SPECIFICATION

of work to be done and materials to be used in carrying out the works shown on the accompanying drawings

Powell House

(project name)

Matarawa Grove Greytown

(project address)

Gail Powell

(owner's name)

Job number: 071216

Date: 12th March 2008

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1201 PRELIMINARIES AND GENERAL

1. THE PROJECT

1.1 THE WORKS
The works are as described in this specification and as shown on the drawings.

1.2 SITE
The site of the works, the site address and the legal description are shown on the drawings. Confine access and work to the area of site indicated on the drawings.

1.3 SITE ACCESS AND LIMITS
To be confirmed with client

1.4 EXISTING SERVICES
Investigate all existing site conditions prior to commencing work

2. DOCUMENTATION

2.1 SPECIFICATION STRUCTURE
The designation and numbering of individual specification sections follows the CBI (Co-ordinated Building Information) system for the co-ordination and classification of construction information. Sections are for reference and convenience only and do not profess to define subcontracts.

Read all sections together and read PRELIMINARIES AND GENERAL with all other sections.

2.2 INTERPRETATIONS

Required:	Required by the documents, or by a statutory authority.
Proprietary:	Identifiable by naming the manufacturer, supplier, installer, trade name, brand name, catalogue or reference number.
Approval:	Approval in writing.
Direction:	Direction in writing.
Provide and fix:	“Provide” or “fix” or “supply” or “fix” if used separately mean provide and fix unless explicitly stated otherwise.
Notified:	Notified in writing

2.3 ABBREVIATIONS
The following abbreviations are used throughout the specification sections:

AS	Australian Standard
AS/NZS	Joint Australian/New Zealand Standard
BRANZ	Building Research Association of New Zealand
BS	British Standard
HERA	Heavy Engineering Research Association
NZBC	New Zealand Building Code
NZMP	New Zealand Miscellaneous Publication
NZS	New Zealand Standard
NZS/AS	Joint New Zealand/Australian Standard
OSH	Occupational Safety and Health

2.4 DEFINED WORDS
Words defined in the conditions of contract, New Zealand Standards, or other reference documents have the same interpretation and meaning when used in their lower case, title case or upper case form in the specification text.

2.5 PERSONNEL

Owner:	The person defined as “owner” in the New Zealand Building Code.
Contractor:	The person contracted by the owner to carry out the contract.

2.6 SUBSTITUTIONS

A substitution may be proposed where specified products are not available, or if substitute products are brought to the attention of and are considered by the owner as equivalent or superior to those specified. Except where a specified product is not available, the owner is not bound to accept any substitutions.

Notify proposed substitution of specified products. Include sufficient information to allow the owner to confirm that the substitution is equivalent or superior to that specified.

Approval of substitutions: In writing.

2.7 MANUFACTURERS AND SUPPLIERS REQUIREMENTS

Manufacturers and suppliers requirements, instructions, specifications or details means those issued by them for their particular material, product or component and are the latest edition.

2.8 MANUFACTURERS AND SUPPLIERS DOCUMENTS

Refer to individual sections for a detailed list of manufacturers and suppliers documents relating to work on this project. Retain current copies of the documents listed, and other relevant manufacturers technical literature, on site. Make this information available to all personnel and ensure they are familiar with requirements for handling, storing, preparing for, fixing and finishing products before commencing work. Provide a copy of all manufacturers literature to the owner.

2.9 REFERENCED DOCUMENTS

Throughout this specification, reference is made to various New Zealand Building Code (NZBC) acceptable solutions and verification methods for criteria and/or methods used to establish compliance with the Building Act 2004.

Reference is also made to various Standards produced by Standards New Zealand (NZS, NZMP, AS/NZS, NZS/AS), , overseas standards (AS, BS,) and to listed Acts, Regulations and various industry codes of practice and practice guides. The latest edition (including amendments and provisional editions) at the date of this specification applies unless stated otherwise.

It is the responsibility of the contractor to be familiar with the materials and expert in the techniques quoted in these publications, and to ensure that all those engaged in construction of the works to be similarly informed.

Documents cited both directly and within other cited publications are deemed to form part of this specification.

2.10 PRECEDENCE OF REFERENCED DOCUMENTS

This specification takes precedence in the event of it being at variance with and requiring a higher standard than, the cited documents.

Resolution of any variance must be confirmed in writing and where building consent approval is affected, the change notified to the territorial authority prior to any further work proceeding.

