This document specifies the general standards of materials and workmanship required by the Department of Construction and Infrastructure for small building works including services and landscape.
ABOUT THIS SPECIFICATION

This document was prepared by the Department of Construction and Infrastructure, and specifies the general standards of materials and workmanship required by the Department for small building works including services and landscape.

It applies to new work, restoration work and maintenance and may be used as a blanket reference document or combined with the Project Specific Requirements to identify particular items where a selection is offered in the reference text.

The text is based on NATSPEC, the national building specification, produced by Construction Information Systems Australia Pty Ltd of which the Department of Construction and Infrastructure, is a stakeholder.

The referenced Australian Standards are current as of 1 March 2012 and this document is compatible with the Building Code of Australia 2011. The annual publication date of this Standard Specification in April aligns with the now yearly updates of NATSPEC and the BCA.

The text has been edited to specify only the type of construction common in the Northern Territory for small building works. For example, brick construction is not specified and the Roofing Section is confined to sheet metal roofing. However, the text contains specific regional and policy requirements developed by Department of Construction and Infrastructure Officers with extensive experience in the construction industry in the Northern Territory.

This Standard Specification, now in its 14th year of publication, supersedes the 2011 version. This edition will remain unaltered from April 2012 and an updated version will be published in April 2013.

Robert Foote
Chief Architect
April 2012
INFORMATION

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Thanks to Wicking for providing the caricatures which help to enliven a rather mundane subject.

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REFERENCE TEXT

REFERENCE: Read this Standard Specification in conjunction with the Project Specific Requirements and Drawings if any. Only those parts of the Standard Specification which refer to the works being carried out apply. This document may be used as a blanket reference specification referring generally to the standards of materials and workmanship required by the Department for small building works including services and landscape.

PROJECT SPECIFIC REQUIREMENTS:
The selection of specific items or materials for the works being carried out are specified in the Project Specific Requirements or shown as notes on the drawings.

OR
There are no separate project specific requirements in this specification. For specific items or materials for the works being carried out, refer to the drawings or scope of work if any.

PRECEDENCE: Any provision in the project specification or on the project drawings shall override any conflicting provision in the Standard Specification.

HOLD & WITNESS POINTS: These apply whether quality assurance is included in this project or not. Refer to the definitions of hold points and witness points in the general requirements section of this reference specification.

SITE COPY: Retain a copy of this document on site for the duration of the works.
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1 GENERAL REQUIREMENTS

1.1 GENERAL

Interpretation

Supply: ‘Supply’, ‘furnish’ and similar expressions mean ‘supply only’ - do not install.

Provide: ‘Provide’ and similar expressions mean ‘supply and install’ and include development of the design beyond that documented.

Required: Required by the contract documents or by the local council or statutory authorities.

Proprietary: Identifiable by naming the manufacturer, supplier, installer, trade name, brand name, catalogue or reference number.

Standards

Use referenced Australian or other standards (including amendments) which are current one month before the date of the contract except where other editions or amendments are required.

Manufacturer’s or supplier’s recommendations

Select, if no selection is given, and provide, transport, deliver, store, handle, protect, install, finish, adjust and prepare for use the manufactured items in accordance with the current written recommendations and instructions of the manufacturer or supplier. If materials or products are supplied by the manufacturer in closed or sealed containers or packages, bring the material or products to the place of use or installation in the original containers or packages.

1.2 DEFINITIONS

Witness Point; Give the superintendent sufficient written notice so that an inspection can be made.

Hold Point; Obtain the written approval of the superintendent for that particular stage of the works. Where work is to be covered or concealed do not proceed past that point until approval has been received.

Minimum notice; Minimum notice required so that inspections may be made: 24 hours in town areas, 3 days in other areas or 5 days in remote areas.

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. If alternatives are proposed, submit sufficient information to the Superintendent to enable evaluation of the proposed alternatives.

1.3 TERMITE PROTECTION

General

Standard for new buildings: To AS 3660.1 and Building Advisory Services Building Note 19-12/5/97 Protection of Buildings from Termite Attack.

To AS 3660.2 for in and around existing buildings and structures.

Chemical soil barriers - reticulation systems:
Submit evidence that the system complies with AS 3660.1, Section 8 and the Building Code of Australia.

Use Fipronil based termiticide for Department of Education and Training projects.

Do not use graded stone particles systems.

All slab penetrations to be fitted with termite protection collars.

Tests— Soil barrier
Submit a registered testing laboratory analysis certificate of chemical soil barriers tested to Appendix E of AS 3660.1 if directed by the Superintendent.

1.4 TIMBER GENERALLY

Moisture content

General: Make milled products from timbers seasoned:

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

Unseasoned timber

If unseasoned timber is provided, or variations in moisture content are likely, make allowance for shrinkage, swelling and differential movement.

Durability

General: Provide timbers with natural durability Class appropriate to the conditions of use as listed below, or preservative- treated timbers of equivalent durability.

Natural durability of Heartwood: to AS 5604.

Minimum requirements:

Class 1 for: Timbers in contact with the ground.

Class 2 for: Timbers above ground, not in continuous contact with moisture, well ventilated, protected from moisture but exposed to the weather.

Class 3 for: Timbers above ground, not in continuous contact with moisture, well ventilated, protected with a finish, and well maintained.

Class 4 for: Timbers fully protected from moisture, indoors, above ground, and well ventilated.

Preservative treatment

Standard: To AS 1604.

Hazard classification: To AS 1604.1 Table D1.

Preservative treatment

Standard: To AS 1604.

Hazard classification: To AS 1604.1 Table D1.

1.5 TESTS

Registered Testing Authority

As defined in the BCA.

Carry out any testing required using an authority registered by the National Association of Testing Authority.
Authorities (NATA) to test in the relevant field, except for tests to installed services.

1.6 COMPLETION
Warranties
Name the Principal as warrantee and give the Superintendent copies of manufacturers’ warranties.

Instruction manuals
Give the Superintendent manufacturers’ instruction manuals.

Cleaning
Remove rubbish and surplus material from the site and clean the work throughout.

Operation
Ensure moving parts operate safely and smoothly.

Termite barriers
Provide the Superintendent with a certificate of installation in accordance with AS 3660.1 Appendix A2.

Notice
Provide a durable termite barrier notice permanently fixed in a prominent location to BCA Volume 1 Part B1.4 (i) and AS 3660.1 Appendix A. Generally fix to the inside of the door to the electricity meter box.

Surveyor’s certificate
If requested by the Superintendent provide a certificate which confirms that the work, including boundary fences, has been correctly located.

Services layout
Give the Superintendent a plan which shows the location of underground services as installed. Use the same format as the contract drawings.

Authorities’ approvals
Give the Superintendent evidence of approval of the statutory authorities whose requirements apply to the work.

1.7 QUALITY
Refer to the QUALITY clause in the GENERAL REQUIREMENTS section of the PROJECT SPECIFIC REQUIREMENTS section of the RFT.

1.8 OTHER REQUIREMENTS
Refer to PROJECT SPECIFIC REQUIREMENTS section of the Request for Tender.

2 SITE PREPARATION

2.1 GENERAL
Standard
Groundworks for slabs and footings: To AS 2870.

Earthworks: To AS 3798.
Site classification: To AS 2870 and BCA 3.2.4.

Interpretation
Bad ground: Ground unsuitable for the purposes of the works, including fill liable to subsidence, ground containing cavities, faults or fissures, ground contaminated by harmful substances and ground which is or becomes soft, wet or unstable.
Rock: Monolithic material with a volume greater than 0.5 m³ which cannot be removed until broken up. The Contractor shall be deemed to have allowed for the cost of performing the required excavations in whatever material may be encountered, and no extra payment shall be paid for excavation in rock.

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.

Immediate notice
If rock or bad ground is encountered, advise the Superintendent immediately. Do not carry out any further work in the affected area until and unless instructed to do so by the Superintendent.

Explosives
Do not use explosives.

2.2 DEMOLITION
Standard
Demolition: To AS 2601

Inspection - Witness Point
Witness Point: Give sufficient notice so that inspection may be made of adjoining structures before commencement of demolition.

Inspection - Witness Point
Witness Point: Give sufficient notice so that inspection may be made of adjoining structures immediately following completion of demolition works.

Photographs
If required, photograph the areas adjoining the demolition work for future reference.

Demolished and salvaged materials
Except for materials to be recovered and retained by the Superintendent or re-used, take possession of demolished materials and remove them from the site. Secure the loads to prevent spillage of demolished materials in transit. Do not burn or bury demolished materials on the site.

Refer to PROJECT SPECIFIC REQUIREMENTS section of the Request for Tender.

Recycling and salvaging
Where possible, dismantle building components for off site recycling.
Refer to PROJECT SPECIFIC REQUIREMENTS section of the Request for Tender.

**Hazardous materials - Witness Point**

Witness Point: Give notice immediately if any hazardous materials or conditions are found.

Refer to PROJECT SPECIFIC REQUIREMENTS section of the Request for Tender.

**Asbestos**
Reference: Refer to the asbestos clause in the Conditions of Contract.

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

Adjacent property: Protect property either adjacent or on site from interference or damage by appropriate means.

Reinstatement: Make good any damage caused during demolition to match the existing.

**Support**
Provide temporary support for sections of existing buildings which are to be altered and which rely for support on work to be demolished.

**Encroachment**
Prevent the encroachment of demolished materials on to adjoining property, including public places.

**Weather protection**
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.

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

### 2.3 TREE PROTECTION

**Trees to be Retained:**
All trees NOT marked for removal.

**Marking**
Mark trees which are to be removed using suitable easily visible means of identification.

**Protection**
Tree protection zone; to AS 4970, Section 3
Tree protection measures; to AS 4970 Section 4
Protect from damage trees which are required to remain. Do not remove topsoil from the area within the dripline of the trees and keep this area free of construction material and debris.

**Excavation**
If excavating near trees required to remain, use hand methods to locate, expose and clean remove the roots on the line of excavation.

**Damage**
If a tree, which is to remain, is damaged and repair work is considered impractical, or is attempted and fails, remove the tree and the root system, if so directed. Replace the tree with a tree of the same species and a similar condition and size or pay compensation.

Compensation for damage to existing vegetation shall be borne by the Contractor as a negative variation to the Contract and determined as follows:
- Maximum valuation: $2500 per tree
- Minimum valuation: $250 per tree

### 2.4 CONTROL AND PROTECTION

**Erosion control**
Avoid erosion, contamination, and sedimentation of the site, surrounding areas, and drainage systems.

**Water quality**
Ensure that washout does not enter waterways or stormwater drains. Ensure that there are no cross connections between stormwater systems and sewerage systems.

**Dewatering**
Keep earthworks and the site of the works free of excess water. Provide and maintain slopes, crowns, drains, 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.

### 2.5 SITE CLEARING

**Extent**
Limit clearing to areas of cut and fill and areas to be occupied by construction, paving, landscape work or to other designated areas.

**Clearing operations**
Remove everything on or above the site surface, including rubbish, scrap, grass, vegetable matter and organic debris, scrub, trees, timber, stumps, boulders and rubble. Remove grassed soil to a depth just sufficient to include the root zone.

**Mulching**
Mulch all demolished aerial vegetation and reduce to pieces not larger than 75 x 50 x 15 mm and stockpile for reuse or remove from site. Refer to PROJECT SPECIFIC REQUIREMENTS section of the Request for Tender.

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

**Removal of topsoil**
General: Remove the topsoil layer of the natural ground which contains substantial organic matter over the areas to be occupied by construction and paving.
- Maximum depth: 200 mm.

**Topsoil stockpiles**
Stockpile site topsoil required for re-use and imported topsoil. Protect stockpiles from
contamination by other excavated material, weeds and building debris.

**Disposal of surplus material**
Take possession of surplus material and remove it from the site. Remove cleared and grubbed and ground material from the site. Dispose of this material legally.

### 2.6 EXCAVATION

**Extent**
Site surface: Excavate to give the levels and profiles required for construction, site services, paving, and landscaping. Allow for compaction or settlement or heaving.
Footings: Excavate for footings to the required sizes and depths. Confirm that the foundation conditions meet the design bearing capacity.

**Marking**
Before commencing excavation, locate and mark existing underground services in the areas which will be affected by the groundworks operations including clearing, excavating and trenching.

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

**Foundations**
After excavation, confirm that the bearing capacity is adequate.

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

**Reinstatement of excavation**
If excavation exceeds the required depth, or deteriorates, reinstate with fill to the correct depth, level and bearing value.

**Grading**
External areas: Grade to give falls away from buildings, minimum 1:100. Grade the ground surface under suspended floors and externally to drain ground or surface water away from buildings without ponding.

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

### 2.7 SURFACE PREPARATION

**General**
Stripping: Prepare ground surface to AS 3798 clause 6.1.5.

Before placing fill, ground slabs or load bearing elements, remove loose material, debris, organic matter and materials which will inhibit or prevent satisfactory placement of fill layers and compact the ground to achieve the required density.

**Source of fill**
Provide fill free from organic matter, imported on to the site from an approved source unless the fill type can be provided from spoil recovered from the excavations or designated borrow pits.

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

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

**General fill**
Inorganic material, maximum particle size 75 mm, plasticity index not exceeding 15%. Select fill: Naturally occurring material, crushed or quarried stone, crushed gravel, or a mixture of crushed or quarried material free of lumps of clay and free from organic or other deleterious material complying with the following requirements:

<table>
<thead>
<tr>
<th>A.S. METRIC SIEVE</th>
<th>PERCENTAGE PASSING BY WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>75.0 mm</td>
<td>100</td>
</tr>
<tr>
<td>9.50 mm</td>
<td>30 - 100</td>
</tr>
<tr>
<td>2.36 mm</td>
<td>15 - 65</td>
</tr>
<tr>
<td>0.075 mm</td>
<td>5 - 25</td>
</tr>
<tr>
<td>Liquid Limit</td>
<td>Maximum 35%</td>
</tr>
<tr>
<td>Plasticity Index</td>
<td>Maximum 12%</td>
</tr>
<tr>
<td>Linear Shrinkage</td>
<td>(Passing 04.25 mm) 6% Maximum</td>
</tr>
<tr>
<td>C.B.R. - 4 day soaked at 95% MMDD at 2.5 mm penetration</td>
<td>Minimum 40</td>
</tr>
</tbody>
</table>

**Locations**
Use select fill under concrete building slabs and paving and general fill in other areas.

**Placing fill**
Placement: To BCA 3.2.2.

Layers: Place fill in near horizontal layers of uniform thickness no greater than 200 mm after compaction, deposited systematically across the fill area. Compact each layer to achieve the required density.

Maximum depth of sand fill: 400 mm.

Placing at structures: Place and compact fill in layers simultaneously on both sides of structures, culverts and pipelines to avoid differential loading.

**Moisture content**
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 in order to achieve the required density.

**Required density**
Density: Compact the subgrade and each layer of fill to the required depth and density, as a systematic construction operation and to conform to the Density
Table. Shape surfaces to provide drainage and to prevent ponding.

### DENSITY TABLE

<table>
<thead>
<tr>
<th>Location</th>
<th>Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential: Lot fill</td>
<td>90</td>
</tr>
<tr>
<td>Footings and non spanning slabs on ground areas of buildings</td>
<td>98</td>
</tr>
<tr>
<td>Embankments and paved areas:</td>
<td></td>
</tr>
<tr>
<td>&gt;0.15 m below subgrade surface</td>
<td>90</td>
</tr>
<tr>
<td>&lt;0.15 m below subgrade surface</td>
<td>95</td>
</tr>
<tr>
<td>All other areas:</td>
<td></td>
</tr>
<tr>
<td>&gt;0.3 m below finished surface</td>
<td>90</td>
</tr>
<tr>
<td>&lt;0.3 m below finished surface</td>
<td>95</td>
</tr>
</tbody>
</table>

* Minimum dry density ratio (standard compaction) to AS 1289.5.1.1

Tests- Witness Point
Witness Point- Provide proof that required compaction has been achieved.

### 2.8 SANDLAYER

**Material**
Clean sharp sand free from deleterious material, well graded with at least 90% by weight passing the 4.75 mm sieve, and not more than 10% passing the 0.075 mm sieve.

**Extent:** Place a layer of sand to the area of the building under concrete slabs.

Nominal thickness: 50 mm.

Wet down before laying vapour barrier.

### 2.9 PILING

**Bored piers**
After excavating bored piers, remove loose material and water from the base and confirm the bearing capacity. Do not allow loose material to fall down the hole before or during concreting; provide a liner if necessary.

**Screw-in foundations**
Provide a proprietary system designed to AS 2159.

### 2.10 SERVICE TRENCHES

**Excavation**
If practicable, make trenches straight between personnel access ways, inspection points and junctions, with stable sides as near to vertical as possible and uniform grades.

**Trench widths**
Keep trench widths to the minimum consistent with the laying and bedding of the relevant service and construction of personnel access ways and pits.

**Backfilling**
General: Backfill service trenches as soon as possible after laying the service. Place backfill in layers. Compact each layer to a density sufficient to minimise settlement.

Backfill material: Excavated spoil or well graded inorganic material with maximum particle size of 75 mm.

- Next to services: Do not place any particles greater in size than 25 mm within 150 mm of services.
- Under paved areas and within 4m of structures: Coarse sand, controlled low strength material or fine crushed rock.
- In reactive clay sites classified M, M-D, H, H1-D, H2, H2-D, E or E-D to AS 2870: Impervious material.

### 2.11 OTHER REQUIREMENTS

Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

### 3 CONCRETE CONSTRUCTION

#### 3.1 GENERAL

**Cross reference**
Refer to the General Requirements section for termite protection.

Refer to Floor Coverings section and drawings for locations of vinyl floor finishes. Ensure concrete floor is compatible with adhesives.

**Standards**
Concrete structures generally: To AS 3600 & AS 3610.

Cement: To AS 3972.

Aggregates: To AS 2758.1

Water: To AS 1379

Chemical Additives: To AS 1478.1 Free of chlorides, fluorides and nitrates.

Plywood Formwork: To AS 6669.

Ground slabs footings and damp proof membranes: To AS 2870 where appropriate.

Reinforcement: To AS/NZS 4671.

Deformed Ribbed Bars: Normal ductility class, strength grade 500 MPa, unless otherwise noted.

Round Bars: Normal ductility class, strength grade 250 MPa.

Reinforcing Mesh: Deformed ribbed, low ductility class, strength grade 500 MPa.

#### 3.2 INSPECTION

**Notice - Witness Point**
Witness Point: Give sufficient notice so that inspection may be made at the following stages:

- Termite barrier and film underlay installed.
- Completed formwork, and reinforcement, tendons, cores and embedments fixed in place.
- Commencement of concrete placing.
- Before core filling masonry.
- Evaluation of surface finish.
3.3 TESTS
Compressive strength – Hold Point
Sample, test, and assess: To AS 3600 and AS 1379.
Hold Point: Agree to the method of strength assessment prior to ordering concrete. Production assessment may be used if applicable and if the project is registered with the concrete producer for dissemination of production assessment statistics.
Other quality parameters
Sample, test and assess: To AS 1379 Section 5 using a NATA registered testing authority.
Slump: Test at least one sample from each batch before placing concrete from that batch in the work. Take the samples at the point of discharge on site. Rejection: Remove rejected concrete from the site.

3.4 GROUND SLAB VAPOUR BARRIER
General
Provide a vapour barrier under slabs on ground including integral ground beams and footings.
Standard
Vapour barriers and damp proof membranes: To AS 2870 clause 5.3.3.
Proprietary Item: Fortecon
Installation
Lay over the base, lap joints 200 mm and seal the laps and penetrations with waterproof adhesive tape. Seal punctures and tears with waterproof tape before pouring concrete.

