraShield	SA 2266

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 (B15)	Dulux Acratex Contempo 959 Advance Base Coat(B38a)	Dulux Acratex Contempo 959 Advance Finish Coat (B38a)	SA 1868
Concrete, blockwork and cement render	Dulux Acraprime 501/1 Water Based Primer (B15)	Dulux Acratex Roll On 950-00 Low Profile Texture (B38a)	Dulux Acratex Acrashield 955 Finish (B38a)	SA 0696
Concrete, masonry, blockwork and	Dulux Acraprime 501/1 Water Based	Dulux Acratex Acrashield 955 Low	Dulux Acratex Acrashield 955 Low	SA 0770

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
cement render	Primer (B15)	Gloss Rolana Finish (B38a)	Gloss Rolana Finish (B38a)	

Semi gloss, water-based enamel – Exterior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Fibre cement products	Dulux 1 Step Acrylic Primer Undercoat (B17A)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	SD 5037
Timber and veneers	Dulux 1 Step Acrylic Primer Undercoat (B17A)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	SD 5038
Concrete	Dulux 1 Step Acrylic Primer Undercoat (B17A)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	SD 5039
Cement render	Dulux 1 Step Acrylic Primer Undercoat (B17A)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	SD 5022
Brick and masonry	Dulux 1 Step Acrylic Primer Sealer Undercoat (B16)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	SD 5040
Concrete blockwork	Berger Gold Label Acrylic Block Filler (B15)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	SD 5041
Zinc coated metals (incl. HD galvanized steel, , Zincalume, Galvabond, Zincanneal, zincseal, zinc-primed steel) (low VOC system)	Dulux Quit Rust All Metal Primer (B12A)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	SD 5023
Shop primed or red oxide primed (ROZP) ferrous metal (low VOC system)	Dulux Quit Rust All Metal Primer (B11)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	SD 3556
Non-ferrous metals (incl. aluminium, brass, copper, tin plate) (low VOC system)	Dulux Quit Rust Etch Primer (B17A)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	SD 5024
Plastics (solvent resistant types e.g. FRP, UPVC) (low VOC system)	Dulux PrepLock Water Based Stain Blocker (B17A)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	Dulux Aquanamel Semi Gloss Acrylic (B8b)	SD 5025

Gloss, water based enamel – Exterior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Fibre cement products	Dulux 1 Step Acrylic Primer Sealer Undercoat (B16)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	SD 5036
Timber and veneers	Dulux 1 Step Acrylic Primer Sealer Undercoat (B16)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	SD 2213
Concrete	Dulux 1 Step Acrylic Primer Sealer Undercoat (B16)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	SD 5042
Cement render	Dulux 1 Step Acrylic Primer Sealer Undercoat (B16)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	SD 2263
Brick and masonry	Dulux 1 Step Acrylic Primer Sealer Undercoat (B16)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	SD 2262
Concrete blockwork	Berger Gold Label Acrylic Blockfiller (B15)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	SD 1522
Zinc coated metals (incl. HD Galvanized steel, Zincalume, Galvabond, Zincanneal, zincseal, & zinc-primed steel)	Dulux Quit Rust Galvanised Iron Primer Plus (B12A)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	SD 2645
Shop primed or red oxide primed (ROZP) ferrous metal.	Dulux Quit Rust All Metal Primer (B11)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	SD 2987
Non-ferrous metals (incl. aluminium, brass, copper, tin plate)	Dulux Quit Rust Etch Primer (B17A)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	SD 5043
Plastics (solvent resistant types e.g. FRP, UPVC)	Dulux PrepLock Water Based Stain Blocker (B17A)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	Dulux Aquanamel Gloss Acrylic (B42) & (B9)	SD 5044

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) (B17)	Dulux Super Enamel High Gloss (B5)	Dulux Super Enamel High Gloss (B5)	SD 0039
Zinc coated metals (incl. HD Galvanized steel,	Dulux Professional Galvanised Iron Primer (B12A) #	Dulux Super Enamel High Gloss (B5)	Dulux Super Enamel High Gloss (B5)	SD 0381

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
zincalume, Galvabond, zincanneal, zincseal, zinc-primed steel)	Apply 2 coats #			
Shop primed or red oxide primed (ROZP) ferrous metal.	Spot Prime with Dulux Quit Rust All Metal Primer (B11)	Dulux Super Enamel High Gloss (B5)	Dulux Super Enamel High Gloss (B5)	SD 1085
Non-ferrous metals (incl. aluminium, brass, copper, tin plate)	Dulux Dulux Quit Rust Etch Primer (B17A)	Dulux Super Enamel High Gloss (B5)	Dulux Super Enamel High Gloss (B5)	SD 3451
Plastics (solvent resistant types e.g. FRP, UPVC)	Dulux Dulux PrepLock Water Based Stain Blocker (B17A)	Dulux Super Enamel High Gloss (B5)	Dulux Super Enamel High Gloss (B5)	SD 5052
Plastics (solvent sensitive types e.g. polystyrene)	Dulux Dulux PrepLock Water Based Stain Blocker (B17A)	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 80-100 mm wide line marking for car parking spaces nominated on drawings.

Materials:

- Paint System: Dulux Roadmaster WB2, spray applied to manufacturers written recommendations.
- Colour shall be white and shall not be subject to discolouration by the bitumen from the road surface.

Application: Unless approved all paint shall be applied by a mechanical line marking sprayer. The road surface shall be clean and dry at the time of painting. Paint shall be applied at wet thickness in the range of 0.35 to 0.40 mm. Bitumen shall be at least 30 days old before coating.

Standard: To AS/NZS 2890.1.

0673 POWDER COATINGS

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Provide powder coating systems to substrates, as documented.

Selections: As documented.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements*.

1.3 STANDARDS

Substrates

Application to aluminium and aluminium alloy substrates for architectural applications: To AS 3715.

Application to metal substrates other than aluminium for architectural applications: To AS 4506.

1.4 INTERPRETATION

Definitions

General: For the purposes of this worksection the following definitions apply:

- Substrate: The surface to which a material or product is applied.
- Powder coating: The process of applying a thermoset powder coat to a substrate.
  - . Thermoset powder coat: A mixture of finely ground particles of pigment and resin sprayed on to the substrate. The charged powder particles adhere to the electrically grounded surfaces until heated and fused into a smooth coating in a curing oven.
  - . Thermoset polyester powder coat: Uses an enhanced polyester resin.
  - . Thermoset fluoropolymer coat: Factory applied spray coatings on aluminium products, includes PVF_2 (polyvinyl fluoride) and PTFE (poly tetra fluoro ethylene) coatings.

2 EXECUTION

2.1 PREPARATION

Substrate pre-treatment and application

Power coating to aluminium: To AS 3715 Appendix G.

Power coating to metals, other than aluminium: To AS 4506 Appendix I.

2.2 CLEANING

Architectural aluminium applications

Completed assembly: Clean to AS 3715 Appendix C.

0702 MECHANICAL DESIGN AND INSTALL

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Refer to mechanical engineer's specification.

0802 HYDRAULIC DESIGN AND INSTALL

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Refer to hydraulic engineer's specification.

0902 ELECTRICAL DESIGN AND INSTALL

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Refer to electrical engineer's specification.