2.11 DOCUMENTS REFERRED TO

Documents referred to in this preliminaries and general section are:

Building Act 2004
Health and Safety in Employment Act
Smoke Free Environments Act

2.12 BUILDING CONSENT COMPLIANCE

It is an offence under the Building Act 2004 to carry out any work not in accordance with the building consent. Refer the resolution of matters concerning compliance to the owner for a direction. Where building consent approval is affected refer any change to the territorial authority.

2.13 STATUTORY OBLIGATIONS

Comply with all statutory obligations and regulations of regulatory bodies controlling the execution of the works.

2.14 BUILDING CONSENT

Obtain the original or copies of the building consent form and documents from the owner and keep on site. Liaise with the territorial authority and/or the building certifier for all notices to be given and all inspections required during construction to ensure compliance. Return the consent form and documents to the owner on completion.

2.15 PRODUCER STATEMENTS

When producer statements verifying construction are required, provide copies to both the territorial authority and the owner. Producer statements to be in the form required by the Territorial Authority to comply with the Building Act.

2.16 MONETARY ALLOWANCES

Monetary allowances are listed in the: ~

Refer to individual work sections for particular requirements relating to monetary allowances.

2.17 SHOP DRAWINGS

Where specified in the work sections, provide shop drawings for review. Proposed shop drawings to be submitted in due time to ensure conformance with the contract programme. Allow 10 working days for review.

Shop drawing review indicates only that the supplied interpretation of the design concept has been reviewed without the need for further modification, other than the corrections indicated by the reviewer. Review of shop drawings does not relieve the contractor of responsibility for the correctness of the shop drawings, site dimensions, the overall design, or for ensuring the work is performed in compliance with the contract documents. Nor does it remove the need for the contractor to comply with the stated requirements, details and specifications of the manufacturers and suppliers of individual components, materials and finishes. Neither can the review be construed as authorising departures from the contract documents.

2.18 MASTER BUILD SERVICES LTD GUARANTEE

Provide a Master Build New Home and Alterations & Additions Guarantees including all costs in the contract price and covering completion, inspection, execution and material defects under the terms of the guarantee offered by Master Build Services Ltd. Execute with all three signatories: owner, registered master builder and Master Build Services Ltd, before commencing the contract works.

Guarantee period: 3 Years from the date of issue of the Building Consent

2.19 REGISTERED CERTIFIED BUILDER GUARANTEE

Provide a Registered Certified Builder 5 year Home Owner Guarantee. Complete the guarantee application. Before commencing the contract works, execute with the signatures of the owner and the registered certified builder and forward to CBA Insurance Services Ltd along with the fee payable.

2.20 WARRANTIES

Provide executed warranties in favour of the owner in respect of, but not limited to, materials, elements, service, application, installation and finishing called for in that specified section of work. The terms and conditions of the warranty in no case negate the minimum remedies available under common law as if no warranty had been offered. Failure to provide the warranty does not reduce liability under the terms of the warranty called for in that specified section of work.

- Conform to the warranty agreement form included in this specification.
- Commence all warranties from the date of practical completion of the contract works.
- Maintain their effectiveness for the times stated.
- Deliver executed warranties to the owner at practical completion.

2.21 WEATHERTIGHTNESS AND WATERTIGHTNESS WARRANTY
Provide a warranty for a minimum period of 2 years, covering the weathertightness of the complete building envelope and the watertightness of all liquid supply and disposal systems and fittings. This general warranty is in addition to any specific warranties required.

2.22 TRADE GUARANTEES AND WARRANTIES
Where specific trade guarantees/warranties are offered covering materials and/or execution of proprietary products or complete installations, provide copies of all such guarantees/warranties to the owner.

2.23 FORM OF WARRANTY
Conform with the form of warranty agreement included in this specification. Commence all warranties from the date of practical completion. Maintain their effectiveness for the times stated.

2.24 LIST OF WARRANTIES

General warranties		Warranty period
1212	Weathertightness and watertightness	2 years
6711	Painting	3 years
6731	Protective coatings	5 years
7403	Drainage	2 years
	Roofing	5 years

2.25 SERVICES PLANS
Prepare services plans setting out the actual positions as constructed of all sewer, stormwater, sanitary plumbing, piped and ducted services, electrical and mechanical services. Except where specified otherwise, as-built plans may be marked up on copies of relevant project drawings. Provide 1 set of services plans to the owner. Provide services plans required by the building consent to the territorial authority.

3. ESTABLISHMENT

3.1 APPROVALS
Attend on territorial authority officers, statutory and network utility inspectors, as necessary to obtain approvals (in addition to building consent approval) for and the satisfactory completion of the works.