3.5 REINFORCEMENT
General
Provide reinforcement, including tie wires, plastic support chairs, spacers and accessories.
Identification: Supply reinforcement which is readily identifiable as to grade and origin.
Dowels
Round Bars, each dowel in one piece, straight, with square cut ends free from burrs. Apply two coats of bitumen emulsion to half the length of the dowel at one end. Embed the unpainted half of the dowels in the concrete placed first.
Minimum lap
Splice as follows:
- Mesh generally: 225 mm.
- Trench mesh: 500 mm.
- Bars: Greater of either 500 mm or 25 x bar diameter.
- Strip footing intersections and corners: For full width of intersecting reinforcement.
Minimum cover
Unprotected by membrane on ground or external surfaces: 40 mm.
Protected by membrane on ground: 30 mm.
Internal surfaces: 20 mm.
Footings: 50 mm
Aggressive soil or salty environment: 65 mm.

3.6 EMBEDDED ITEMS
Placing and fixing – Hold Point
Hold Point: Fix cores and embedded items to prevent movement during concrete placing. Obtain approval before cutting reinforcement or displacing reinforcement from its required location.
Tolerances on placement
Maximum deviation from correct positions:
- Embedded items generally: + 10 mm.
- Fasteners including, anchor bolts: + 3 mm.
- Anchor bolt groups for structural steel: To AS 4100 clause 15.3.1.
Corrosion protection
Galvanized ferrous fixings (other than stainless steel) to AS/NZS 4680 or AS 1214. Passivate galvanized surfaces to be embedded in concrete by dipping in 0.2% sodium dichromate solution.

3.7 CONCRETE
Pre mixed supply
Standard: To AS 1379, by the batch production process.
Maximum slump: 80 mm.
Concrete Grade
Footings - N25
Exposed slabs on ground - N32
Internal slabs on ground - N25
Columns & suspended slabs - N40
Other concrete grades may be required as shown on the drawings or in the PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.
Grout for blockwork cores
Standard: AS 3700 Materials section, grout clause.
Grout: Class S15 (to AS 1379) 15 MPa with a pourable slump, a minimum cement content of 300 kg/m3 and maximum 6 mm aggregate.
Tolerances
General:
Formed element: To AS 3610.1 Table 3.3.2.
Formed surfaces: Confirm conformance with the surface finish requirements of AS 3610.1 and the following:
- Visible: Class 3
- Not visible: Class 5
Unformed surfaces: Confirm conformance with the Flatness Tolerance Classes Table for the class of finish nominated using a straight edge placed anywhere on the surface in any direction.
Flatness tolerance classes table

<table>
<thead>
<tr>
<th>Class</th>
<th>Measurement</th>
<th>Max.deviation (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>3 m straight edge</td>
<td>3</td>
</tr>
<tr>
<td>B</td>
<td>3 m straight edge</td>
<td>6</td>
</tr>
<tr>
<td>C</td>
<td>600 mm straight edge</td>
<td>6</td>
</tr>
</tbody>
</table>
Concrete placing
Depth: If concrete is deeper than 350 mm, place it in layers so that each succeeding layer is blended into the preceding one by the compaction process.
Slabs and pavements: Place concrete uniformly over the width of the slab so that the face is generally vertical and normal to the direction of placing.

Hot weather placing - Hold Point
The provisions of this clause apply to concreting where the surrounding shade outdoor temperature is greater than 32°C.
Hold Point: Mixing: Do not mix concrete when the outdoor shade temperature on the site exceeds 38°C, unless otherwise approved and then only subject to such conditions as may be imposed. Handling: Take precautions to prevent premature stiffening of the fresh mix and to reduce water absorption and evaporation losses. Mix, transport, place and compact the concrete as rapidly as possible.

Placing
Before and during placing maintain the formwork and reinforcement at a temperature not greater than 32°C by protection, cold water spraying, or other effective means. When placed in the forms, the temperature of the concrete shall not exceed 35°C. Temperature control methods: Submit for approval the proposed method or methods of maintaining the specified temperature of the placed concrete, which may include using chilled mixing water, spraying the coarse aggregate with cold water or covering the container transporting the concrete.
Evaporation Control: Erect barriers to protect freshly laid concrete from drying winds.

Compaction
Vibrate concrete to remove entrapped air, but avoid over-vibration that may cause segregation.

Curing:
Protection: Protect concrete from premature drying and from excessive hot, cold and/or windy conditions by a suitable approved method.
Minimum Curing Time:
- In-ground footings: 3 days.
- Fully enclosed internal surfaces: 3 days
- Exposed footings, beams and slabs: 7 days.
- Other surfaces: 7 days

3.8 FORMWORK
Surface finish class
Use the applicable class from AS 3610, Table 3.3.1.

Formwork removal
Remove all formwork, including formwork in concealed locations.

Stripping times
Leave formwork for suspended structures in place after pouring concrete for the following periods:
- Vertical surfaces: 2 days.
- Bottom surfaces: 7 days with shoring and backprops left in position for 21 days.

3.9 JOINTS
Construction joints
Joint preparation: Roughen and clean the hardened concrete joint surface, remove loose or soft material, free water and foreign matter. Dampen the surface before placing the concrete.

Slip joints
If concrete slabs are supported on masonry, provide proprietary pre-lubricated slip joints.

Movement joints
Insert 12mm thick Abelflex closed cell compressible filler strip in the joint. Detach the removable top strip and fill with Fosroc Thioflex 600.

3.10 FINISHES TO UNFORMED SURFACES
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

Screeeding
Finish slab surfaces by approved means to finished levels. Produce surfaces to tolerance Class B - maximum deviation from a 3m straight edge of 6 mm.

Scored finish
After screeeding, give the surface a course scored texture in the required direction by drawing a stiff brush or rake across the surface.

Machine floated finish
Finish the screeeded surface with approved power driven equipment to a uniform smooth texture. Hand float in locations inaccessible to the machine float. Finish: To a surface tolerance Class A.

Steel trowelled finish
Use steel hand trowels to produce the final finish free of trowel marks and uniform in texture and appearance. Finish: To a surface tolerance class A.

Wood float finish
Produce the final finish with a wood float.

Sponge finish
After floating use a broom to produce an even textured slip-resistant surface.

3.11 MISCELLANEOUS ITEMS
Concrete strength: 25 MPa.
Clothes hoist footing: 400 deep x 250 diameter with a 300 x 300 x 75 mm thick concrete surround above the finished ground line weathered away from the post.
Splash Pads: Provide 600 x 600 x 50 mm thick concrete splash pads at each downpipe to direct the water away from the building.
Mowing strips: Provide 300 wide x 75 thick concrete mowing strips where shown on the drawings. Fall away from building and construct tooled joints at 3 m maximum centres.

Gas cylinder pad: Provide 1000 x 500 x 100 mm thick concrete base slab where shown on the drawings or as directed.

Footpath Crossings: To local authority requirements.

3.12 OTHER REQUIREMENTS
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

4 TIMBER AND STEEL CONSTRUCTION

4.1 GENERAL
Cross references
Refer to the following sections:
- GENERAL REQUIREMENTS: For termite protection and timber durability.
- CONCRETE: For installation of foundation bolts.
- TILING: For waterproofing wet areas.
- CLADDING AND LINING: For timber trims.

Standards
Timber framing and flooring: To AS 1684.
Design: To AS 1720.1.
Anti-ponding boards: To AS/NZS 4200.2
Structural steelwork: To AS 4100.
Steel framing: Provide a proprietary system designed to AS 3623.
Preparation of metal surfaces: To AS 1627. Cold Formed Sections: To AS /NZS 4600.

4.2 MATERIALS AND COMPONENTS
Cold-formed steel framing
Cold-formed sections from zinc-coated steel or aluminium/zinc alloy coated steel to AS 1397/Z200 or AZ175.

Self-drilling screws
Standard: To AS 3566.2
Generally: Corrosion resistance class 2.
Exterior applications: Corrosion resistance class 3

Flashings and damp-proof courses
Standard: To AS/NZS 2904.

Timber fasteners
Metal washers: Provide washers to the heads and nuts of all bolts and coach screws.
Steel straps: Zinc-coated steel to AS 1397/Z275, minimum size 25 x 1 mm or 30 x 0.8 mm.

Galvanizing
Galvanize mild steel components (including fasteners) to AS 1214 or AS/NZS 4680, as appropriate, if exposed to weather; embedded in masonry; or in contact with chemically treated timber.

Electrogalvanizing
Ferrous hollow and open sections: To AS 4750.

4.3 STRUCTURAL STEEL
Weld Procedure Specification - Hold Point
Obtain Superintendent’s approval of Weld Procedure Specification (WPS) prior to commencement of any welding.

Certification of welders and welding supervisors
Standard: To AS1554.1
The Superintendent may at any time request to see the Welder Qualifications Records (WQR) of any welder and welding supervisor involved in the works. Use only personnel who are pre-qualified for the operations they are to perform.

Inspection - Witness Point
Witness Point: Give sufficient notice so that inspection may be made at the following stages:
- Commencement of shop fabrication.
- Surface preparation prior to painting.
- Steelwork and column bases erected on site, prior to grouting, encasing, site painting or cladding.

Pay for the costs of weld examinations and tests, including the costs of re-examination and re-testing of repair welds.

Shop drawings - Hold Point
Hold Point: Submit 2 complete sets of shop drawings showing the relevant details of each assembly, component, connection and details of transport and erection, including temporary lifting lugs etc.

Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

Materials

<table>
<thead>
<tr>
<th>Steel Section</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural bars &amp; sections to AS/NZS 3679.1</td>
<td>250</td>
</tr>
<tr>
<td>Steel plate to AS/NZS 3678</td>
<td>250</td>
</tr>
<tr>
<td>Hollow steel sections to AS 1163</td>
<td>250 or 350</td>
</tr>
<tr>
<td>Cold form sections to AS 1397</td>
<td>450 or Z350</td>
</tr>
</tbody>
</table>

Compliance: Provide evidence that the steel used in the works complies with the required material standards.

4.4 STEEL CONSTRUCTION
Beam Camber
If beam members have a natural camber within the straightness tolerance, fabricate and erect them with the camber up.
Foundation bolts
Hexagonal bolts: To AS 1111.1.
Hot-dip galvanized: To AS 1214.
Supply each foundation bolt with 2 nuts and 2 oversize washers and provide sufficient thread to permit the levelling nut to be set below the base plate.

Temporary connections - Hold Point
Hold Point: Do not attach cleats without approval.
Remove temporary cleats on completion and restore the surface.

Enlargement of bolt holes - Hold Point
Hold Point: Do not hand flame cut or otherwise enlarge any bolt holes without approval.

Bolts
Use Grade 4.6/S bolts unless otherwise noted.

Welding
Standard: To AS/NZS 1554.1 use SP category welds unless noted otherwise.
All welds to be 6 mm continuous fillet welds for full perimeter of contact unless noted otherwise (UNO).
Visually examine the total length of all SP welds, in accordance with AS 1554.1 sections 6 and 7.

Protective coating
Surface Preparation: To AS 1627.
Remove loose millscale, rust, oil, grease, dirt, globules of weld metal, weld slag and other foreign matter.
Priming: Apply the primer coat to the structural steel before delivery to the site and protect from damage during handling and transport.
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

Single pack zinc phosphate
Thoroughly wire brush steelwork to AS 1627.2 and prime with one coat of single pack zinc phosphate to APAS specification 0162/1 with a dry film thickness of 40 microns.

Epoxy zinc phosphate
Blast clean to the recommendations of AS 1627.4 to grade Sa of AS 1627.9 and prime with one coat of epoxy zinc phosphate to APAS specification 2971 with a dry film thickness of 45 microns.

Inorganic zinc silicate
Blast clean to recommendations of AS 1627.4 to grade Sa of AS 1627.9 and prime with one coat of inorganic zinc silicate to APAS specification 2908 with a dry film thickness of 75 microns.
Site work: After erection, repair any damage to the shop coating and apply the coating, if any, omitted at site connections.
Time delay: Prime the steel surface as soon as possible after surface preparation and prior to any deterioration of the surface. If the surface is contaminated or rust bloomed, repeat the surface preparation before applying the primer.

4.5 LIGHT STEEL FRAMING SYSTEM
Use the Lysaght framing system designed in accordance with Lysaght’s design manual for steel wall framing in cyclonic areas or non-cyclonic as applicable.
Framing: Generally 75 x 1.6 G450 studs for cyclonic areas and 75 x 1.2 G300 studs for non-cyclonic areas externally at 450 max crs and 75 x 1.2 G300 studs internally with top and bottom plates, heads, Mullions and bracing designed for the specific application.

Inspection - Witness Point
Witness Point: Give sufficient notice so that inspection may be made of steel framing erected on site prior to lining or cladding.

Fabrication
Cut members accurately to length so that they fit firmly against abutting members. Form holes by drilling or punching. Flare the holes for services or provide plastic grommets.
Weld the framing using the metal inert gas (MIG) technique or carbon arc welding. Clean the weld and coated areas affected by welding and touch up with zinc rich organic binder to APAS - 2916.
Cleaning: On completion of framing remove any debris from the cavities of members.
Temporary earthing: Provide temporary earthing during erection until the permanent earthing is installed. Permanent earth completed steel frames in accordance with PowerWater regulations.
Damp course: Provide a continuous damp proof course of Super Alcor between the concrete slab and floor plate.

Metal Roof Trusses – Hold Point
Approved manufacturer: Use metal roof trusses prefabricated by an approved manufacturer using Lysaght light steel framing sections.
Hold Point: Shop Drawings – Submit shop drawings showing the truss arrangement, location, loading, member sizes, joint details, lifting points and method of fixing and bracing.
Certification: Provide with the shop drawings certification of the structural sufficiency of the truss and roof design supplied on a completed NT Building Act Section 40 Certificate of Compliance form.

Steel battens
Roof Battens: Stratco 40 mm high cyclonic steel roof batten fixed to Deemed to Comply M/630/01A.
Ceiling Battens: Rondo Part No. 303 cyclonic steel ceiling batten fixed to Deemed to Comply M/621/01.

4.6 TIMBER FRAMING
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.
Identification
Branding: Brand all structural timber, floor boards and structural plywood, under the authority of a recognised quality assurance program applicable to the product. Locate the brand mark on faces or edges to be concealed in the works. Provide a suppliers certificate showing compliance.

Inspection - Witness Point
Witness Point: Give sufficient notice so that erected structural woodwork may be inspected before it is covered, for example by cladding, lining and roofing.

Preservative pressure treatment
Pressure treat all structural timbers with ACQ Preservative Formulation in accordance with AS 1604.1 or alternatively with BFCA salts by the CSIRO approved dip-diffusion process. The minimum dry salt retention in permeable species is 5.6 kg/m³ to all timber with susceptible sapwood.

Timber grades
Hardwood: To AS 2796.1
Grading: To AS 2796.2
Structural Timbers: Generally F14 minimum.
Timber Trusses: To the truss manufacturers design.
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

Fasteners
Use fasteners capable of transmitting the loads imposed, and sufficient to ensure the rigidity of the assembly. Do not split or otherwise damage the timber.

Adhesives
Use adhesives capable of transmitting the loads imposed, and sufficient to ensure the rigidity of the assembly and that do not cause discolouration of finished surfaces.
Structural Adhesives: To AS/NZS 1328.1

Finished sizes
Use milled timbers with actual dimensions which are not less than stated dimensions, except for dimensions qualified by a term such as “nominal” or “out of” to which industry standards for finished sizes will apply. If unseasoned timber is used, or variations in moisture are likely, make allowance for shrinkage, swelling and differential movement.
Coating: Before placing bolts in contact with ACQ treated timber, coat the shank of the bolt in a grease or bituminous coating.

Plywood
Standard: To AS/NZS 2269.0
Plywood certified formaldehyde emission level to AS/NZS 2098.11: Class E1

Structural plywood
Standard: To AS/NZS 2269.0
Bond: Type A to AS/NZS 2754.1 (INT)
Flooring: Tongued and grooved.
Grading:
- Veneer quality to visible surfaces: C (Minimum).
- Grade: Bond Type A

Structural sheet flooring
Installation: Fix 17 mm thick F14 Grade structural plywood flooring with elastomeric adhesive to AS 2329 in addition to nailing or screwing. Sand junctions lightly to a smooth, level surface.

Timber decking
Standard:
- Treated softwood to AS 4785.1 Section 4.
- Hardwood to AS 2796.1 Section 4.
Definition: Timber flooring with plain, bevel or pencil round edge suitable for pedestrian or light vehicle loadings in balconies, decks and access ways. Timber (Minimum requirements): Hardwood species of durability Class 2, size 70 x 19 mm finished. Installation: Lay in long lengths (minimum 3 spans) Stagger joints and make them over joists. Leave 4 mm between edges of boards.
Adhesive: General: Use a urethane elastomer adhesive in addition to screws or 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.
Fixing: No 10 Countersunk head tek screws to AS 3566.2 Corrosion resistance class 3. Two screws to each joist. Stainless steel round head nails may be used for timber joists, if timber joists approved.
Surface finish: Apply the first coat of decking oil all around before fixing. Apply a second coat after the deck is completed.

Fibre cement flooring
Compressed sheets: To AS/NZS 2908.2, Type A, Category 4.
Thickness: Generally 15 mm.
Proprietary item: Hardies or CSR compressed sheet.
Installation: Lay the length of the sheets at right angles to the joists and continuous over at least 2 spans. Stagger the end joints and locate them centrally over joists. Butter the edges of sheets with adhesive and firmly butt join together. Provide expansion joints as recommended by the sheet manufacturer.
Fixing: 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.

Wall framing
Gauging: Use gauged timbers in studs, noggings and plates for double faced walls. Generally 100 x 50 studs at 450 max. crs.
Timber species or group: Hardwood. Minimum stress grade F14.
Provide additional support in the form of noggings, trimmers and studs for fixing lining, cladding, hardware, accessories, fixtures and fittings as required.
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 is ≥ 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 the following as appropriate:
  o Continuous trimming joists.
  o Solid blocking or herringbone strutting.
- Trimmers or blocking dimensions:
  o Depth: Joist depth less 25 mm.
  o Width: ≥ 25 mm.
- Herringbone strutting dimensions: ≥ 38 x 38 mm.

Flashings

Location: Provide flashings to external openings sufficient to prevent the entry of moisture. Form trays at the ends of sill flashings.

Damp-proof courses

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: Turn up at least 75 mm on the inside and tack to studs. Project 10 mm beyond the external slab edge or dwarf wall and turn down at 45°.
- Walls of bathrooms, shower rooms and laundries: Turn up at least 150 mm on the ‘wet’ side and tack to studs.
- All other walls: Turn up 25 mm each side of bottom plate.

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.

Material: Super Alcor damp-proof courses (DPC).

Sealing: Apply mastic type sealant around penetrations through bottom plate and DPC.

4.7 TIMBER ROOF TRUSSES

Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

Fabrication

Camber: Camber bottom chord upward.

Overhangs: Free from spring or splits.

Approved manufacturer

Use timber roof trusses prefabricated by an approved manufacturer.

Shop drawings - Hold Point

Hold Point: Submit shop drawings showing the truss arrangement, location, loading, timber species, grade and sizes, joint details, lifting points and method of fixing and bracing.

Marking: Permanently mark each truss to show the manufacturer, timber species, location, support points, project identification, tag or number and other relevant data.

Certification: Provide with the shop drawings certification of the structural sufficiency of the truss and roof design supplied on a completed NT Building Act Section 40 Certificate of Compliance form.

Installation

Standard: To AS 4440.

Support trusses on bottom chord at two points only, unless designed for additional support. Plumb to within H/200, where H is the height at the apex. Provide the required ties and wind bracing. Over internal walls provide not less than 10 mm vertical clearance and use bracing methods which allow for vertical movements.

Fixing: Fix to the top plate with 50 x 5 mm mild steel over brackets with 1-M12 bolt to the truss top chord centre line and 1-M16 bolt to the structure.

4.8 MISCELLANEOUS ITEMS

Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

Roof Battens: Generally 75 x 50 mm Hardwood.

Ceiling Battens: Generally 75 x 38 mm Hardwood.

Fixing: Fix in long lengths with joints at truss crossings and staggered. Double nail ceiling battens and fix roof battens to Deemed to Comply details.

Valley Boards: Fabricate from 19 mm exterior grade ply and nail to each rafter.

Supports for water containers

General: If a water container or heater is located in the roof space provide a support platform to AS/NZS 3500.4 clause 5.5.

4.9 OTHER REQUIREMENTS

Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.
5 BLOCK CONSTRUCTION

5.1 GENERAL

Cross references
Refer to the following sections:
General Requirements, for termite protection.
Timber and steel construction, for structural steelwork.

Standard
Masonry generally: To AS 3700. Masonry units: To AS/NZS 4455.1 and AS/NZS 4455.3.

5.2 MATERIALS AND COMPONENTS

Steel components
Galvanizing: Galvanize mild steel components (including fasteners) to AS 1214 or AS/NZS 4680 as appropriate.

Masonry units
Strength: Generally 15 MPa for structural units. Colour: Generally grey.
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

Flashings and damp-proof courses
Standard: To AS/NZS 2904.

Mortar materials
Cement: To AS 3972, Type GP.
Sand: Fine aggregate with a low clay content and free from efflorescing salts, selected for colour and grading.
Additives: Do not provide additives unless required and approved.

Mortar mix
Provide mortar mixes as follows: 1:1:6 cement, lime, sand for all general block work. Other mix proportions may be required for special purposes. Measure volumes accurately to achieve the specified proportions. Machine mix for six minutes minimum.

5.3 CONSTRUCTION GENERALLY

Joints and cutting
Set out masonry with joints of uniform width and the minimum cutting of masonry units.

Joints
Externally: Tool to give a dense water-shedding finish. Use a 12 mm dia ironing rod.
Internally: Rake to give a key if wall is to be plastered or strike flush if concealed.
To existing: Provide a straight joint. Do not tooth new masonry into existing work.

Rod
90 mm high blocks: 6 courses to 600 mm.
190 mm high blocks: 3 courses to 600 mm.

Bond
Stretcher bond unless otherwise noted.

Bedding
Shell bed hollow blocks and completely fill bed joints and perpends.

Perpends
Keep perpends in alternate courses vertically aligned.

Building in
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 core brickwork or blockwork, fill appropriate cores with grout or mortar.

Steel door frames
Fill the backs of jambs and heads solid with mortar as the work proceeds.

Double face walls
Select the masonry units for uniform width and double-face qualities in single leaf masonry with facework both sides. Before commencement, obtain a ruling as to which is the preferred wall face, and favour that face should a compromise be unavoidable.

Colour mixing
In unpainted facework, distribute the colour range of units evenly to prevent colour concentrations.

Sills
Use proprietary concrete sill units solidly bedded.

Appearance
Leave unpainted facework clear of mortar smears, stains and discolouration. Do not clean using an acid solution and do not erode joints if using pressure spraying.

Wall Chasing
Chase concrete block walls to a maximum depth of 35 mm for 190 mm blockwork or 20 mm for 90 mm blockwork. Do not chase walls nominated as fire rated or acoustic.

Rate of construction
Regulate the rate of construction to eliminate joint deformation, slumping or instability.

Protection
Contamination: Protect masonry materials and components from ground moisture and contamination.
Elements: Protect masonry from rain and hot drying winds for at least 24 hours after laying.

5.4 DAMP-PROOF COURSES

Location
Provide damp-proof courses to the first 3 courses and perpends, including the first mortar bed, of all walls on raft slabs or as shown on the drawings.

Damp proof course: Use mortar with a damp course admixture to manufacturer’s instructions. Add a black pigment if the mortar admixture is not coloured differently to mortar without the damp course admixture.

5.5 CONTROL OF MOVEMENT

General
Provide joints to AS 4773.1 Section 13.

Control joints for concrete Blockwork
Maximum length of continuous wall: 6 m. Minimum width of control joint: 10 mm.
Flexible ties and anchors
If ties or anchors extend across control joints, provide ties or anchors which maintain the stability of the masonry without impairing the effectiveness of the joint.
Proprietary Item: Masonry flexible anchors MFA3/3 install at 400 crs max.

Joint material
Installation: Clean the joints thoroughly and insert a 19mm dia closed cell expanded polyethylene compressible backing rod before sealing.
Sealant depth: Fill the joints with gun-applied Thioseal 5000 single pack polysulphide flexible sealant for a depth of at least two-thirds the joint width.
Sealant Type: external, UV stable.

5.6 STEEL LINTELS
Cold-formed lintels
Proprietary cold-formed flat-based type designed to AS/NZS 4600.
Steel flats and angles
Sizes: To BCA Volume 2 Figure 3.3.3.5.
Material
Mild steel galvanized to AS/NZS 4680. Do not cut after galvanizing.
Corrosion protection: To AS/NZS 2699.3 and BCA Table 3.4.4.2.
Installation
General: Install with the longer leg vertical. Keep lintels 10 mm clear of heads and frames. Pack mortar between the angle upstand and supported masonry units.
Propping: To prevent deflection or excessive rotation, temporarily prop proprietary cold-formed lintels until the masonry reaches its required strength.
Minimum propping period: 3 days.

5.7 REINFORCED MASONRY
Designation
Masonry required to be strengthened with embedded steel reinforcement (other than bed joint reinforcement) is designated reinforced masonry.
Cleaning core holes - Hold Point
Hold Point: In blockwork use purpose-made cleanout blocks or machine cut a cleaning hole at the base of each reinforced core, located on the side of the wall which is to be rendered or otherwise concealed. After cleaning out has been inspected and approved, cover the hole with formwork and grout the core.
Bond beams
Use bond beams made from purpose-made hollow concrete blocks with reinforcement grouted in place. Install 6 mm fibre cement or proprietary metal closers at non reinforced cores of the wall below. Reinforcement: As shown on the drawings.
Starter bars: Wire tie core reinforcement to starter bars.

Lintel blocks
Purpose made U shaped blocks with reinforcement grouted in place.
Clean out blocks – Witness Point
Location: At the base of each core to be grout filled including above bond beams and stage filled walls.
Hole size: Machine cut 100 x 100 mm.
Witness Point: Sealing: Following inspection of the core and reinforcement form over holes to contain core filling grout.
Core filling grout
Reference: Refer to the Concrete Construction section.
Structural blockwork: Fill core holes, bond beams and lintels etc. of structural blockwork with pre mixed grout.
Placing: Wait at least 3 days after construction of blockwork before placing grout. Limit the height of pours to 3 m. Grout fill all cores below ground level.

5.8 OTHER REQUIREMENTS
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

6 INSULATION AND SARKING
6.1 GENERAL
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.
Interpretation
Sarking-type material: Flexible membrane material normally used for waterproofing, vapour retarding or thermal reflective insulation.

6.2 MATERIALS AND COMPONENTS
Bulk and reflective insulation
Cellulosic fibre: To AS/NZS 4859.1 Section 5.
Mineral blankets and cut pieces to AS/NZS 4859.1 Section 8.
Glass fibre in loose fill: To AS/NZS 4859.1. Polystyrene: Moulded rigid cellular sheets: To AS1366.3.
Polystyrene: Extruded rigid cellular sheets: To AS 1366.4.
Reflective insulation: To AS/NZS 4859.1 Section 9.
Wool: To AS/NZS 4859.1 Section 6.
Composite foam and foil blankets or boards: To AS 4859.1
Sarking membrane Standard:
To AS/NZS 4200.1.

Wire support to roof insulation
Use support mesh of 1.25 mm diameter galvanized wire welded in a grid of 100 x 115 mm.
Welded safety mesh to statutory requirements may also be used to support sarking.
Standard: To AS/NZS 4389.
Size: 300 x 150 mm grid of 2 mm diameter galvanized wire.

6.3 INSPECTION
Notice - Witness Point
Witness Point: Give sufficient notice so that the sarking, vapour barrier and insulation may be inspected before it is covered up or concealed.

6.4 INSTALLATION
Bulk insulation
Standard: To AS 3999 and BCA Clause J1.2.
General: Ensure batts or blankets are firmly butted and fitted tightly between framing members with no gaps except as follows:
- Do not obstruct access holes or vents
- Light fittings to AS/NZS 3000 clause 4.5
- Electrical cables - prevent contact with polystyrene insulation by wrapping the cable with tape.
If support is not otherwise provided, secure nylon twine to the framing and stretch tight.
Insulation material: 75 mm thick fibreglass blankets or batts with a minimum R value of 2.0.
Bonding: Where required provide insulation blankets factory bonded to aluminium foil sarking material.

Sarking material
Standard: To AS/NZS 4200.2.
Proprietary Item: Bradford Thermofoil 753 (heavy weight).

Wall sarking
General: Provide sarking where shown on the drawings, behind cladding which does not provide a permanent weatherproof seal, or behind cladding which may be subject to condensation forming on the internal face, including
- boards fixed vertically or diagonally;
- boards or planks fixed in exposed locations where wind driven rain can penetrate the joints;
- unpainted or unsealed cladding.
Installation: Apply to run horizontally to the outer face of external stud walls from the bottom plate, over the flashing, up to the top plate. Provide horizontal laps at least 150 mm wide with the direction of the laps ensuring that water is shed to the outer face of the membrane. At windows run over the head flashing.
Where the wall sarking also acts as vapour barrier lap and seal as for roof sarking to form a continuous air tight seal.

Roof sarking
General: Provide sarking to metal roofs as detailed on the drawings.
Installation: Lay the sarking to the whole of the roof area running parallel to the purlins or battens and lapped 150 mm over the purlins or battens.
Use support mesh to sarking on exposed roofs.
Ridge ventilation: Finish sarking at least 50 mm clear of ridges.

Combined Insulation and Sarking
Use a medium weight reflective foil factory bonded to an insulation blanket with a minimum R value of 2.0. Lap the insulation material a minimum of 150 mm at joints. Tape joins at edges of the blanket, both top and bottom. Press tape by running a blunt scraper like tool to ensure no air is entrained and that bond is achieved for full width of tape.

Vapour Barrier
Requirement: Where the sarking also forms a vapour barrier seal the laps and penetrations with heat resistant pressure sensitive tape 75 mm wide to form a continuous air tight seal and seal to the walls with timber battens.
Ensure that the laps are mechanically fastened.

Blanket for sound insulation
Install over the roof support frame, reflective thermal insulation (if any), and mesh support, so that the blanket is in continuous contact with the underside of the metal roofing sheets. Ensure minimum required thermal insulation level is achieved.

6.5 OTHER REQUIREMENTS
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

7 ROOFING

7.1 GENERAL
Cross reference
Refer to the INSULATION AND SARKING section for roof sarking requirements.

Protection
General: Keep the roofing and rainwater system free of debris and lose material during construction, and leave them clean and unobstructed on completion. Repair damage to the roofing and rainwater system.

Thermal movement
Requirement: provide for thermal movement in the roof installation and the structure, including movement in joints and fastenings.
Metal separation
Requirement: Prevent direct contact between incompatible metals, and between green hardwood or chemically treated timber and aluminium or coated steel, by either:
- Applying an anti-corrosion, low moisture transmission coating to contact surfaces.
- Inserting a separation layer.

7.2 MATERIALS AND COMPONENTS
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

Roof material
Formed from G550 steel (or G300 for curving) with an AZ 150 Finish complying with AS 1397.
Protection: Protect the roof sheets from damage during handling and storage and prevent damage by moisture in stacked sheets.

Prepainted Steel
Prepainted steel sheet, factory finished with a polyester finish to AS/NZS 2728.

Flashing material
Use material with the same finish and from the same manufacturer as the roofing sheets.
Thickness: 0.55mm BMT steel sheet.

Fasteners
Self-drilling screws: To AS 3566.1, complete with washers and EDPM black, non conductive seals.

<table>
<thead>
<tr>
<th>For Atmospheric Corrosivity Classification</th>
<th>Use Corrosion Resistance Class</th>
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<tbody>
<tr>
<td>AS 3715, ISO 9223</td>
<td>AS 3566.2</td>
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<td>Refer to NT Climate Zones Table</td>
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Exposed fasteners: Provide fasteners which are prefinished with an oven baked polymer coating to match the roofing material.
Fixings: Use only approved metal fixings.
When replacing sheet roofing use new fasteners – do not re-use old fasteners.

Roof lights
Type: As scheduled or shown on the drawings and fitted in accordance with the Northern Territory Deemed to Comply standards.

7.3 INSPECTION

Notice - Witness Point
Witness Point: Give sufficient notice so that inspection may be made of the substructure before fixing the roof sheeting.

7.4 ROOF STRUCTURE

Alignment
Check and adjust the alignment of the roof structure before fixing any sheets.
Battens: 2 mm maximum mismatch at abutting ends.
Roof Plane: 5 mm per metre maximum deviation across the battens from a plane parallel to the specified roof slope.

7.5 METAL FASCIA & BARGE
Stratco 0.55 mm BMT prepainted steel 210 mm or 185 mm deep to suit the particular application.
Fixing: Fix to rafter ends with proprietary fixing clips in accordance with manufacturer’s instructions.
Provide corner trims, end trims and cappings as required.

7.6 METAL ROOFING

Design and installation
Standard: To AS 1562.1.
Corrosion protection: To BCA Table 3.5.1.1a.
Prepainted and organic film/metal laminate products: To AS/NZS 2728.
Fixing: Fix the sheathing in accordance with the Northern Territory Deemed to Comply Manual standards.

Visible accessories
Finish: to match roofing sheets.

Eaves
Treat ends of sheets as follows:
Generally: Close off ribs at tops and bottoms of sheets by mechanical means or with purpose-made end caps.
Turn ends of pans up at tops and down into gutters at bottoms by mechanical means.
Project sheets 50 mm into gutters.
Fit purpose-made ridge and eaves fillers of closed cell polyethylene similar to Unisil.

Swarf
Remove swarf and other debris as soon as it is deposited.

7.7 ROOF PLUMBING

Selection and installation of rainwater goods
Standard: To AS/NZS 3500.3.
Sealing: Seal fasteners, mechanically fastened joints and the holes of blind rivets with silicone sealant.
Fixings: Use only approved metal fixings.

Flashings and cappings
General: Flash projections above or through the roof with two part flashings consisting of an apron flashing and an over-flashing, with at least 100 mm vertical overlap. Provide for independent movement between the roof and the projection. Continue over flashing to the roof ridge.
Large penetrations to low pitched roofs: extend the base flashing over the roofing ribs to the ridge to prevent ponding behind the penetrating element.
Wall abutments: Where a roof abuts a wall, provide overflashings, stepped to the roof slope in masonry and planked cladding, otherwise raking, and as follows:
- Masonry or concrete: built into a 25 mm deep raking sawcut.
- Planked cladding: Stepped.
Pipe Penetrations: Seal with a neoprene coupling clamped to the pipe and fixed to the profile of the roof sheeting.

Proprietary Item: Deklite flashings by Dek-Thyer Pty Ltd.

Colour: To match the roof sheeting.

In Concrete or Masonry: Turn 25 mm into joints or grooves, wedge at 200 mm centres with compatible material and point up.

**Gutters**

Standard: To AS/NZS 2179.1.

Generally: Prefabricate gutters to the required shape where possible. Form stop ends, bends and returns. Turn down into outlets. Provide overflows to prevent back-flooding.

Minimum slope of eaves gutters: 1:200.

Eaves Gutters: High fronted square profile with overflow slots. Size 125 x 100 mm.

Material: Prepainted Steel 0.55 mm BMT.

Fixing: Fix to fascia with 40 mm x 1.0 mm galvanized brackets at 900 mm max. centres with overstraps. Expansion Joints: Form expansion joints at max.

12 m centres by stop ending the gutter and saddle flashing over the two stop ends.

Valley Gutters: Profile to suit the valley boards. Turn back both edges 180° x 12 mm high. Screw to valley boards at the top to prevent creep.

Minimum overall width: 400 mm.

Material: 0.55 BMT steel sheet. Finished to match the roof sheeting.

**Downpipes**

Material: 0.55 mm BMT Prepainted steel.

Prefabricate downpipes to the required section and shape with lock seams. Connect heads to gutter outlets and, if applicable, connect feet to rainwater drains. Fabricate joints, bends, offsets and provide accessories including supports and fittings as required.

Access Cover: Provide a removable watertight access cover at the foot of each downpipe stack.

PVC Downpipes: Use a proprietary system of bends, connections and fittings.

8. OTHER REQUIREMENTS

Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

8.1 GENERAL

Cross references

Refer to the following sections:

- LINING, for architraves.
- PAINTING, for priming of frames and doors before installation.

Minimum clear opening

Generally 850mm minimum clear opening. To AS1428.1-2009.

Door furniture mounting height

Standard: To AS 1428.

8.2 MATERIALS AND COMPONENTS

Flashings

Standard: To AS/NZS 2904.

Metal finishes

Zinc plating: To AS 1789, at least service condition number 2.

Aluminium extrusions: To AS/NZS 1866.

Anodising: To AS 1231, thickness; ≥ 15 microns to 20 microns.

Thermoset powder coating: To AS 3715 – Grade: Architectural coating.

Glass

Selection and installation: To AS 1288.

Types and quality: To AS/NZS 4667.

Safety Glazing: To AS/NZS 2208.

Doors

In general: To AS2688, AS2689 & AS1909.

Timber doors: As per TIMBER DOORS clause.

Security screen doors and window grilles: To AS 5039.

Fire Doors: To AS 1905.1 and BCA Spec C3.4.

Garage Doors: To AS/NZS 4505

Windows

Selection: To AS 2047.

Preglazing

Supply inclusive of glazing, shop preglazed.

Bushfire Screens: To BCA table SA 3.7.4.1 and AS 3959.

8.3 CONSTRUCTION GENERALLY

Standards

Window installation: To AS 2047.

Security screen doors and window grilles installation: To AS 5040.

Flashings and weatherings

Install flashings, weather bars, drips, storm moulds, caulkling and pointing so that water is prevented from penetrating the building between frames and the building structure.

Installation

Install doorsets and windows so they are plumb, level, straight and true; are adequately fixed or anchored to the building structure; allow for thermal movement, and will not carry building loads, including loads caused by structural deflection or shortening.
8.4 STEEL DOOR FRAMES
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

Description
Use frames assembled from zinc coated steel sections, including necessary accessories such as grommet type buffers, strike plates to suit the specified hardware, spreaders, mortar guards, switch boxes, fixing ties or brackets, and cavity flashing with suitable provision for fixing hardware; prefinished with protective coatings, built in or fixed to prepared openings.

Sections
Incorporate rebates or double rebates where required for side hung doors or glazed transoms.
Coated steel sheet: To AS 1397
  - coating class interior: Z275
  - coating class exterior: Z450
Frame material: 1.2 mm thick zincanneal (Lysaght GZ-ZF100).

Assembly method
Welded: Shop assemble frames by continuous welding across mitred flanges. Grind welds smooth and cold galvanize the welded joints before shop priming with primer to APAS 2916.

Shop priming
Shop prime the sections for the painting system.

Fixing
Generally build in metal window and door frames in masonry as the work proceeds using proprietary galvanized fixing clips at 400 mm centres.

Packing
Pack behind fixing points with durable full width packing.

Lining
Provide reveal and jamb linings as necessary.

8.5 TIMBER DOORS

General
Proprietary doors manufactured for interior or exterior applications and for the finish required.

Flush Doors
Door thickness: Generally 38mm for internal doors and 40mm for external doors and doors over 900mm wide.

Construction
Balanced construction, with cellular core and intermediate rails with additional material to take hardware and fastenings. Provide a minimum 25mm timber sub frame around openings for louvres or glazing. Do not make cut outs closer than the width of the stiles. Provide bottom rails of sufficient thickness to allow trimming to clear carpet.

Solid core doors
Flush doors with blockboard cores and facings each side of no less than two sheets of timber veneer. MDF cores may be used in arid areas only.

Adhesives
Internal doors: To AS/NZS 2270

External doors: To AS/NZS 2271

Edge Strips
Fix hard wood edge strips to all edges to finish a minimum of 10mm thick.