4. TEMPORARY WORKS AND SERVICES

4.1 SITE TELEPHONE AND FACSIMILE
Provide on site telephone and facsimile facilities for the duration of the works.

4.2 SITE ACCOMMODATION
Provide, erect and maintain scaffolding, sheds, toilets, water, power, hoardings and access to the site. Allow for cartage, craneage, plant hire and storage. Arrange for temporary works and services necessary for the completion of the works. Pay fees and remove temporary works and services on completion of the works.

4.3 PROTECT
Protect parts of the work liable to damage, including adjoining public or private property, existing buildings, existing roads, footpaths, fences, site services, trees, landscaping and existing retained site features, until completion of the works. Take all precautions necessary to protect the works from damage by unauthorised entry or inclement weather. Brace and support all parts of the works against damage during construction.

Make good damage to existing property and site features arising from construction activities or failure to protect.

4.6 STORAGE

Provide temporary storage areas and protective covers and screens. Fillet stack and protect all framing and structural members from moisture and contamination. Completely protect finishing materials from the weather and damage and store in accordance with the manufacturer's requirements. Protect fabricated elements from the weather and damage, and store in accordance with suppliers' requirements.

4.7 ANTIQUITIES AND ITEMS OF VALUE AND INTEREST

Report immediately the finding of any fossils, antiquities, or objects of value. Ensure they remain undisturbed until direction is given for their removal.

5. PROJECT MANAGEMENT

5.1 SITE MEETINGS

Hold site meetings when required by the owner. The contractor's representative and site supervisor to attend such meetings. Inform subcontractors and others when their presence is required.

Meetings will normally be held: Fortnightly

5.2 MEANS OF COMMUNICATION

All directions and approvals to be in writing.

5.3 PROGRAMME

Provide within 2 weeks of award of the contract a programme for the contract works, including the work of separate contractors being carried out concurrent with this contract. Form of programme: A dated bar chart, identifying the contract work's critical path and all key dates for the provision of labour, materials and elements. Review and update the programme monthly. Supply a copy of the programme and all updates to the owner.

5.4 WORKING HOURS

Work on site is not restricted. Comply with territorial authority consent conditions and noise and nuisance controls.

5.5 WORKING HOURS RESTRICTIONS

Work on site is restricted to hours advised by client

Work outside these hours may be permitted, but 24 hours notice is required in writing to the owner before proceeding. Obtain any necessary permits and permission for such work.

5.6 HEALTH AND SAFETY

Refer to the requirements of the Health and Safety in Employment Act. Comply with all relevant New Zealand safety legislation.

Take all practical steps to make the site and the contract works safe and to provide and maintain a safe working environment. Ensure that all those working on or visiting the site are aware of the rules governing site safety, are properly supervised and are not unnecessarily exposed to hazards.

Identify any significant hazards.

Maintain proper procedures for dealing with any emergencies that may arise. Immediately investigate accidents, identify their cause and maintain a register of accidents and serious harm. Provide a copy of any report which the contractor is required to make to a public authority on any accident which is associated with carrying out the contract works and results in serious harm to any person.

5.7 SMOKING

Do not smoke on site except in a designated location in accordance with the Smoke Free Environments Act. Location determined by the contractor, with the approval of the owner.

5.8 RESTRICTIONS

Do not:
- light rubbish fires on the site
- bring dogs on to or near the site
- bring radios/audio players on to the site.

6. CONSTRUCTION

6.1 QUALITY ASSURANCE

Carry out and record regular checks of material quality and accuracy, including:
- Concrete quality and finishes
- Dimensional accuracy of structural columns (following completion of foundations).
- All perimeter columns and frames for plumb.
- Levels of all floors relative to the site datum.
- Framing timber moisture content (refer to 3801 CARPENTRY).

Where any material, quality or dimension exceeds specified or required tolerances, obtain written confirmation of remedial action from the owner. When building consent approval is affected, confirm with the territorial authority.

Provide all materials, equipment, plant, attendances, supervision, inspections and programming to ensure the required quality standards are met.

6.2 DAMAGE AND NUISANCE

Take all reasonable precautions to prevent damage and nuisance from water, fire, smoke, vehicles, dust, rubbish, noise and all other causes resulting from the contract works. Comply with the requirements of the territorial authority and relevant Acts and Standards.

6.3 SET OUT AND DATUM

Set out the works to conform with the drawings. Establish a permanent site datum to confirm the proposed building ground floor level and its relationship to all other existing and new building levels.