Tolerance
Squareness: Not more than 3mm between lengths of diagonals.
Twist: Not more than 3mm between the perpendicular measurements from the diagonal corners.
Nominal size:
  - Height: +0, -2mm
  - Width: +0, -2mm

Painting
Priming: Prime all areas subjected to paint removal during the course of fitting hinge housings, locks and the like, prior to hanging.
Painting: Within forty-eight hours of hanging and prior to the installation of door handles, weather excluders and the like (latches and locks excepted), undercoat all surfaces, followed by a minimum 1 finishing coat to all surfaces including top and bottom edges. The final coat may be applied at a later stage.

8.6 DOOR FURNITURE

Installation
Supply:
- Delivery: Deliver door hardware items, 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.

Fasteners:
- Materials: Provide materials compatible with the item being fixed, and of sufficient strength, size and quality to perform their function.
  - Concealed fixings: Provide a corrosion resistant finish to concealed fixings.
  - Exposed fixings: Match exposed fixings to the material being fixed.

Security: Locate exposed fixings to lock furniture on the inside faces of external doors.
Support: Provide appropriate back support (for example lock stiles, blocking, wall noggings and backing plates) for hardware fixings.

Hinges:
- Metal frames: Fix hinges using metal thread screws.
- Timber doorsets: Install butt hinges in housings equal in depth to the thickness of the hinge leaf (except for hinges designed for mounting without housing), and fix with countersunk screws.

Door Stops
Install door stops to prevent door furniture striking the wall or other surface.

Door Seals
Provide door seals to the bottom of all external doors. Proprietary Item: Raven RP4. Thresholds to be AS 1428 compliant.
Hinge table
Provide 4 hinges for external doors and door leafs over 2040 mm in height or more than 850 mm in width. Otherwise provide 3 hinges as follows:

- 100 x 75 Lanes stainless steel hinges. Generally loose pin Cat No. 8580 or if required fixed pin cat No. 8588.
- For aluminium swing doors provide 3 No. stainless steel 102 x 42 interfold hinges - Doric SS DH18.

8.7 SLIDING INTERNAL DOORS
General
Suspend sliding doors from overhead tracks and wheel carriages appropriate to the size and mass of the doors.
Accessories
General: Provide overhead track supports and head and jamb linings appropriate to the arrangement of the door, and removable prefinished metal pelmets at the head to allow access to the wheel carriages for adjustment.
Wheel carriages: Fully adjustable precision ball race type providing smooth quiet operation.

8.8 SECURITY SCREEN DOORS
Use a proprietary system of extruded aluminium frames and infill of woven wire security mesh. Use Amplimesh Supascreen, Panther Mesh or Crimsafe or equal strength equivalent. In areas with Atmospheric Corrosivity Classification 5 use stainless steel mesh. Refer to NT Climate Zones Table. Powder coat colour as specified or noted on drawings. Materials to AS 5039. Fix in accordance with AS 5040.
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

8.9 ROLLER SHUTTERS
Manual operation
Use a proprietary system comprising a flexible curtain sliding between vertical guides incorporating windlocks and operating mechanism of a hand pulled chain or for smaller units a spring balanced inertia movement.
Motorised operation
Provide a proprietary operator with a limit switch, manual safety stop and reversing mechanism, and overload cutout operated by a battery-powered radio remote controller and by a direct push-button or key switch. Locate operating switch 1.5 m above floor level.

8.10 LOCKSETS
External doors
Provide a push-button key and knob deadlock set to each door.
Security screen doors: Whitco double cylinder deadlock with internal snib.
Internal doors
Generally: Passage sets.

Bathrooms, showers and toilets: Privacy sets.
Sliding patio doors and windows: Provide key-lockable surface mounted bolts.

Door lockset mounting heights
To centreline of spindle: 1 m above finished floor.

Keying
Number of keys: Provide 2 keys for each lock.
Key external doors on domestic premises (excluding garage doors) alike and key windows alike.
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

8.11 WINDOW
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.
Design
Assemblies: Design the windows and external door assemblies, including glazing, framing and fixings in accordance with AS/NZS 1170.2, AS 4055, AS 1288, and AS 2047.
Pressures: Design the assemblies to be capable of resisting the most adverse combination of pressures as set out in AS/NZS 1170.2.
Suction: Design the assemblies to take into account the high local suction factors as given in AS/NZS 1170.2.
Human Impact: Design the assemblies to take into account the human impact requirements as given in AS 1288.
Windborne debris impact: For Wind Regions B, C & D design assemblies to AS/NZS1170.2, Clause 2.5.7.

Frame Sections
Sections: The window and door frame sections shown on the drawings are indicative only to show the required relationships between openings and adjoining surfaces.

Shop Drawings - Hold Point
Hold Point: Submit shop drawings showing the layout and construction and fixing details a minimum of 14 days prior to ordering materials.

Certification
Provide a completed NT Building Act Section 40 Certificate of Compliance form, indicating that the entire assembly when installed as detailed, complies with the requirements of AS/NZS 1170, AS 1288 and AS 2047. State on the certificate the design criteria used, and that the installation is in accordance with the Contract Documents. Supply calculations if requested.

8.12 GLAZING
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.
Glass Thickness: To AS 1288.
Glass Types:
- General Use: Clear Float Glass
- Tinted Glass: Grey Tinted Float Glass
- Safety Glass: Toughened or Laminated
- Obscure Glass: Satinlite
- Mirrors: Silvered Float Glass
Safety Mirrors: Vinyl backed Grade A safety mirror complying with AS/NZS 2208
Glazed Shower Screens: Use a proprietary system comprising extruded aluminium frames with a powder coat finish and fixed so that water sheds to the inside.
Mirrors: Seal the edges against moisture. In wet areas entirely seal the space behind the mirror.

8.13 CONSTRUCTION

Joints
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.

Insect Screens
Black anodised aluminium mesh beaded into an extruded aluminium frame and attached to the window by a clipping device to permit removal and finished to match the window frames.

Security Screens and Grilles
Standard: To AS 5039
Installation: To AS 5040

Security Screens
Use a proprietary system of extruded aluminium frames and infill of woven galvanized wire security mesh. Use Amplimesh Supascreen, Panther Mesh or Crimsafe or equal strength equivalent. In areas with Atmospheric Corrosivity Classification 5 use stainless steel mesh. Refer to NT Climate Zones Table. Powder coat colour as specified or noted on drawings. Fix to the building with tamper resistant fastenings. Finish to match the window frames. Proprietary Item: As specified or as approved by Superintendent.

Security Grilles
Proprietary metal security grille in aluminium frames fixed to the building with tamper resistant fastenings and finished to match the window frames. Proprietary Item: Permaline Amplimesh 103.

Debris Screen
Proprietary Item: Permaline Amplimesh 351 debris screens in aluminium frames and finished to match the window frames.

Louvre Windows
Aluminium galleries with adjustable black plastic clips and dual operating mechanisms screw fixed to the mullions and jambs.
Louvre Blade width: 150 mm nominal.
Glass Louvre Blades: To AS 1288 with arrissed edges.
Metal Louvre Blades: Proprietary pre finished metal blades complying with the design requirements.

8.14 INSTALLATION
Install flashings and weatherings so that water is prevented from entering the building. Finish the installation with trims etc., to make neat, clean junctions at adjoining building surfaces.

8.15 COMPLETION
Remove temporary protection and ensure smooth and free operation of the assemblies.

8.16 OTHER REQUIREMENTS
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

9 CLADDING AND LINING

9.1 GENERAL
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.
Cross references Refer to the following sections:
- TILING, for waterproofing of wet areas.
- INSULATION AND SARKING, for wall sarking requirements.
- TIMBER AND STEEL CONSTRUCTION, for compressed fibre cement flooring.

Substrates or framing
Requirement: Before fixing cladding check and, if necessary, adjust the alignment of substrates or framing.

Fixing - general
Method: Nail to timber framing, screw to steel framing.

Fixing – proprietary systems or products
Fix the following proprietary systems in accordance with the current written recommendations and instructions of the manufacturer or supplier:
- Fibre cement plank cladding.
- Fibre cement cladding.
- Compressed fibre cement cladding.

Accessories and trim
Provide accessories and trim necessary to complete the installation.

Fixing eaves and soffit lining
Nailing: in accordance with the manufacturers’ requirements and the Northern Territory Deemed to Comply Manual. Minimum at 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, or
- Inserting a separation layer.
9.2 MATERIALS AND COMPONENTS

Flashing material
Standard: To AS/NZS 2904Sarking
Heavyweight reinforced aluminium foil complying with AS/NZS 4200.1.
Proprietary Item: Bradford Thermofoil 753 (heavy weight).

Fasteners
Steel nails: Hot-dip galvanized to AS/NZS 4680.
Self-drilling screws: To AS 3566, corrosion resistance class 4 in tropical areas and class 3 in inland areas.
Finish: Prefinish exposed fasteners with an oven baked polymer coating to match the cladding.

9.3 PLASTIC CLADDING

Standard
Unplasticised polyvinyl chloride (UPVC) sheet: To AS 4256.4.
Glass fibre reinforced polyester (GRP) sheet: To AS 4256.3.
Polycarbonate: To AS 4256.5.
Provide a proprietary system of interlocking planks including all accessories fixed in accordance with the manufacturers’ requirements and the Northern Territory Deemed to Comply Manual standards.

Installation
Standard: To AS 1562.3.

9.4 FIBRE CEMENT CLADDING

Standard
General: To AS/NZS 2908.2.
Cladding, eaves and soffit linings: Type A Category 3 (modulus of rupture ≥ 7 MPa).

Fibre cement planks
Standard: To AS/NZS 2908.2.
Plank cladding: Provide a proprietary system of single faced fibre cement building planks:
  - Plank thickness: 7.5 mm.
  - Joints and edges: Metal joining clips and UPVC extrusion.
  - Corners: Preformed metal joining pieces.

Fibre cement sheet cladding
Sheet cladding: 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.
Type: Provide single faced fibre cement sheets 6 mm thick.
Joints, corners and edges: UPVC extrusions or V butt joints. Use a Super Alcor backing strip behind vertical V butt joints and a Z section zincalume trim at horizontal joints.

Eaves & soffit lining
Eaves and soffit lining: Provide a proprietary system of single faced fibre cement sheets:
  - Sheet thickness: 6 mm.
  - Joints: UPVC extrusion or V butt joints.

Installation: Screw fix at 150 mm crs with proprietary self embedding head screws in accordance with the manufacturers’ instructions and the Northern Territory Deemed to Comply Manual standards.

9.5 COMPRESSED FIBRE CEMENT CLADDING

Standard: To AS/NZS 2908.2, Type A, Category 5 (modulus of rupture ≥ 18 MPa).
Cladding: 9 mm thick compressed fibre cement sheets.
Joints: Expressed joints - 10 mm gaps with EDPM gasket backing strips.
Fixing: Recessed countersunk screws in pre-drilled holes, filled with epoxy compound and sanded smooth in accordance with the manufacturers’ technical data.

9.6 SHEET METAL CLADDING

Cladding
Provide a proprietary system of prefinished profiled metal cladding complete with accessories, trim and flashings.
Fixing: Fix in accordance with the manufacturers instructions and the Northern Territory Deemed to Comply Manual standards.

Design and installation
Standard: To AS 1562.1.
Prepainted and organic film/metal laminate products: To AS/NZS 2728.
Penetrations: Flash all pipes and ducts, etc., passing through the cladding and trim with colour matched material to ensure weathertight joints.

Visible accessories
Provide materials with the same finish as cladding sheets.

Cladding sheet installation
Swarf: remove swarf and other debris as soon as it is deposited.
Corner flashing
Requirement: Finish off at corners with purpose-made folded flashing strips.

9.7 LINING

Materials and components
Plasterboard
Standard: To AS/NZS 2588.
Do not use plasterboard in wet areas.

Fibre cement
Standard: To AS/NZS 2908.2, Type B, Category 2.

Fasteners
Steel nails: Use corrosion resistant nails.
Self Drilling Screws: To AS 3566.2, corrosion resistance Class 2.
9.8 PLASTERBOARD
Installation
Plasterboard: To AS/NZS 2589.
Framed construction: Screw or nail or combine with adhesive.
Masonry construction: Adhesive fix direct to masonry.
Joints
General: Provide recessed edge sheets and finish flush with perforated reinforcing tape.
External corner joints: Make over zinc-coated steel corner beads.
Control joints: Provide purpose-made zinc-coated control joint beads in walls and ceilings at 12 m maximum centres and to coincide with structural control joints.

9.9 FIBRE CEMENT SHEET
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
Fixings: Screw fix with self embedding head screws and flush over screw heads.
General: Run sheets across the framing members. In flush jointed applications, stagger end joints in a stretcher (running) bond 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.
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.
Joints (general)
Dry Joints: Provide square edged sheet and finish with a UPVC joining section.
Control joints: Provide purpose-made metallic-coated control joint beads at ≤ 7.2 m centres in walls and ceilings and to coincide with structural control joints.
Wet areas: Provide additional supports, flashings, trims and sealants as required.
Joints in tiled areas: Bed perforated paper tape in bedding compound. Do not apply a topping coat.
- Control joints: Space to suit joints required in tiling.
- Internal corners: Reinforce with metallic-coated steel angles. In corners subject to continuous moisture, flash over the angle and under the sheeting with continuous bitumen coated aluminium flashing.
Joint materials
Flush jointing: Use 6 mm thick Villaboard with recessed edges. Provide a flush finish using perforated reinforcing tape. In tiled areas do not apply a topping coat after bedding the perforated paper tape in bedding compound.
Control Joints: Install purpose made zinc coated control joint beads at max 7.2 m centres.
UPVC Joining Strips: Use 6 mm Versilux with proprietary UPVC mouldings at joints of sheets and edges.
V Joints: Use 6 mm Versilux with bevelled edges tightly butted to form neat V joints.

9.10 TONGUE AND GROOVE LINING
Installation
Stained or clear finished boards: Select boards to give a random pattern. At corners, return the same board to give a continuous grain pattern.
Fixing: Nail twice to each crossing except for secret nailed profiles.
Nailheads: Treat visible nail heads as follows:
- In stained or clear finishes: Drive flush.
- In opaque finishes: Punch below surface and fill flush with putty after the surface has been primed.
Joints
End grain joints: Install boards so that butt joints are in compression.
Corners: Mitre external corners and scribe internal corners.

9.11 PLASTIC LAMINATE
3 mm thick plastic laminate sheet for use in wet areas. Adhesive fix the sheets and join with proprietary UPVC Joiners. Seal all joints.

9.12 TRIM
Provide timber or moisture resistant medium density fibreboard trim, such as beads, skirtings, architraves, mouldings and stops, where necessary to make neat junctions between components, finishes and adjacent surfaces.

9.13 OTHER REQUIREMENTS
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.
10 SUSPENDED CEILINGS

10.1 GENERAL
Standard to AS/NZS 2785.

Performance Criteria
Technical Data: Provide technical data to substantiate compliance with the loading requirements including upward wind load.

Fixing:
Approved Fixers: Install the complete system and accessories using specialist fixers approved by the suspended ceiling manufacturer.

10.2 INSPECTION
Notice - Witness Point
Witness Point: Give sufficient notice so that inspection may be made of the suspension system prior to installation of the panels or lining.

10.3 MATERIALS AND COMPONENTS
Zinc coated steel: To AS 1397/Z200.
Aluminium extrusions: To AS/NZS 1866.
Anodising: To AS 1231, not less than class AA10.
Thermoset powder coating: To AS 3715.
Plasterboard panels: To AS/NZS 2588.
Fibrous plaster tiles: Proprietary tiles with hard cast plaster faces.

Fasteners: Self-drilling screws: To AS 3566.
Powder activated fasteners: To AS/NZS 1873.4.

Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

10.4 CONSTRUCTION GENERALLY
Ceiling grid – Hold Point
Set out the ceiling grid so that panel joints and centre lines of visible suspension members coincide with grid lines if shown on the drawings. If not otherwise shown, set out so that opposite margins are equal.

Hold Point: Obtain approval of the setout before commencing the installation.
Support members: Galvanized metal rods with a length adjustment of 50mm.
Installation: Install the ceilings level and fix so that there is no looseness or rattling of components or any of the faults described in the Appendices to AS/NZS 2785.

Bracing
Provide bracing where necessary to prevent lateral movement.

Fasteners
Use fasteners so that they are not visible in the finished ceiling.

Bulkheads
Construct bulkheads and other similar ceiling formations so that they are an integral part of the ceiling structure and comply with the ceiling performance requirements.

Panel installation
Painting: Paint ceiling tiles before erection.
Panel lock clips: Where panels are exposed to wind loads or where required for security, insert panel lock clips at the junction of carrier rails and panels.

10.5 ACCESSORIES AND TRIM
General
Provide accessories and trim necessary to complete the installation.

Control Joints
Provide control joints in sheet finishes where required.

Service penetrations
Provide openings for, and fit the ceiling system up to, services elements such as light fittings, ventilation outlets, detectors, sprinklers and loudspeakers.

Access Panels
Provide flush fitting access panels in non-demountable ceilings supported and anchored by methods which permit ready removal and refixing.
Number: One per 10 m² or where shown on the drawings.

10.6 OTHER REQUIREMENTS
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

11 PLASTERING

11.1 GENERAL
Cross references
Refer to the following sections:
- TILING, for waterproofing of wet areas.
- TIMBER AND STEEL CONSTRUCTION and PAINTING, for priming of embedded steel.

Standard
General standard; To SA HB-161
11.2 MATERIALS AND COMPONENTS

Plaster materials
Sand: Fine aggregate with a low clay content, selected for grading and complying with SA HB-161.
Cement: To AS 3972, type GP. Lime: To AS 1672.1.
Sand: Fine, sharp, well graded with low clay content and free from efflorescent salts.
Gypsum plaster: To comply with the recommendations SAA HB 161.
Plasticizers/workability agents: Do not use in cement plasters.

Accessories
Metal lath: Expanded metal to AS 1397/Z350 (internal) or stainless steel or PVC (external).
Beads: Proprietary sections fixed to substrates and/or embedded in the plaster to form and protect edges and junctions.
Lime putty mixes
Make a coarse mix of lime putty and sand 16 hours before use and do not allow to dry out.
Gauged mixes
To improve workability, mixes required to contain only cement and sand may be gauged by the addition of lime up to 25% of the cement content, but not as a substitute for the cement.

11.3 SUBSTRATE

Correction of substrate
Before plastering, make good defects in the substrate. Hack off excessive projections. Fill voids and hollows with a mix not stronger than the substrate nor weaker than the first coat.

Absorbent Surfaces: If suction is excessive control by dampening but avoid over wetting.
Painted Surfaces: Remove paint and hack the surface at close intervals.

Untrue substrate
If one coat application is required, but the substrate is not sufficiently true to comply with the thickness limits for one coat, or has excessively uneven suction resulting from variations in the composition of the substrate, apply 2 coats.

Cleaning
Remove loose material and leave the surface clean and dust free.
Embedded items
Sheath water pipes and other embedded items to permit thermal movement. If ungalvanized steel items are to be embedded in plaster, prime before fixing.

Chases
If chases or recesses are more than 50 mm wide, cover with metal lath extending at least 75 mm beyond each side of the recess.

Metal backgrounds
Fix metal lath to provide a key for plaster. Press the plaster through the apertures of the metal lath.

Dense concrete backgrounds
Provide a mechanical key by hacking, bush hammering or abrasive blasting to expose the aggregate then dash coat.

11.4 PLASTERING

Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

Thickness limits
One coat work: 12 - 15 mm.
Multi-coat work:
  • First coat: 9 - 15 mm.
  • Setting coat: 2 - 3 mm.

Cement rendering
Proportions by volume (cement:lime:sand) for concrete and dense concrete block: 4:1:16

White-set plaster
Use 3:1 gypsum plaster: lime putty, applied as a skim coat direct to the substrate.

Waterproof render
Use cement based render with proprietary waterproofing admixture.

Tolerances
To SA HB-161. Finish plane surfaces within a tolerance of 6 mm in 2400 mm, determined using a 2400 mm straight edge placed anywhere in any direction. Finish corners, angles, edges and curved surfaces within equivalent tolerances.

Temperature
Ensure the temperatures of mixes, substrates and reinforcement are within the range 5°C ≤ 35°C at the time of application.

Curing
Do not allow rapid or uneven drying out.
Keep continuously moist for 2 days and allow to dry for 5 days before applying further plaster coats.

V-joints
Provide V-joints cut straight through the plaster to the substrate at the following locations:
  • Junctions between different substrate materials.
  • Abutments with other finishes.
  • Abutments with metal door frames.

Trim
Provide purpose-made zinc-coated steel sections as corner beads, stop beads, and at movement control joints.

Finishes
Sand finish generally for cement render.
Steel trowel finish for white set and cement render to be vinyl sheeted.
Wood float finish for cement render to be tiled.

Control joints
Provide control joints 3 to 6 mm wide in the finish to coincide with control joints in the substrate. Finish with Rondo stopping beads and fill with a resilient sealant.

11.5 OTHER REQUIREMENTS

Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.
12 JOINERY AND FIXTURES

12.1 GENERAL
Outline description
This section covers:
• Joinery & Associated Hardware
• Fire Extinguishers & Blankets
• Pin Boards & White Boards etc.,
• Clothes Hoists, Letter Boxes etc.
Cross references
• Painting: For paint finishes.

12.2 MATERIALS AND COMPONENTS

Plywood
Interior use generally: To AS/NZS 2270.
Interior use, exposed to moisture: To AS/NZS 2271

Particleboard
Standard: To AS/NZS 1859.1.

Medium density fibreboard
Use fine grained uniform density resin-bonded board.
Standard: To AS/NZS 1859.2.

Moisture resistant medium density fibreboard: Designated by the manufacturer as having improved moisture resistance and marked as such.

Melamine overlaid medium density fibreboard: Medium density fibreboard overlaid on both sides with low pressure melamine.

Wet Processed Fibreboard
Standard: To AS/NZS 1859.4.

Moisture content
Make milled products from timbers seasoned to within 3% of the equilibrium moisture content appropriate to the timber and its intended conditions of use; and with no more than 3% difference between any 2 pieces in any one group.

Finished sizes
Provide milled timbers with 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.

Decorative overlaid wood panels
Standard: To AS/NZS 1859.3.

High pressure decorative laminated sheet
Standard: To AS/NZS 2924.1.

Decorative laminated sheet application table
Provide classes as follows in either standard type or type P for post forming as applicable:

Class to AS/NZS 2924.1 | Application
---------------------|------------------
HGS or HGP | Kitchenwork - tops
VGS | Kitchen front panels
VLS | Other locations

Thickness
When fixed to a continuous background
• Horizontal surfaces: 1.2 mm
• Vertical surfaces: 0.8 mm
• Post formed laminate: 0.8 mm
• Edge strips: 0.4 mm
• Vertical fixing to studs etc: 3.0 mm

12.3 CONSTRUCTION GENERALLY

General
Construction: Build components square and install plumb.
Framing: Frame and trim where necessary for openings, including those required by other trades.
Accessories and trim: Provide as necessary to complete the installation.
Joints: Provide materials in single lengths whenever possible. If joints are necessary, make them over supports.

Fasteners and adhesives
General: Provide fasteners, adhesives or both to transmit the loads imposed and ensure the rigidity of the assembly. Do not split, discolour or otherwise damage timber or sheets.
Visiblility: 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.
Installation: Secure plinths and carcasses to floors, walls, or both, at not more than 600 mm centres. Fix floor mounted units to backgrounds at maximum 600 mm centres. Fix wall mounted units to each nogging or stud stiffener or both.
Fixings: Screws with washers into timber or steel framing, or masonry anchors into masonry or concrete.

Finishing
Junctions with structure: Scribe plinths, benchtops, splashbacks, ends of cupboards, kickboards and returns to follow the line of floors or walls.
Edge Strips: Finish all exposed edges of sheets with edge strips that match the sheet faces.

12.4 CUPBOARD AND DRAWER UNITS
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

Plinths
Generally: 16 mm melamine overlaid high moisture resistant medium density fibreboard.

Wet Areas: Ex 25 Thick Hardwood
Height: 90 mm
Fabrication: Form up with front and back members and full height cross members at 900 max. centres.
Finish: Plastic laminate or painted.
Carcasses, drawer fronts, shelves and doors
Material: Melamine overlaid high moisture resistant medium density fibreboard.
Minimum thickness: 16 mm.
Fasteners: Conceal with finish.
Installation: Secure plinths and carcasses to floors, walls, or both at not more than 600 mm centres.
Drawer fronts: Rout for drawer bottoms.
Adjustable shelves: Support on proprietary pins in holes bored at 32 mm centres vertically.

**Drawer and door hardware**
Hinges: Provide concealed all-metal hinges with the following features:
- Adjustable for height, side and depth location of door.
- Self closing action.
- Hold open function.
- Nickel plated.
Proprietary item: Blum 170° opening. If required use Machined brass butts.
Door leaves up to 760 mm high - 2 no. 64 mm.
Door leaves over 760 mm high - 3 no. 75 mm.
Drawer Slides: Provide metal runners and plastic rollers with the following features:
- 30 kg loading capacity.
- Closure retention.
- White thermoset powder coating or nickel plated. Proprietary Item: Blum BS220 m with length to suit the drawer size.
Cupboard Locks: Lockwood 690 pin tumbler cupboard locks.
Cupboard Handles: 100 mm x 10 mm diameter stainless steel ‘D’ pulls - Satin Finish.

**12.5 BENCHTOPS**
Laminated benchtops
Material: Moisture resistant medium density fibreboard.
Minimum thickness: 32 mm.
Finish: Decorative laminated sheet adhesive fixed.
Sealing underside: Laminate undersides of benchtops if likely to be subject to excessive moisture from equipment such as dishwashers; or the benchtop is not restrained against warping by cupboard carcass or support framing.
Installation: Fix to carcass at least twice per 600 mm length of benchtop.
Joint sealing: Fill joints with a 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.

**12.6 CEILING ACCESS**
Ceiling
Trim openings and provide lockable access panels of minimum size 600 x 600 mm, Rondo or similar.

**12.7 FIRE FIGHTING**
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

**Portable extinguishers**
Provide portable fire extinguishers and location signs in accordance with the general requirements of AS/NZS 1841.1.

**Fire blankets**
Provide fire blankets and location signs to AS/NZS 3504 - size: 1800 x 1800 mm.

**12.8 DISPLAY BOARDS**

**White boards**
White Vitreous enamel steel sheet on backing board fixed in a clear anodised aluminium frame with a black neoprene strip to conceal fixings and with an integral pen rail. Conceal screw fix to wall at 900 maximum crs. Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

**Pin boards**
Of a homogenous, resilient material on a backing board, fixed in a clear anodised aluminium frame with a black neoprene strip to conceal fixings. Screw fix to wall at 900 maximum crs. Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

**12.9 CLOTHES HOISTS**
Supply clothes hoists as required in the positions indicated or as directed.
Rotary Hoists - Hills Supa 4 rotary clothes hoist.
Folding Hoist - Hills Paraline Duo FD40362.
Install as per the manufacturers’ written instructions.
Concrete Footings: refer to the miscellaneous items clause in the Concrete Construction section.
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

**12.10 GRAB RAILS**
Polished stainless steel 32 mm diameter with concealed fixings.
Design and fixing: To AS 1428.1.
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

**12.11 LETTERBOXES**
Supply mailboxes complying with AS/NZS 4253.
Provide locks where required.
Install on the fence with galvanized brackets or mount on 40 N.B. galvanized pipe 1000 mm above ground level in a concrete footing 300 dia x 600 mm deep. Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

**12.12 OTHER REQUIREMENTS**
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.
13 TILING

13.1 GENERAL
Standards
Follow the guidance given in AS 3958.1 and AS 3958.2.
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

13.2 MATERIALS AND COMPONENTS
Exposed edges
If available, provide purpose-made border tiles with the exposed edge (whether round, square or cushion) glazed to match the tile face.

Accessories
If available, provide tile accessories such as round edge ceramic tiles, cove tiles, step treads and nosings to stairs, landings, and thresholds, skirtings, sills, copings and bath vents, which match the surrounding tiles, composition, colour and finish.

Adhesives
Standard: To AS 2358 and AS 4992.1.
PVA based adhesives: Do not use in wet areas or externally.

Mortar materials
Sand: Fine aggregate with a low clay content selected for grading, sharp and free from efflorescing salts. Cement: To AS 3972, type GP.

Bedding mortar
Proportioning: Select proportions from the range 1:3 to 1:4 cement: sand by volume to obtain satisfactory adhesion. Use minimum water.

Grout
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. Use minimum water consistent with workability. Proportioning:
- For joints up to 3 mm: 1:2 cement: sand.
- For joints over 3 mm: 1:3 cement: sand.

Epoxy Grout: Use a proprietary epoxy grout in commercial kitchens and other heavy duty applications.

Terracotta Tiles: Use proprietary polymer modified grout.

Substrates
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.

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.

Fails: If the membrane is directly under the floor finish ensure the fall in the substrate conforms to the fall nominated for the finish.

Water stops
Requirement: Provide water stop angles at door thresholds and shower enclosures to support the waterproof membrane at junctions between waterproofed and non-waterproofed areas.

Substrate Preparation
General: Ensure substrates are as follows:
- Clean and free of any deposit or finish which may impair adhesion or location of tiles.
- If walls are plastered, remove loose sand.
- Compatible with all components of the floor system.
- 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 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.
  - Fill cracks in substrates wider than 1.5 mm with a filler compatible with the membrane system.

External corners: Round or arris 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.

13.3 INSPECTION
Notice - Witness Point
Witness Point: Give sufficient notice so that an inspection may be made at the following stages:
- Completion of waterproof membrane.
- Initial or trial set out.

13.4 SAMPLES
General
If required submit labelled samples of tiles, including fittings, accessories, grout and sealants, illustrating the range of variation in colour and finish.
13.5 WATERPROOFING WET AREAS

Standard
General: To AS 3740.
Membrane: To AS/NZS 4858.
Extent: To BCA 3.8.1.2.

Membrane
Provide a proprietary (non acrylic) liquid applied or sheet membrane system for use in wet areas, shower recess bases and associated floors and wall to floor junctions which are to be tiled. Proprietary Item: Bostik Dampfix 2.

Bond breakers materials
Requirement: Compatible with the flexibility class of the membrane to be used.
Material: Purpose made bond breakers tapes and closed cell foam backing rods or fillets of sealant.

Bond breakers installation
Requirement: After the priming of surfaces, provide bond breakers at all wall/floor, hob/wall junctions and at control joints where the membrane is bonded to the substrate.

Sealant fillet bond breakers:
- Application: Form a triangular fillet or cove of sealant to internal corners within the period recommended by the membrane manufacturer after the application of the primer.
- Widths: 8 mm minimum to vertical corners. 10 – 12 mm to horizontal corners.

Backin rod bond breakers: Retain in position with continuous length of tape pressed firmly in place against the surfaces on each side of the rod.

Sealants
Requirement: Waterproof, flexible, mould-resistant and compatible with host materials.

Preparation
See Substrate Preparation clause in MATERIALS AND COMPONENTS sub-section.

Installation
Floor wastes: Turn membrane down into the floor waste drainage flanges, and adhere to form a waterproof connection.
Hobs: Extend membrane over the hob and into the room at least 50 mm. For unenclosed showers extend membrane at least 1500 mm into the room measured from a point directly below the shower rose outlet on the wall.
External tiling: Provide a waterproof membrane under external floor tiling, to balconies and over habitable rooms, which forms a drained tank suitable for continuous immersion. Do not run under bounding walls.
Curing: Allow membrane to cure fully before tiling.

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.

Variations
Distribute variations in hue, colour, or pattern uniformly, by mixing tiles or tile batches before laying.

Protection
Keep traffic off floors until the bedding has set and attained its working strength.

Setting out
General: Set out tiles to give uniform joint widths within the following limits:
Floors:
- Quarry tiles: 6 to 12 mm.
- Vitrified floor tiles: 3 to 5 mm.
- Dry pressed tiles: 3 mm.
- Extruded tiles: 6 mm.
Mounted mosaics tiling: To match mounting pattern. Stone tiles: 1.5 to 3 mm.
Internal ceramic tiling: 1.5 to 3 mm.
Walls:
- Dry pressed tile: 1.5 mm.
- Extruded tile: 6 mm.
Joint alignment: Set out tiling with joints accurately aligned in both directions and wall tiling joints level and plumb.
Joint position: Set out tiles from the centre of the floor or wall to be tiled and if possible, ensure cut tiles are a half tile or larger.

Fixtures: If possible, position tiles so that holes for fixtures and other penetrations occur at the intersection of horizontal and vertical joints or in the centre of tiles.

Falls and levels
General: Grade floor tiling to even and correct falls generally, and to floor wastes and elsewhere as required. Make level junctions with walls. If falls are not required, lay level.
Minimum fall generally: 1:100. Minimum fall in shower areas: 1:60.
Change of finish: Maintain finished floor level across changes of floor finish including carpet.

Preparation of tiles
Adhesive bedding: Fix tiles dry, do not soak.
Mortar bedding: Soak porous tiles in water for half an hour, then drain until the surface water has disappeared.
Terracotta Tiles: Use presealed tiles or apply a breathable sealer.

Floor finish dividers
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.
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.

Bath ventilation
Ventilate the space below fully enclosed baths with at least 2 ventilating tiles.

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 the grout is dry, polish the surface with a clean cloth.

Sealant joints
General: Provide sealant joints filled with sealant and finished flush with the tile surface as follows:
- Where tiling is cut around sanitary fixtures.
- At corners of walls in showers.
- Around fixtures interrupting the tile surface, for example pipes, brackets, bolts and nibs.
- At junctions with elements such as window and door frames and built-in cupboards.
Material: Anti-fungal modified silicone.
Proprietary Item: ABA Colourflex silicone sealant to match the colour of the grout.

Control joints
Standard: To AS 3958.1 Clause 5.4.5.
Provide control joints over structural joints and at walls or to divide tiled areas into bays a maximum of 20 m² and 5 m wide. Provide joints 6 to 12 mm wide to suit the tiling pattern and fill with a colour matching silicone sealant over a foam backing rod.

13.7 OTHER REQUIREMENTS
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

14 PAINTING

14.1 GENERAL
Standards
Follow the guidance given in AS/NZS 2311 and AS/NZS 2312.

Powder Coating
Aluminium surfaces: To AS 3715.
Steel or zinc coated surfaces: To AS 4506.

‘Wet Paint’ warning
Place notices conspicuously and do not remove them until the paint is dry.

14.2 MATERIALS AND COMPONENTS
Premium Paints
Use only premium paints from approved manufacturers.

Paint Manufacturer
Prior to placing orders provide a list showing the brand of the paint proposed for use and the trade names of the paint types referred to by generic type and APAS specification number in the painting schedule.

Spray Painting - Hold point.
Do not apply by spray without approval.

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

Delivery
Deliver paints to the site in the manufacturers’ labelled containers. Ensure containers are marked with the APAS (Australian Paint Approvals Scheme) specification number.

Low VOC Paints
Use low VOC emitting paints.

14.3 INSPECTION
Notice – Witness Point
Witness Point; Give sufficient notice so that each of the following stages may be inspected:
- Substrate immediately prior to the commencement of painting.
- Prior to application of final coat.

14.4 PAINTING

Substrate Preparation
Unpainted surfaces: To AS/NZS 2311 Section 3.
Previously painted and in good condition: To AS/NZS 2311 Clause 7.4
Previously painted and in poor condition: To AS/NZS 2311 Clause 7.5
Steel with protective coatings: To AS/NZS 2312 Section 10 and to AS 1627.1.
This includes cleaning down with sugar soap, treatment of mould growth, rubbing back existing painted surfaces with abrasive paper and patching and priming of damaged surface.

Order of work
Complete clear timber finishes before commencing opaque paint finishes in the same area.

Protection
Before painting, clean the area and protect it against dust entry. Use drop sheets and masking to protect finished surfaces or other surfaces at risk of damage during painting.
Remove door furniture, switch plates, light fittings and other fixtures before starting to paint, and re-fix in position on completion of painting.

Restoration
Clean off marks, paint spots and stains progressively and restore damaged surfaces to their original condition. Touch up damaged decorative paintwork or misses with the paint batch used in the original application.

Fillers
Provide a filler tinted to match the substrate if the finish is transparent.

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

**Number of coats**
Apply additional coats if necessary at no extra cost to achieve the required total film thickness and satisfactory opacity.

**Priming before fixing**
Timber: Apply a first coat (two coats to end grain) to exposed roof trim, timber doors including tops and bottoms of doors, associated trims and glazing beads before fixing in position.
Steel: Apply a priming coat of zinc-rich organic binder to APAS - 2916.

**Repair of galvanizing**
If galvanized or zinc-coated surfaces have been cut or welded after galvanizing, prime the affected area with a zinc-rich organic binder to APAS - 2916.

**Paint system description**
If a system is referred to only by its final coat (for example by the manufacturer’s brand name, the APAS specification code or the generic name) provide stains, primers, sealers and undercoats which are suitable for the substrate and are compatible with the finish coat and each other.

**Painting / Finishes Schedules**
Refer to the PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document for painting and finishes schedules.

14.5 **OTHER REQUIREMENTS**
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

15 **FLOOR COVERINGS**

15.1 **GENERAL**

**Cross reference**
Refer to the Painting section for finishing of sanded timber floors.
Refer to the Concrete section. Ensure adhesives used for vinyl floor finishes are compatible with additives or coatings to concrete floor.

**Approved Fixers**
Have the floor coverings and accessories installed by experienced fixers approved by the floor covering supplier.

15.2 **INSPECTION**

**Notice - Witness Point**
Witness Point: Give sufficient notice so that inspection may be made of the prepared substrate or underlay.

15.3 **MATERIALS AND COMPONENTS**

**Hardboard underlay**
Standard: To AS/NZS 1859.4, standard hardboard Type RD, manufactured as flooring underlay. Thickness: 5.5 mm.

**Carpet underlay**
Needled underfelt: Provide a felt composed of 60% animal fibre and 40% jute, reinforced with polypropylene scrim with a minimum mass of 50 g/m², or hessian fabric with a minimum mass of 150 g/m².
Synthetic Foam underlay: Provide a high density synthetic latex flat cushion foam sandwiched between reinforced carrier fabric.
Rubber underlay: Provide a heavy-duty natural rubber, waffle pattern, with a backing of reinforcing fabric, either hessian, spun nylon, or polyester.

**Hot-melt adhesive tape**
Provide a 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.

Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

15.4 **SUBSTRATE**

**Substrate preparation**
Prepare the substrate including the following:
- Stripping and cleaning: Remove deleterious and loose material, including existing floor coverings and any surface treatment which could adversely affect adhesion.
- Repairs: Make good to the surface finish as necessary. Fill depressions with a suitable filler, and remove high spots and projections. If necessary lay a steel-trowelled underlay to concrete substrate.
- Fixtures and fittings: Remove door stops and other fixtures, and refix in position undamaged on completion of the installation.
- Basic sanding: Produce an even plane sanded surface on strip flooring to be covered. Lightly sand the junctions of sheet flooring.

**Moisture Content**
General: Do not commence the installation of flooring unless the moisture content of the concrete substrate has been tested to AS/NZS 2455.1, Appendix B and values in clause 2.4.2(c) have been obtained. If necessary provide artificial means for drying out the substrate before installation.
15.5 LAYING CARPET
Standard: To AS/NZS 2455.1.

Setting out
General: Lay the carpet in continuous lengths without cross joins in the body of the area. Make unavoidable cross joins at doorways under the closed door.
Joints in underlay: Ensure joints in underlay do not coincide with carpet joints. Do not carry underlay over carpet grippers or edge strips.

Seaming methods
Woven carpet: Machine or hand sew.
Tufted carpet: Provide hot-melt adhesive tapes.

Fixing
Gripper strip: To AS/NZS 2455.1 Clause 3.5.
Provide preformed gripper strip and tackless edge strip. Space fixings at 150 mm maximum centres.
Direct stick method: To AS/NZS 2455.1 Clause 3.6.
Use low VOC adhesives.
Immediately after laying, and again one hour later, roll the carpet from the centre diagonally towards each edge using a multi-wheeled roller. Do not roll foam-backed carpet.

Edge strip
Provide a proprietary aluminium edge strip with a PVC insert at exposed edges of the carpet. If edge strips occur at doorways, make the junction underneath the closed door.
Proprietary Item: Roberts multi-purpose aluminium trim section.

Clearance
Doors: Trim doors as required to clear the finished carpet by 3 mm and reseal the underside.

15.6 LAYING RESILIENT FINISHES
Standard: To AS 1884.

Sheet set out
Set out sheets to give the minimum number of joints. Run sheet joints parallel with the long sides of floor areas.

Tile set out
Set out tiles from the centre of the area. Match edges and align patterns. Arrange the material so that variation in appearance is minimised. Wherever possible cut tiles at margins only, to give a cut dimension of at least 100 mm x full tile width.

Adhesives
Use low VOC adhesives as recommended by the manufacturer for the particular application.

Joints
Heat welding: After fixing, groove the seams with a grooving tool and weld the joints with matching filler rod and hot air welding gun. When the weld rod has cooled, trim off flush.
Cold welding: Apply seaming compound 100 mm wide to the substrate centrally under the seam. Roll the finish in two directions until the compound is forced up into the joint. Clean off flush with a damp cloth.

Junctions
Scribe neatly up to returns, edges, fixtures and fittings. Finish flush with adjoining surfaces.

Vinyl Skirting
Moulded black PVC feather edge skirting section, 100 mm high. Scribe as necessary, mitre corners and fix to walls with low VOC contact adhesive.

Cleaning and protection
Keep traffic off floors until bonding has set but not before 24 hours after laying. Do not allow water in contact with the finish for 7 days.

Finishing
Finish in accordance with the manufacturers written instructions.

15.7 OTHER REQUIREMENTS
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

16 PLUMBING AND DRAINAGE

16.1 GENERAL

Cross references
Refer to the following sections:
- SITE PREPARATION, for service trenches.
- ROOFING, for roof plumbing.
- TILING, for waterproofing of wet areas.
- PAINTING, for priming steel or iron before installation and exposed piping required to be painted.

Standards
Plumbing and drainage products: To SAA MP52, the Plumbing Code of Australia, the AS/NZS 3500 series and the ATS 5200 series.
Installation: To AS/NZS 3500.5.

16.2 NOTICE

Commencement – Hold Point
Hold Point: Do not commence work until a copy of the approved plumbing plans has been lodged with the Building Certifier. Supply one copy of the approved Drawings to the Superintendent before commencing work on site.

16.3 INSPECTION

Notice: Give sufficient notice so that inspection may be made of work ready for testing. Include inspection for, plumbing, drainage and gas instructions.
16.4 TEST
Hydrostatic tests – Hold Point
Hold Point: Waterpipes: Test to AS/NZS 3500.1, Section 16.
Preparation for testing
Seal off items of equipment not designed to withstand the test pressure. Securely anchor pipes and fittings in position to prevent movement during the tests. Cure solvent cement joins for at least 24 hours before testing.
Testing
Check pipe joints, valve seats, tap washers, strainers and other elements for leaks. Repair or replace if damaged, and retest.

16.5 CONTRACTOR’S SUBMISSIONS
Work-as-executed drawings
Submit drawings showing the ‘as installed’ locations of pipes, fittings, tanks, water heaters, control valves and accessories. Show the depth of underground pipework.
Connections
Excavate to locate and expose the connection points and connect to the authorities’ mains. On completion, backfill and compact the excavation and reinstate surfaces and elements which have been disturbed such as roads, pavements, kerbs, footpaths and nature strips.
Local authorities
If the authority elects to perform or supply part of the works, make arrangements and pay and bear the fees payable for the work.

16.6 MATERIALS AND COMPONENTS
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.
Water supply pipes
Copper pipe: To AS 1432, Type B. Jointing methods: Use capillary fittings, compression fittings, silver brazed slip joints or screwed joints. Galvanized steel pipe: To AS 1074, with screwed joints.
Wall thickness: Heavy for sizes up to and including DN 80, medium for sizes above DN 80. Generally: Use copper pipes.
Corrosive water areas: Use class 16 Polybutylene pipes to AS/NZS 2642.2 and where exposed, use 316 stainless steel pipes.
Finishes
Finish exposed piping, including fittings and supports as follows:
- Internal locations such as toilet and kitchen areas: Chrome plate copper piping to AS 1192 Service condition 2, bright.
- Externally: Paint.
- Concealed but accessible spaces (including cupboards and non-habitable enclosed spaces): Leave unpainted except for required identification marking. Prime steel piping and iron fittings.

Valves
Finish valves to match connected piping.

Tapware and Fixtures
Provide sanitary fixtures and tapware as scheduled or shown on the drawings.

Toilet Cisterns
Provide toilet cisterns complying with a minimum 4A water efficiency rating.

16.7 CONSTRUCTION GENERALLY
General
Install piping in straight lines and to uniform grades. Arrange and support the piping so that it remains free from vibration and water hammer, whilst permitting thermal movement. Keep the number of joints to a minimum. Prevent direct contact between incompatible metals.

Concealment
If practicable, conceal piping and fittings requiring maintenance or servicing so that they are accessible within non-habitable enclosed spaces such as roof spaces, subfloor spaces and ducts. Keep pipeline in subfloor spaces at least 150 mm above ground and ensure access can be provided throughout for inspection. Provide at least 25 mm clearance between adjacent pipelines (measured from the piping insulation where applicable). Embedded pipes: Do not embed pipes that operate under pressure in concrete or surfacing material.

Building penetrations
If piping passes through building elements provide purpose-made metal or plastic sleeves formed from pipe sections. Prime steel or iron before installation.

Pipe supports
Materials: The same as the piping, or galvanized or non-ferrous metals, with bonded PVC or glass fibre woven tape sleeves where needed to separate dissimilar metals.

Cover plates
Where exposed piping emerges from wall, floor or ceiling finishes, provide cover plates of non-ferrous metal, finished to match the piping, or of stainless steel.

Connections to Network Utility Operator Mains
General: Excavate to locate and expose the connection points and connect to the Network Utility Operator mains. On completion, backfill and compact the excavation and reinstate surfaces and elements which have been disturbed such as roads, pavements, kerbs, footpaths and nature strips.

16.8 STORMWATER
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

Standard
General: To AS/NZS 3500.3 or AS/NZS 3500.5.
Cleaning
During construction, use temporary covers to openings and keep the system free of debris. On completion, flush the system using water and leave it clean.

Pipelaying
Lay pipelines with the spigot ends in the direction of flow.

Downpipe connections
Turn up drain branch pipelines to finish 50 mm above finished ground or pavement level.

Subsoil drains
Connection: Connect subsoil drains to the stormwater drainage system.
Trench width: Minimum 450 mm.
Subsoil drains: Provide proprietary perforated plastic pipe.
Filter fabric: Provide a non woven polymeric fabric formed from a plastic yarn containing stabilisers or inhibitors to make the filaments resistant to deterioration due to ultraviolet light.
Filter sock: Provide a non woven polyester permeable sock capable of retaining particles of 0.25 mm size. Securely fit or join the sock at each joint.
Backfilling: Backfill with 20 mm nominal size washed screenings, to the following depths:
• To the underside of the bases of overlying structures such as pavements, slabs and channels.
• To within 75 mm of the finished surface of unpaved or landscaped areas.

Stormwater Pits
Cover levels: Locate the top of covers or gratings, including frames as follows:
• In paved areas: Flush with the paving surface.
• In landscaped areas: 25 mm above finished surface.
• Gratings taking surface water runoff: Set to receive the runoff without ponding.

16.9 WASTEWATER
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

General
Standard: To AS/NZS 3500.2 or AS/NZS 3500.5.
Materials: UPVC drainage pipes, type DWV.
Waterless composting toilets: To AS/NZS 1546.2
On site domestic wastewater treatment units: To AS/NZS 1546.3.

Cleaning
During construction, use temporary covers to openings and keep the system free of debris. On completion, flush the system using water and leave it clean.

Septic tanks
Precast concrete or glass fibre reinforced plastic septic tank: To AS/NZS 1546.1.
Efluent disposal: To AS/NZS 1547 and the requirements of the Environmental Health Branch of the Department of Health and Community Services.

Vent pipes
Staying to roof: Do not penetrate the roof covering, fix the stays at roofing screws.
Terminations: Provide bird-proof vent cowls made of the same material and colour as the vent pipe.

16.10 FRESH WATER
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

Standards
General: To AS/NZS 3500.1 and AS/NZS 3500.5.
Tap positions
Locate hot tap to the left of, or above, the cold water tap.

Accessories
Provide the accessories and fittings necessary for the proper functioning of the plumbing systems, including taps, valves, outlets, pressure and temperature control devices, strainers, gauges and pumps.

Water Heaters
Electric water heaters: To AS/NZS 4692.1
Minimum energy performance: To AS/NZS 4692.2
Gas hot water heaters: To AS 4552
Oil fired heaters: To AS 1691.
Solid fuel heaters: To AS/NZS 2918.

Heater installation
Location: Locate water heaters where they can be maintained or replaced without damaging adjacent structures, fixtures or finishes.

Solar water heater
Design and construction: To AS/NZS 2712.
Use a proprietary automatic water heater comprising solar collector and storage container, with supplementary heating unit, including the connections, controls and fittings necessary for the proper functioning of the system.
Manufacturer: Solahart 302 litre with 4 m² solar collectors for houses and 180 litre with 2 m² solar collectors for units. Use D models in corrosive water areas.

Electric Water Heater
Provide and electric water heater wall mounted in the position shown on the drawings or as directed. Proprietary Item: Hardies Dux 50 litre. Model HDE50V.

Temperature
Maximum temperature at ablution outlets: 50°C.
Maximum temperature at kitchen sinks and laundry tubs: 60°C

Isolating valves
Provide isolation valves to water heaters.

Cleaning
On completion, flush the pipelines using water and leave them clean.
Rainwater Tanks
Standards
Metal tanks and rainwater goods: To AS/NZS 2179.1
Design and Installation: To the recommendations of SAA HB 230.
Polyethylene Tanks: AS/NZS 4766.

16.11 FIRE HOSE REELS
Standard: To AS/NZS 1221.
Reel Type: Reel drum mounting bracket, independent of the supply pipe.
Hose: 36 m hose with metal nozzle for jet and spray.
Installation: To AS 2441. Provide swing out arms where necessary.

16.12 GAS
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.
Standard
General: To AS 5601 and AS/NZS 1596.
Installation
Install pipework in straight lines and uniform grades. Keep the number of joints to a minimum. Prevent direct contact between incompatible metals. Conceal pipes where possible.
Accessories: Provide the accessories and fittings, necessary for the proper functioning of the gas system.
Buried pipes
Warning tape: During backfilling, lay plastic warning tape above and for the full length of buried gas pipes. Pressure test pipes to AS 5601 before any pipes are buried, concealed or built in.
Type: Minimum 100 mm wide, with “GAS PIPE UNDER” marked continuously.
Certificate of appliance - Hold Point: Submit a certificate from the manufacturer stating that the appliance meets with AGA/ALPGA approval for operation with the type of gas to be used.
Isolation Solenoid
If a Fire Indicator Panel or other fire alarm system is installed, provide a fire alarm activated isolation solenoid to the gas supply line, close to the supply point.
Gas bottles
Provide 2 x 45 kg gas cylinders with a manual change over valve. Locate where shown on the drawings or as directed on a concrete pad.
Provide a lockable ventilated enclosure if gas bottles are installed in a public location.
Appliances
Gas water heaters: To AS 4552.
Gas space heating appliances: To AS 4553.
Pressure Test
Pressure test pipes to AS 5601 before any appliances are connected and before commissioning any part of the installation.

Commissioning
On completion of installation and testing, turn on isolating and control valves and purge and charge the installation.
Compliance plate - Hold Point
Hold Point: Install a compliance plate and provide a certificate of approval prior to practical completion.

16.13 OTHER REQUIREMENTS
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

17 ELECTRICAL INSTALLATIONS

17.1 GENERAL
Cross reference
Refer to the Site preparation section for service trenches.
Standards
Design and access for mobility: To AS 1428.1.
Electrical installations generally: To AS/NZS 3000 and SAA HB 301.
Domestic electrical installations: To AS 3006.
Selection of Cables: To AS/NZS 3008.1.1
Design: To SAA HB 301
Minimum energy performance standards: To AS/NZS 4782.2 and AS/NZS 4783.2
Regulations
Comply with the following:
- PowerWater Regulations
- NTWorkSafe requirements
- OH&S Regulations
- The B.C.A.
- DCI, Safety and Technical Regulations
- The N.T. Electricity Reform Act.
Materials & Components
Luminaires: To AS/NZS 60598.1. Circuit breakers: To AS 60947.2.
Low voltage switchgear and control gear: To AS 60947.1.
Switchboards: To AS/NZS 3439.1 or AS/NZS 3439.3 as appropriate.
Domestic electricity meter enclosures: To AS 6002 and PowerWater requirements.
Cables: To AS/NZS 3008.1.1.
17.2 INSPECTION
Notice - Witness Point
Witness Point: Give sufficient notice so that inspection may be made of trench excavations and underground or concealed conduits or cables before covering.

17.3 INSTALLATION GENERALLY
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.
Wiring: Conceal cables and conduits, including underground cable or conduit entering the building, in a manner that will allow wiring replacement without structural work or the removal of cladding or lining. Do not penetrate damp-proof courses.
Fixed appliances: Provide connections with socket outlet and flush blank plate for fixed and stationary appliances.
Earth all slab fabric.

17.4 CONSUMER MAINS & METERING
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.
General: Provide a consumer main and connect to the main service.
Meter Box: Provide a metal meter box with a hinged lid and arrange for the kWh meter to be installed by PowerWater.
Standard: To AS 6002 and PowerWater requirements.

17.5 DISTRIBUTION BOARD
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.
General: Provide control switchgear, circuit breakers and residual current devices (RCD’s) on a wall mounted distribution board enclosed in a case with a hinged door.
Housing: Install a distribution board with a minimum of 4 spare poles.
Circuit Breakers: DIN rail mounted. 6kA minimum fault current rating. Size circuit breakers to the calculated fault current at the site. Provide combined circuit breakers and residual current devices on each circuit requiring RCD protection.
Leave documents and instructions on how to use the RCD’s with the Superintendent or in the building for use by the building occupiers.

17.6 ACCESSORIES
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.
Socket outlets and light switches
Proprietary Item: Use Clipsal 2000 series or HPM Excel. For Public Housing or institutional buildings use single piece face plates and positively locked switches.
Mounting heights
Light Switches and Fan Controllers: Generally 1000 above finished floor level (AFL). Socket Outlets: Generally 300 AFL or 200 above bench surface.

Ceiling Fans
Mounting Height: 2300 mm minimum.
Fixing: fix to 75 x 50 hardwood trimmers securely fixed between truss bottom chords. On sloping ceilings provide a hardwood mounting block to give a horizontal fixing.
Controls: 5 speed or electronic generally mounted adjacent to light switches and in view of the fan.

Smoke detection
Provide smoke detectors to the requirements of the BCA.
Standard: To AS 3786.
Power: Connect to the nearest light circuit or where the number of detectors is 4 or more connect to a dedicated final subcircuit.
Connection: Inter connect detectors so as to raise the alarm in all areas in the event of one detector being activated.
Installation: To AS 1670.6.

Emergency lighting
Provide emergency lighting and exit signs in accordance with the BCA and to AS 2293.1.

Intruder Alarm System
Provide an intruder alarm system.
Standard: To AS/NZS 2201.1.

17.7 APPLIANCES
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.
Wiring: For permanently connected appliances, including appliances the provision of which is specified in other Sections, provide a standard wall box, if required, or a wall bracket in stud framed structures, with either a flush blank plate or isolating switch, angle take off terminator, and approximately 900 mm of flexible PVC conduit terminated at the appliance and supported in accessible locations.

17.8 TELECOMMUNICATIONS CABLELING
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.
Pre Wiring: Have pre-wiring of telephone, data, TV and telecommunications services carried out before the installation of linings, paving and landscaping.
General
Provide a complete operational telecommunications cabling system, tested and commissioned in conformance with AS/NZS 3080, AS/ACIF S009, SAA HB 29 and as appropriate SAA HB 252 and the NBN Co. Limited - Installation Pit and Conduit Infrastructure-Guidelines for Developers
Comply, also, with the requirements of NT Government ICT Standard "Data and Voice Cabling - Specifications and Guidelines"
SYSTEM DESCRIPTION

Accommodation
Provide accommodation for telecommunications cabling infrastructure in conformance with AS/NZS 3084 including the detailed requirements of Appendix ZA, ZB and ZC. Include the following as documented:
- Building distributor.
- Backbone cabling.
- Floor distributors.
- Consolidation points.
- Horizontal cabling.
- Telecommunications outlets.
- Fly leads.

System Performance
Application class to AS/NZS 3080 clause 6.3: E for Cat 6A and FA for Cat 7
- Balanced system to AS/NZS 3080 clause 7 (data): Category 6A and Category 7
- Balanced system to AS/NZS 3080 clause 7 (voice): Category 6A and Category 7
Conformance: Certify the design and installation for conformance with AS/NZS 3080 in conformance with the detailed requirements of clause 4.
System warranty: Warrant the specified communications cabling performance for a minimum of 15 years.

DISTRIBUTORS

Equipment Racks
Type: 19 inch rack.
Free standing racks: Provide adjustable feet.

Cross Connect Patch Panels
Terminations: Terminate directly to the modular connector.
Patch cords: Terminate cord ends with appropriate registered jacks.

Optical Fibre Termination Panels
Break out trays: Provide fibre optic cable break out trays at each group of fibre optic cable terminations.
Loom cables: Neatly loom cables and lay stripped cables into the break out tray.
Secure cables: Make sure that cables are secured by the sheath and that there is no stress on the fibre optic cores.

TELECOMMUNICATIONS OUTLETS

Outlets: Provide RJ45 8 way modular jacks except where documented otherwise.
Pinouts: The pinouts vary with the application. Determine required pinouts before making cable terminations.

CABLES

Installation
Crossover: Install cables neatly and without crossovers between cables.
Loom size: Loom cables into groups not exceeding 50 cables, and hold looms in place using re-usable cable ties at least 20 mm wide. Do not exert compressive force on the cables when installing cable straps.

Cable Separation
Low voltage cables: Separate telecommunications cables not enclosed in conduits or ducts from low voltage services by at least 150 mm.
Electromagnetic interference (EMI): Provide clearance to minimise the effect of EMI where communications cables are installed parallel and adjacent to power cables carrying loads in excess of 200 A.

Fly Leads
Quantity: Provide fly leads to 50% of the outlets installed.

Patch Cords
Provide terminated patch cords for 100% of the total incoming and outgoing ports used.

EARTHING SYSTEM

Communications System earth
Communication earth system (CES): Provide a communications earth terminal (CET) adjacent to each electrical switchboard. Connect the CET to the local protective earth (PE) system at the switchboard.

CABLE MANAGEMENT

Record book: Provide a record book at each cross connect.
Records in pencil: Complete the records in pencil for each termination and jumper, providing origin and destination and type of service.
Location: Secure log books in each distribution frame records holder.
Identification and labelling, and record documentation: To AS/NZS 3085.1.

TELEPHONES IN BUILDINGS

Wire and terminate telephone outlet to a Telstra lead in box on external wall and provide a conduit and draw wire to the property boundary. Liaise with the service provider for location of termination box. Arrange with the service provider for the installation of the incoming service line, cabling etc., as supplied by the service provider.
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document for requirements for connection to Telstra network.

17.9 TELEVISION

Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.
Provide an analogue and digital television distribution system to AS/NZS 1367 and conforming to the recommendations of Digital Broadcasting Australia.
Antennas: Provide and locate antennas to receive all locally available free-to-air television stations suitable for satellite or cable network operators’ services. Provide a coaxial cabling system. Conduits for future cabling: > 25 mm diameter with drawstrings.
Outlets: Connect the TV antennae to outlet plates where shown on the drawings.
Testing - Witness Point
Witness Point: Test the complete television and audio system and provide the superintendent with a certificate showing test results and certifying compliance.

17.10 COMMISSIONING
Requirement: On completion clean faceplates, luminaire reflectors and diffusers, and the like, replace faulty lamps, reinstate ground surfaces and finishes disturbed by trenching, and hand over the completed installation in working order.
Testing: Carry out mandatory inspection and testing in accordance with AS/NZS 3000, Section 8.
Contractor’s Submissions: Prior to practical completion submit a copy of the test results and the Electrical Certificate of Compliance to the Superintendent.

17.11 OTHER REQUIREMENTS
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

18 MECHANICAL INSTALLATIONS

18.1 GENERAL
Cross references
Refer to the following sections:
- General requirements: for compliance with manufacturers’ instructions.
- Electrical installations: For electrical requirements.

Standards
Non ducted air conditioners: To AS/NZS 3823.1.1.
Ducted air conditioners: To AS/NZS 3823.1.2.
Evaporative air coolers: To AS 2913.

18.2 AIR CONDITIONERS
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

Efficiency Rating: Minimum 4 Star Rating.

Split Systems - Installation
Split system air conditioners of less than 18kW capacity.
Refrigerant Lines: Use refrigeration grade copper tube and install with low rated K value closed cell insulation, glued and taped to maintain a vapour barrier and sealed at both ends. Where pipes run through ceiling or wall cavities, insulate with a minimum of 19mm Bradflex. Support pipe runs to minimize the compression of insulation.
Refrigerant Type: Use R410A or R407C. Do not use R22 which is being phased out for new equipment.
Leakage Testing: Comply with AS/NZS 1677.2 and the recommendations of SAA HB 40.1 and SAA HB 40.2
Dryness testing: Test each refrigerant system for dryness by evacuating the whole system when the ambient temperature is over 16°C to maximum 25 Pa absolute pressure and measuring the pressure rise with the vacuum pump isolated from the system. Maximum allowable absolute pressure rise after minimum 4 hours is 15 Pa.

Room Air Conditioners
Installation: Seal and weatherproof window and wall apertures.

18.3 INSTALLATION GENERALLY
Location: Locate units where shown on the drawings or as directed by the Superintendent.
Generally install condensing units on concrete plinths at ground level or mount on concrete block walls. Position condensing units so as not to cause an obstruction or hazard. Do not mount on roofs or bracket off framed walls without prior approval.
Installation: Bolt units down to manufacturer’s recommendations using anti vibration mounts.
Mount units in such a way as to prevent vibration and reduce operational noise to an acceptable dB level. Install refrigeration piping and electrical wiring neatly.
Clearance: Provide minimum recommended clearance around units for correct condenser air flow and maintenance requirements.
Insulation: Protect pipework insulation against ultra-violet light and mechanical damage by fitting folded Colorbond metal or proprietary uPVC covers.
Cyclone Fixings: Fix all external plant to resist cyclonic winds in accordance with the N.T. Building Act.
Electrical: Hardwire split systems from isolating switches adjacent to the outdoor units, with control wiring to the indoor units. Connect RACs to adjacent power outlet with a three pin plug and flexible cord.

18.4 CONDENSATE DRAINS
Install condensate drains in accordance with the N.T. Plumbing code, AS/NZS 1477, AS 2032 and AS/NZS 3666.1. Minimum size: 20 mm or increase to the size of the unit discharge line. Where more than one unit is connected to a common drain, increase the drain size to meet the capacity. Connect to the nearest floor waste, stormwater drain or to a soaker drain.
Insulate drains within the building envelope to eliminate sweating.
Provide an air break and tundish on condensate lines close to the connection to the soaker drain or stormwater line.

Soakage Pit: 50 Dia uPVC pipe 2 m long with 2 m of slotted uPVC pipe at end graded away from building in 600 deep trench. Surround slotted pipe with 100 mm cover of 13 mm aggregate.

Drawing: Refer to detail 2 on standard housing drawing B08 - 7278.

18.5 FRESH AIR
Provide fresh air supply through the air conditioning unit to air conditioned spaces in accordance with AS 1668.2.

18.6 DUCTWORK
Standard: To AS 4254.
Requirement: Provide ductwork for fresh air supply or exhaust air as required. Fan coil units are considered to be part of the ductwork and must comply with AS 4254.

Provide suitable grilles at intakes and outlets.
Filters: Provide filters for fresh air supply to AS 1324.1 G2, Type 1, Class A.
Circular Flexible Ductwork
Fabrication: To AS 4254 clause 2.8 using reinforced foil laminate to fire rating 4.0.0.0.
Installation: Fix without restriction to airflow using straps to prevent sagging.

18.7 FANS
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

General
Provide fans which have quiet operation with acceptable dB levels, deliver the required air quantity against the resistance of the system as installed and have maximum static efficiency at the required duty.
Installation: Install fans so as to isolate vibration and to allow access for maintenance.

18.8 COMMISSIONING
Test, commission and maintain the specified mechanical services, including all inferred and obvious work required to complete the works.

18.9 CORRECTIVE MAINTENANCE
Commence any corrective maintenance within 4 hours of verbal advice from the Superintendent during the defects liability period. Report on the progress and advise the Superintendent if any delays are foreseen.

18.10 SERVICING
During the defects liability period, provide servicing to mechanical units in accordance with the manufacturer’s instructions.

18.11 OTHER REQUIREMENTS
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

19 FENCES

19.1 GENERAL
Cross reference
Refer to the following sections:
• BLOCK CONSTRUCTION for block fences and walls.
• PAVING for Log Barriers.

19.2 MATERIALS AND COMPONENTS
Galvanizing
Galvanize mild steel components as follows:
• Threaded fasteners: To AS 1214.
• Other components: To AS/NZS 4680.
Steel Tubes
Standard: To AS/NZS 1163 grade C350LO or to AS 1074.

Wire
Chainwire, cablewire, tiewire or barbed wire: To AS 2423.
Concrete
Standard: To AS 1379 Grade N25.
Metal Components
Self-drilling screws: To AS 3566 corrosion resistance class 3.
Steel framing: Zinc-coated or aluminium/zinc alloy coated steel to AS 1397/Z450 or AZ150.
Steel sheeting: Prepainted to AS/NZS 2728.

19.3 CONSTRUCTION GENERALLY
Clearing
Clear vegetation, except for trees and shrubs to be retained, within 1 m 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.

Boundaries
Confirm property boundaries by survey before commencement of works.

Setout
Setout the fence lines and mark the positions of gates, posts and bracing panels.

Excavation
Excavate footings so that they have vertical sides and a firm base.
Minimum footing size
Refer to the standard drawing for the required fence.

Line and level
Erect posts vertically. Set heights to follow the contours of the natural ground.

Earth footings
Place 100 mm of gravel in the footing base and backfill with earth around posts, compacting firmly by hand or machine in 150 mm layers.

Concrete footings
Place mass concrete around posts and finish with a weathering top falling 25 mm from the post to ground level.

Steel panel fencing
Ensure bottom rails have drain holes and are at least 50 mm clear of the ground or mowing strip.

Mowing strips
Where required provide a 200 mm wide x 75 mm deep concrete mowing strip under the centreline of the fence to finish 20 mm above finished ground level.

Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

19.4 GATES
General
Construction: Construct gates to match the fencing and in the locations shown on drawings or as directed.

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: select to ensure smooth operation and to facilitate adjustment to correct future sagging.

Hand access: Provide openings to give access from outside to reach locking provision.

19.5 FENCE TYPES
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

Domestic fences
Street Frontage: 760 mm high galvanized posts and rails with chainwire in accordance with standard drawing CS 1304-2.
Other Boundaries: 760 mm high galvanized posts and pigwire in accordance with standard drawing CS 1304-2.

Security fences
1830 mm high chainwire supported on 4 mm galvanized wire cables and posts, complete with offset 3 strand barbed wire at the top constructed and installed in accordance with standard drawing CS 1303-1.

Remote Community Fences
1500 mm high chainwire with knuckled selvedges supported on 3 strands of 2 x 4 mm galvanized twisted wire and galvanized steel posts set in concrete footings in accordance with standard drawing B93-1168-D.

Swimming pool fences
Standard panels of 16 dia tube roll top fencing 2400 long x 1250 high welded to 32 x 32 x 1.6 rails and fixed with proprietary fittings to 65 x 65 x 2.5 mm SHS posts, including caps. Gate posts 76 x 76 x 3.2 mm SHS.

Concrete Footings: 250 dia x 600 deep for posts and 300 dia x 700 deep for gateposts.

Finish: Hot dipped galvanized and powder coated. Fit proprietary hinges and safety latches etc. Proprietary Item: Magnalatch.

Horizontal sheet metal fences
Hot dipped galvanized 65 x 65 x 3 SHS posts with caps at 2400 centres set in 225 dia x 900 deep concrete footings with 0.42 mm BMT Colorbond Trimdek in long lengths, valley fixed horizontally to finish 1600 above ground level in accordance with standard drawing B93-1168-D.

Vertical sheet metal fences
Hot dipped galvanized 76 x 76 x 3.2 SHS posts, 1500 high with caps, at 2400 crs set in 250 dia x 600 mm deep concrete footings with 64 x 38 x 3.2 mm RHS horizontal rails clad with 0.42 mm BMT Colorbond Trimdek valley fixed vertically to finish 1650 above ground level.

Refer to the Northern Territory Deemed to Comply Manual, Drawing # S8.

19.6 OTHER REQUIREMENTS
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

20 PAVING

20.1 GENERAL
Cross reference
Refer to the Site Preparation section for fill types.

Footpath crossing
Provide a footpath and kerb crossing to local council requirements.

20.2 MATERIALS AND COMPONENTS
Mortar materials
Sand: Use a fine aggregate with a low clay content selected for grading.
Cement: To AS 3972, type GP.
Mortar
Mix proportions: 1:3 cement: sand.

20.3 CONSTRUCTION GENERALLY
Grading
General: Grade paving to even falls to drain away from buildings to drainage outlets without ponding. Minimum fall for drainage: 1:100.

20.4 BASE COURSE
Preparation
Prepare the subgrade to suit the thickness of the base course and paving. If necessary, loosen the ground to a depth of 200 mm and adjust the moisture content before compaction. Compact the ground to a firm even surface using at least 2 passes of a vibrating plate compactor or roller. Remove and replace soft areas with suitable fill.

Base course material
Provide well-graded crushed rock or gravel, free of deleterious material, with a maximum particle size of 26.5 mm, uniformly graded and with a maximum clay content of 6% by mass.

Placing
Spread and compact the base course to a firm, tight, close textured surface using at least 3 passes of a vibrating plate compactor or roller. Adjust the moisture content as needed to facilitate compaction.

Base course minimum thickness table
Comply with the following minimum thicknesses:

<table>
<thead>
<tr>
<th></th>
<th>Unit paving</th>
<th>Bituminous paving</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS2870 Site Class</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foot &amp; bicycle traffic</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Light domestic traffic</td>
<td>75 mm</td>
<td>100 mm</td>
</tr>
</tbody>
</table>

For other conditions – to engineer’s specifications.

20.5 ASPHALT PAVING
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

Hotmix paving
Standard: Place and compact asphaltic concrete paving over the prepared base course to AS 2150. Mix designation: AC7.
Bitumen binder: Class 320 bitumen.
Minimum thickness: 25 mm.
Tack coating: Bituminous emulsion spray to AS 2150.

20.6 SPRAY SEALING
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

Preparation
Prepare the surface as per the Gravel Driveways clause.
Priming: Prime the surface with cutback bitumen to AMC 00 at the rate of 1 litre per m².

Sealing
Apply the bitumen seal at the rate of 2.5 litres per m².
Mix Designation: S10E.
Aggregate: Apply 14 mm aggregate and roll into the surface.

Completion
Broom off the excess aggregate and remove from site.

20.7 UNIT PAVING
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.
Masonry segmental pavers:
General: Provide paving units of clay, natural stone or concrete masonry, purpose-made for use as paving, or units made for bonded masonry construction but suitable for paving.
Standard: To AS/NZS 4455.1 and AS/NZS 4455.2.
Minimum thickness:
- Foot and bicycle traffic: 40 mm.
- Light domestic traffic occasionally up to 3 tonne gross: 60 mm.

Cutting units: Cut paving units to maintain sharp edges and accurate joints and margins.
Pattern: As shown on the drawings, otherwise stretcher bond.

Laying unit paving
General: Over the base course, lay the units on bedding sand screeded to a uniform thickness not exceeding 50 mm, and to the required falls and levels. Do not disturb the screeded sand bedding before the units are laid. Provide a gap of 2 to 5 mm wide between adjoining units. After laying, tamp the units using a vibrating plate compactor. Cut courses: 50 mm minimum plan dimension. On footpaths and other linear elements, use at least 2 cut courses and maintain symmetry.

Compaction: Compact the sand bedding after laying paving units using a vibrating plate compactor and appropriate hand methods. Continue until lipping between adjoining units is eliminated.
Joint 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.

Edge restraint
Provide concrete fillet edge restraint to bedding and units where not provided by other structures.

20.8 IN SITU CONCRETE PAVING
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.
Concrete
Standard: To AS 1379 grade N25.
Minimum thickness
Foot and bicycle traffic and light domestic traffic occasionally up to 3 tonne gross: 100 mm. Reinforcing Mesh: SL62 placed centrally.

Preparation
Trim the ground to suit the required thickness of concrete and compact to a firm, even surface.

Control joints
Form tooled joints at maximum 2 m spacing for concrete paths.

Expansion joints
Cast-in 10 mm thick Abelflex closed cell compressible filler strip at maximum 6 m spacing.

Abutment with building
If concrete paving more than 1.5m wide abuts the wall of a building, provide a strip of 10 mm thick Abelflex closed cell compressible filler strip between the paving and the wall.

Broom finish
Wood float and broom to an even textured slip-resistant surface with steel tooled margins. On gradients steeper than 10%, roughen the surface by scoring.

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

Sponge finish
After screeding and finishing with a steel trowel obtain an even textured sand finish by wiping the surface using a damp sponge.

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

20.9 GRAVEL DRIVEWAYS
Location: Hardstand, driveways and paths as shown on the drawings.
Material: Approved road gravel - Type 3.
Thickness: Minimum 100 mm after compaction.
Falls: Minimum 1:100.
Compaction: Compact and Proof Roll to achieve a dry density ratio of 95% MMDD when tested to AS 1289 5.4.1.

20.10 LOG BARRIERS
Provide log barrier bollards or fencing consisting of timber posts and rails complete with connections. Construct as shown in the standard drawing C(S) 1302.1.
For bollards turn the tops to a hemispherical shape.
Use pine timber, pressure impregnated with ACQ preservative formulation, copper oxide (CuO) and quaternary ammonium compound (DDAC) to Category H4 of AS 1604.
Do not use preservative treatments that contain arsenic or chromium.

20.11 OTHER REQUIREMENTS
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

21 LANDSCAPE

21.1 GENERAL
Cross reference
Refer to the GENERAL REQUIREMENTS section for timber durability classes appropriate for various applications.

21.2 MATERIALS AND COMPONENTS
Concrete
Standard: To AS 1379.
Topsoil
Standard: To AS 4419.

21.3 PREPARATION
Weed eradication
Eradicate weeds using a non-residual glyphosate herbicide in any registered formulae, at the recommended maximum rate.

Surplus spoil
Remove surplus spoil from site. Do not burn vegetative material.

21.4 INSPECTION
Notice - Witness Point
Witness Point: Give sufficient notice so that inspection may be made of the planting and garden edging setout prior to excavation and advanced tree and palm holes excavated.

21.5 SAMPLES
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

Requirement - Hold Point
Hold Point: Provide the following samples for approval:
• 5 kg bag of topsoil and test documentation.
• 5 kg bag of mulch.

21.6 SUBSOIL
Ripping
General: If practicable rip parallel to the final contours. Do not rip when the subsoil is wet or
plastic. Do not rip within the dripline of trees to be retained.

Ripping depths: Rip the subsoil to the following typical depths:
- Compacted subsoil: 300 mm.
- Heavily compacted clay subsoil: 450 mm.

Cultivation
Cultivate to a minimum depth of 100 mm. Do not disturb services or tree roots; if necessary, cultivate these areas by hand. During cultivation, thoroughly mix in materials required to be incorporated into the subsoil. Remove stones exceeding 25 mm, clods of earth exceeding 50 mm, and weeds, rubbish or other deleterious material brought to the surface during cultivation. Trim the surface to the required design levels after cultivation.

Additives
General: Apply additives after ripping or cultivation and incorporate into the upper 100 mm layer of the subsoil.
Gypsum: Incorporate at the rate of 0.25 kg/m².

21.7 TOPSOIL
General
Provide sand based topsoil which is free from unwanted matter and complying with AS 4419. Add 6 kg/m³ of “Terra Firma Organic Life” and thoroughly combine.

Source
Obtain topsoil from an approved source and keep records of soil delivery.

Placing topsoil
Spread the topsoil on the prepared subsoil and grade evenly, making the necessary allowances so that required finished levels and contours are achieved after light compaction; and grassed areas may be finished 20 mm below adjacent hard surfaces such as kerbs, paths and mowing strips.

Consolidation
Compact lightly and uniformly in 150 mm layers. Avoid differential subsidence and excess compaction and produce a finished topsoil surface which is finished to design levels; smooth and free from stones or lumps of soil; graded to drain freely, without ponding, to catchment points; graded evenly into adjoining ground surfaces; and ready for planting.

Topsoil depths
Spread topsoil to the following typical depths:
- Planting areas: 250 mm.
- Irrigated grassed areas generally: 150 mm.
- Grass areas: 100 mm.

21.8 TURFING
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

Turf
Obtain turf from a specialist grower of cultivated turf. Provide turf of even thickness, free from weeds and other foreign matter.

Supply
Deliver the turf within 24 hours of cutting, and lay it within 36 hours of cutting. Prevent it from drying out between cutting and laying.

Fertilising
Mix fertiliser thoroughly into the topsoil before placing the turf.

Laying
Lay turf as follows:
- In “stretcher” pattern with the joints staggered and close butted;
- Parallel with the long sides of level areas, and with contours on slopes and;
- To finish flush, after tamping, with adjacent finished surfaces of ground, paving edging, or grass seeded areas.

Tamping
Lightly tamp to an even surface immediately after laying. Do not use a roller.

Watering
Water immediately after laying until the topsoil is moistened to its full depth.

21.9 GRASS SEEDING
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

Seed
Use seed mixtures which are thoroughly pre-mixed with a bulking material such as safflower meal. Deliver to the site in bags marked to show weight, seed species and supplier’s name. Use fresh, clean new seed. Do not use wet, mouldy, or otherwise impaired seed.

Preparation
Prepare the areas to be sown. Spread the fertiliser evenly over the cultivated bed not more than 48 hours before sowing, and rake lightly into the surface. If a prepared area becomes compacted from any cause before sowing can begin, rework the ground surface before sowing.

Sowing
Sow the seed only in favourable conditions and using a suitable mechanical spreader. Roll the seed bed immediately after sowing.

Watering
Water the seeded area with a fine spray until the topsoil is moistened to its full depth. Continue watering until germination to keep the surface damp and the topsoil moist but not waterlogged. After germination: Water to maintain a healthy condition, progressively hardened off to the natural climatic conditions. Remove weeds that occur in sown areas.

Germination
A dense continuous sward of healthy grass over the whole of the seeded area. Reseed areas that do not germinate within 1 month.
21.10 SPRAYGRASS (HYDROSEEDING)
Preparation
Cultivate in situ soil to a minimum of 100mm and bring existing soil to a fine tilth 50mm below finished levels. Remove all deleterious material. Add “Tropigro-Clay-Breaker” to manufacturers’ specifications. Spread 50mm topsoil and incorporate additional “Terra Firma Organic Life” at 6kg/m3.

Application
Apply seed at 10g/m2 using:
- 30% Cynodon dactylon
- 35% Paspalum notatum pensicola
- 35% Paspalum notatum argentina

Apply to the area to be seeded a thoroughly mixed slurry of seed, fertiliser, vegetative emulsion, mulch and water, free of weed, seed or germination inhibitors, using a purpose made mechanical mixer and high pressure pumping equipment. Use local applicators experienced in this work and using approved methods.

21.11 MOWING
Mow to maintain the grass height within the required range of 40 to 80 mm. Carry out the last mowing not more than seven days before the end of the planting establishment period. Remove grass clippings from the site after each mowing.

21.12 PLANTING
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

Excavation
Excavate plant holes a minimum of twice the size of the volume of the specified pot size.

Plants
General: Provide plants with the following characteristics:
- Large healthy root systems, with no evidence of root curl, restriction or damage;
- Vigorous, well established, free from disease and pests, of good form consistent with the species or variety and;
- Hardened off, not soft or forced, and suitable for planting in the natural climatic conditions prevailing at the site.

Trees: Provide trees which, unless required to be multi-stemmed, have a single leading shoot.

Labelling
Label at least one plant of each species or variety in a batch using a durable, readable tag.

Planting conditions
Carry out planting on the same day that plants are delivered to the site. Do not plant in unsuitable weather conditions such as extreme heat, cold, wind or rain. In other than sandy soils, suspend excavation when the soil is wet, or during frost periods.

Backfilling
Backfill planting holes with imported blended topsoil.
Watering
Thoroughly water plants before planting and immediately after planting.
Fertiliser
Provide proprietary materials, delivered to site in sealed bags marked to show manufacturer or vendor, weight, fertiliser type, N:P:K ratio, recommended uses and application rates.

<table>
<thead>
<tr>
<th>Location</th>
<th>N:P:K ratio</th>
<th>Application rate</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grassed areas</td>
<td>15.9 : 7 : 7</td>
<td>7.5kg per 100 m²</td>
<td>Mastergreen</td>
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<tr>
<td>All planted trees</td>
<td>20 : 4.3 : 4.1</td>
<td>Manufacturer’s recommendation – spaced equally around root ball</td>
<td>Agriform Planting Tablets</td>
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<tr>
<td>All planted trees</td>
<td>12.5 : 3.3 : 6.5</td>
<td>Manufacturer’s recommendation – under mulch</td>
<td>Agriform Planting and Feeding Mix</td>
</tr>
<tr>
<td>Ground cover &amp; shrubs</td>
<td>15 : 4 : 9</td>
<td>100 gm per m²</td>
<td>Osmocote Exact 8-9 months</td>
</tr>
<tr>
<td>All planted trees &amp; palms</td>
<td>-</td>
<td>300 gm in base of each hole</td>
<td>Tropigro 10-88</td>
</tr>
</tbody>
</table>

For grassed areas: Fertilizer during establishment period

<table>
<thead>
<tr>
<th>Time</th>
<th>N:P:K ratio</th>
<th>Application rate</th>
<th>Product (or equiv.)</th>
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<tbody>
<tr>
<td>November *</td>
<td>10.3:9.7:11(s)</td>
<td>7.5 kg per 100 m²</td>
<td>Tropigro 10-97</td>
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<tr>
<td>March *</td>
<td>38% N</td>
<td>1 kg per 100 m²</td>
<td>Osmoform 38N</td>
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</table>

* Or when directed.

For planting:
Week 10 of the establishment period

<table>
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<th>Location</th>
<th>N:P:K ratio</th>
<th>Application rate</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>All planted trees</td>
<td>12.5:3.3:6.5</td>
<td>Manufacturer’s recommendation – under mulch</td>
<td>Agriform Planting and Feeding Mix</td>
</tr>
<tr>
<td>All planted trees</td>
<td>-</td>
<td>Manufacturer’s recommendation – under mulch</td>
<td>Tropigro 10-88</td>
</tr>
<tr>
<td>Ground cover &amp; shrubs</td>
<td>13:5.6:10.8</td>
<td>100 gm per m²</td>
<td>Agriform Planting and Feeding Mix</td>
</tr>
<tr>
<td>Ground cover &amp; shrubs</td>
<td>-</td>
<td>100 gm per m²</td>
<td>Tropigro 10-88</td>
</tr>
</tbody>
</table>
### 21.13 MULCHING
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

**Mulch**
General: Provide mulch which is free of deleterious and extraneous matter such as stones, soil, weeds and sticks.
Application: Place mulch clear of plant stems, and rake to an even surface flush with the surrounding finished levels.
Depth: 75 mm.

**Mulch Types**
- **Hay**: Cut from seasonal grasses and free from noxious weeds etc.
- **Laterite gravel**: Uniform colour and size or graded from 5 to 25 mm.
- **Brush Chippings**: Approved “Forest Blend” vegetative material processed to pieces not larger than 75 x 50 x 15 mm and aged from 6 to 12 weeks.
- **Washed River Pebble**: Uniform size or graded from 10 to 25 mm.

### 21.14 STAKES AND TIES

#### Stakes
Material: Hardwood, straight, free from knots or twists, pointed at one end.
Installation: Drive stakes into the ground at least one third of their length, avoiding damage to the root system. Remove those no longer required at the end of the establishment period.

**Stake sizes:**
- For plants 1 to 2.5 m high: Two 50 x 50 x 1800 mm stakes per plant.
- For plants smaller than 1 m high: One 38 x 38 x 1200 mm stake per plant.

#### Ties
General: Provide ties fixed securely to the stakes, one tie at half the height of the main stem, others as necessary to stabilise the plant. Attach ties loosely. Webbing: Provide 50 mm hessian webbing stapled to the stake.

### 21.15 GARDEN EDGING
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

**Spade Edging**
Location: To edges between garden beds and around tree planting in areas of lawn.
Requirement: Form a spade cut edge to a minimum depth of 150 mm below the adjacent surface levels. Align adjacent spade cuts to achieve smooth curves and/or straight lines as required. Remove all grass or weeds from the spade cut and maintain the edge free from grass and weed growth.

**Concrete Edging**
Location: To garden edges against lawns and areas not planted.
Edging Strip: N20 in situ concrete 175 mm wide x 90 mm high. Place in position on a cleared compacted base with a forming machine to the layout shown on the drawings or as directed. Finish with a profiled steel trowel and tool in control joints at a maximum 2.5 m centres.
Profile: Rounded or splayed top.

### 21.16 IRRIGATION
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

**Standard**: To AS/NZS 3500.1.

**Cross references**
Refer to the following section:
- **Site preparation**: for excavating trenches.

**Inspection - Witness Point**
Witness Point: Give sufficient notice so that inspection may be made of work ready for testing.

**Hydrostatic tests - Hold Point**
Hold Point: Fill the pipework with water and test at the required pressure and duration.

**Contractors design plans - Hold Point**
Hold Point: Submit drawings indicating design proposals showing all pipework, sprinklers, tanks, valves and control systems for approval.

**Work-as-executed drawings**
Submit drawings showing the “as installed” locations of all pipework, fittings, sprinklers, control valves and accessories. Show the depth of underground pipework. Show location of all controllers and automatic control wiring, indicate colours used for individual valves.

**Connection**
Connect the cold water supply system to the supply authority’s main through a stop valve and meter. Carry out the excavation necessary to locate and expose the connection point. On completion reinstate surfaces and elements which have been disturbed such as roads, pavements, kerbs, footpaths and nature strips.

**Excavation and installation**
Requirement: Excavate to the lines, levels and grades as required for irrigation trenches. Trench depths and widths as required by AS/NZS 3500.1.
Obstructions: Cut back roots encountered in trenches to not less than 600 mm clear of the pipework. Remove such other obstructions including stumps, boulders and the like which may, in the opinion of the Superintendent, interfere with the pipework.

Installation
Generally: Install pipework in straight lines and uniform grades. Provide unions, flanges and isolating valves for the satisfactory removal of piping and fittings for maintenance or replacement of plant. Arrange and support pipework so that it remains free from vibration whilst permitting necessary movements such as thermal expansion and contraction. Minimize the number of joints.

Accessibility
Location: Locate fittings requiring maintenance or servicing, including control valves, joints designed to enable removal of pipes, and the like, in accessible positions, with adequate clearance. Arrange the pipework so that it does not interfere with the removal or servicing of associated equipment or valves.

Description of irrigation system
Use a fixed location type with automatically or manually operated sprinklers, sprays, microsprays and drippers.

Performance of irrigation system
Coverage (mm of water over area to be watered): 50 to 60mm per week during the establishment period and then progressively hardening off to local conditions. Ensure that water usage is such that plant health and vigour is maintained without wastage of water.

Backflow
Fit a backflow prevention device to AS/NZS 3500.1 and as required to meet the approval of PowerWater Corp.

Automatic controls
Use electric solenoid valves wired to an irrigation controller. Irrigation controller: Mount the controller in a weatherproof lockable cabinet. Include the following features:
- Variable timer for each station with a range from 1 minute to not less than 30 minutes.
- Manual cycle and individual station operation.
- Manual on-off operation of irrigation without loss of program.
- 240 V input and 24 V output capable of operating 2 control valves simultaneously.
- 24 hour battery program backup.

Micro irrigation system
Polyethylene irrigation pipe: To AS 2698.2 with barbed fittings of similar pressure rating fastened with ratchet type clamps. Lay pipe on finished ground surface under planting bed mulch and anchor at minimum 1.5 m intervals with U-shaped stakes. Connect micro-tube laterals with proprietary push in or screw in fittings.

Microsprays: Mount microsprays on stakes 300 mm above ground and connect to the pipework with microtubes.

Drippers: Use drippers which are turbulent flow types, easily dismantled for cleaning. Connect directly into the pipework or with microtubes.

Micro irrigation valve box: Use micro irrigation valve boxes which are of high impact plastic with snap lock covers at finished ground level, each housing a stop cock, filter (200 mm for microsprays, 100 mm for drippers), pressure reducing valve (170 kPa outlet pressure) and automatic control valve. Use vandal resistant controls in public areas.

<table>
<thead>
<tr>
<th>Location</th>
<th>Item</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>As shown on drawings</td>
<td>External hose cocks</td>
<td>To AS/NZS 3500</td>
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<tr>
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<td>Size</td>
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<tr>
<td>As on approved design plan</td>
<td>Sprinkler</td>
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<tr>
<td>As on approved design plan</td>
<td>Automatic valve</td>
<td>Solenoid operated</td>
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<tr>
<td></td>
<td>Size</td>
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<td>As shown on drawings</td>
<td>Quick Coupling valve</td>
<td>Polypropylene</td>
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<td>Size</td>
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<td>As required to achieve uniform coverage</td>
<td>Micro-sprays</td>
<td>No moving parts</td>
</tr>
<tr>
<td>At each plant</td>
<td>Drippers</td>
<td>Turbulent flow</td>
</tr>
<tr>
<td>At each plant</td>
<td>Bubblers</td>
<td>Adjustable from 0 to 10 litres per minute</td>
</tr>
</tbody>
</table>

Materials:
Pipework upstream of control valves: Use uPVC class 12.
Pipework downstream of control valves: Use uPVC class 9 or 25 mm diameter polyethylene.

21.17 COMPLETION
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.

Maintenance Manual
Provide a maintenance manual which includes notes and specifications of all landscape and irrigation work and recommendations for ongoing maintenance work.

Plant Establishment
Maintain the planted areas for a minimum of 13 weeks from the time of practical completion. Replace damaged, stolen or vandalised stock as required. For all other work including irrigation and hardworks, the contractual defects liability period applies.

21.18 OTHER REQUIREMENTS
Refer to PROJECT SPECIFIC REQUIREMENTS section of Request for Tender document.
<table>
<thead>
<tr>
<th>AS/Standard</th>
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<tr>
<td>AS 1074</td>
<td>1989</td>
<td>Steel tubes &amp; tubulars for ordinary services</td>
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<td>AS 1111.1</td>
<td>2000</td>
<td>ISO metric hexagon bolts &amp; screws – Product Grade C – Bolts</td>
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<td>AS 1163</td>
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<td>- General principles.</td>
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<td>2002</td>
<td>- Wind actions</td>
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<td>AS 1214</td>
<td>1983</td>
<td>Hot-dip galvanized coatings on threaded fasteners (ISO metric coarse thread series)</td>
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<td>AS/NZS 1221</td>
<td>1997</td>
<td>Fire hose reels</td>
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<td>AS 1231</td>
<td>2000</td>
<td>Aluminium and aluminium alloys - Anodic oxidation coatings</td>
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<td>AS 1288</td>
<td>2006</td>
<td>Glass in buildings - Selection and installation</td>
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<tr>
<td>AS 1289.5</td>
<td>-</td>
<td>Methods of testing soils for engineering purposes - Soil compaction &amp; density tests</td>
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<td>AS 1289.5.1.1</td>
<td>2003</td>
<td>- Determination of the dry density/moisture content relation of a soil using standard compaction effort.</td>
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<td>AS 1289.5.4.1</td>
<td>2007</td>
<td>- Compaction control test – Dry density ratio, moisture variation and moisture ratio</td>
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<tr>
<td>AS 1324.1</td>
<td>2001</td>
<td>Air filters for use in general ventilation and air conditioning - Application, performance and construction</td>
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<td>AS/NZS 1328.1</td>
<td>1998</td>
<td>Glued laminated structural timber - Performance requirements and minimum production requirements</td>
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<td>AS 1366</td>
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<td>Rigid cellular plastics sheets for thermal insulation</td>
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<td>AS 1366.3</td>
<td>1992</td>
<td>- Rigid cellular polystyrene - Moulded (RC/PS-M)</td>
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<td>AS 1366.4</td>
<td>1989</td>
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<td>Coaxial cable and optical fibre systems for the RF distribution of analogue and digital television and sound signals in single and multiple dwelling installations</td>
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<td>AS 1379</td>
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<td>Specification and supply of concrete</td>
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<td>AS 1397</td>
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<td>AS 1428.1</td>
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<td>Design for access and mobility – General requirements for access – New building work</td>
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<td>Copper tubes for plumbing, gas fitting &amp; drainage applications</td>
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<tr>
<td>SAA MP52</td>
<td>2005</td>
<td>Manual of authorization procedures for plumbing and drainage products</td>
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<tr>
<td>AS/ACIF S008</td>
<td>2006</td>
<td>Requirements for customer Cabling Products</td>
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<td>AS/ACIF S009</td>
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<td>Installation requirements for customer cabling (Wiring Rules)</td>
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<tr>
<td>SAA HB 40.1</td>
<td>2001</td>
<td>The Australian Refrigeration and Air conditioning Code of Good Practice - Reduction of emissions of fluorocarbon refrigerants in commercial and industrial refrigeration and air conditioning applications</td>
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<td>SA HB 40.2</td>
<td>2001</td>
<td>The Australian Refrigeration and Air conditioning Code of Good Practice - Reduction of emissions of fluorocarbons in residential air conditioning applications</td>
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<tr>
<td>SA HB 161</td>
<td>2005</td>
<td>Guide to plastering</td>
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<td>SA HB 301</td>
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<td>Electrical installations - Designing to the wiring rules</td>
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<td>ATS 5200</td>
<td>-</td>
<td>Technical specification plumbing and drainage products</td>
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**AUSTRALIAN PAINT APPROVAL SCHEME (APAS) SPECIFICATION NUMBERS**

<table>
<thead>
<tr>
<th>Specification Number</th>
<th>Description</th>
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<tbody>
<tr>
<td>0014/1</td>
<td>One pack organic binder zinc rich pre-construction primer</td>
</tr>
<tr>
<td>0015/1</td>
<td>Full gloss alkyd enamel for interior and exterior use (buildings)</td>
</tr>
<tr>
<td>0015/3</td>
<td>Semi gloss interior enamel (buildings)</td>
</tr>
<tr>
<td>0016/1</td>
<td>Solvent borne undercoat for exterior and interior use (buildings)</td>
</tr>
<tr>
<td>0032</td>
<td>Metal primer – lead and chromate free (buildings)</td>
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<tr>
<td>0114</td>
<td>One pack interior varnish (general purpose)</td>
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<tr>
<td>0115</td>
<td>Lightly pigmented alkyd low gloss ranch finish for exterior timber</td>
</tr>
<tr>
<td>0117/4</td>
<td>Long life texture coating for exterior concrete and masonry - High build, high profile</td>
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<tr>
<td>0134</td>
<td>Latex primer for galvanised steel and Zincalume ® (buildings)</td>
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<td>0162</td>
<td>Zinc phosphate metal primer</td>
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<tr>
<td>0171</td>
<td>Solvent borne sealer for concrete and masonry (buildings)</td>
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<tr>
<td>0172</td>
<td>Interior latex sealer (buildings)</td>
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<tr>
<td>0181</td>
<td>Solvent borne wood primer (buildings)</td>
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<td>0200/1</td>
<td>One pack semi gloss pigmented solvent borne paving paint for concrete</td>
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<tr>
<td>0200/2</td>
<td>One pack full gloss pigmented solvent borne paving paint for concrete</td>
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<tr>
<td>0205</td>
<td>One pack clear moisture cured finish for timber</td>
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<td>0206</td>
<td>Two pack clear finish for timber</td>
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<td>0260/1</td>
<td>Interior gloss latex paint (buildings)</td>
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<td>Semi gloss interior latex paint in MCR (buildings)</td>
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<td>Low gloss interior latex paint in MCR (buildings)</td>
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<tr>
<td>0260/4</td>
<td>Washable flat finish for interior use (buildings)</td>
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<tr>
<td>0260/5</td>
<td>Ceiling paint – interior flat (buildings)</td>
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<tr>
<td>0280/1</td>
<td>Gloss exterior latex paint in MCR (buildings)</td>
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<tr>
<td>0280/2</td>
<td>Semi gloss latex paint, exterior (buildings)</td>
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<tr>
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<td>Flat or low gloss exterior latex finish in MCR (buildings)</td>
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<td>Heavily pigmented gloss latex ranch finish for exterior timber</td>
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<td>Heavily pigmented low gloss latex ranch finish for exterior timber</td>
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<td>2908</td>
<td>Inorganic zinc coating for protection of steel</td>
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<td>2916</td>
<td>Organic zinc rich coating for protection of steel</td>
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<td>2971</td>
<td>Epoxy 2-pack durable primer for protection of steel in atmosphere</td>
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<td>2972</td>
<td>Low build epoxy 2-pack coating for the long term protection of steel in atmosphere</td>
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### 23 NORTHERN TERRITORY CLIMATE ZONES

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<tr>
<th>Geographic Region</th>
<th>AS 1170</th>
<th>AS 1192</th>
<th>AS/NZS 2312</th>
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<tr>
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<td>Service Condition Category</td>
<td>Corrosion Category</td>
<td>Climate Category</td>
<td>Service Condition Category</td>
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<td>Areas south of, and including, Tennant Creek</td>
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<td>2</td>
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<td>Areas north of Tennant Creek and south of and including Katherine, and areas more than 50 km from the coast or tidal estuaries</td>
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<td>C &amp; F</td>
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<td>Areas north of Katherine and areas between 10 km and 50 km from the coast or tidal estuaries</td>
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<td>D</td>
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<td>Areas less than 10 km from the coast or tidal estuaries</td>
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<td>E</td>
<td>E &amp; F</td>
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<td>Areas inside buildings</td>
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