6.4 SET OUT BY REGISTERED SURVEYOR

N/A

6.5 OWNER TO SIGHT SETOUT

While it remains the contractor’s responsibility to set out the works accurately and correctly and to confirm any changes from the approved location with the territorial authority, obtain the owner's written confirmation that they have sighted the proposed building location, site datum and profiles, before commencing any further work.

6.6 EXECUTION

Conform to the requirements of this specification. Ensure work is level, plumb, and true to line and face. Employ only experienced workers familiar with the materials and techniques specified.

6.7 MATERIALS AND PRODUCTS

Use only new materials and products, unless stated otherwise, of the specified quality and complying with all cited documents.

Substitution of alternative materials, products, plant or equipment from those specified must first be confirmed by the owner in writing. If the building consent approval is affected, obtain the approval of the territorial authority for the substitution.

6.8 COMPATIBILITY

Ensure all parts of a construction or finish are compatible and their individual use approved by the manufacturers and suppliers of other parts of the system. Source all parts of a system from a single manufacturer or supplier.

6.9 COMPLETE ALL SERVICES

Ensure building services are operational, with temporary labelling removed, required labelling fixed and service instructions provided.

6.10 CLEAR AWAY

Regularly clear away trade debris, unused materials and elements from the site. On completion of the works leave the building clean and ready for occupancy, with all services operating and mechanical parts in good working order. Remove temporary markings, coverings and protective wrappings. Ensure that any maintenance requirements listed on temporary markings are conveyed to the owner.

6.11 CLEAN

Clean and wash down external surfaces to remove dirt, debris and marking. Clean interior surfaces including cabinetwork, joinery, sanitary and hardware items. Vacuum or polish floor surfaces. Clean and polish glass, both sides.

6.12 SPARES

Collect, protect and store safely spare materials required under the contract. Give the owner an inventory of spares.

2201 PREPARATION AND GROUNDWORK

1. GENERAL

1.1 DOCUMENTS
Documents referred to in this section are:

NZS 3604	Timber framed buildings
OSH	Approved code of practice for safety in excavation and shafts for foundations

1.2 SITE SAFETY
Provide adequate support for all excavations. Cover holes and fence off open trenches and banks.

1.3 ANTIQUITIES AND ITEMS OF VALUE
Report the finding of any fossils, antiquities and other items of value. All to remain undisturbed until approval is given for removal, and all remain the property of the owner.

2. PRODUCTS

2.1 EXCAVATED FILL
Material from other formations in the excavation which may be selected and approved as suitable for filling by having grading and moisture content properties that will allow recompaction to 95% of maximum density.

2.2 VOLCANIC TUFF FILL
Scoriaceous tuff of variable grading excluding excessive silt or clay material, capable of being placed and compacted as specified.

2.3 ROCK FILL
Hard material comprising rock, broken stone, hard brick, concrete, run of pit scoria, or other comparable inert material capable of being placed and compacted as specified.

2.4 SAND FILL
Clean sand of such grading in particle size to achieve mechanical compaction to 90% maximum density.

2.5 HARD FILL
Scoria or crushed rock to GAP (General All Passing) 40 grading.

2.6 GRANULAR FILL
Approved screened crushed gravel or scoria, graded in size from 20 mm to 7 mm, clean. When tested with a standard sieve of 4.75 opening no material is to pass.

2.7 DRESSING COURSE
Scoria to GAP 20 grading, or "dirty footpath scoria", or equivalent "all in" graded crushed metal aggregate.

2.8 FREE-DRAINING AGGREGATE
Scoria or crushed gravel graded 50 to 14 clean.

3. EXECUTION

3.1 EXCAVATION GENERALLY
Carry out excavation to the guidelines set by the OSH publication: Approved code of practice for safety in excavation and shafts for foundations.

3.2 BURNING OF MATERIALS
Burning of materials is not permitted on site.

3.3 PROTECT EXISTING WORK

Protect from damage existing buildings, structures, roads, paving and services nominated on the drawings as being retained.

3.4 PROTECT TREES

Protect from damage trees, shrubs, natural site features and existing landscaped areas nominated on the drawings as being retained.

3.5 SURFACE PREPARATION

Comply with NZS 3604, section 3.5, Site preparation. Remove all turf, vegetation, trees, topsoil, stumps and rubbish from the area to be built on.

3.6 UNDERGROUND ELEMENTS AND SERVICES

Break out and remove old foundations, slabs, drainage pipes, manholes, tanks, cables and redundant services. Report for instructions when any unexpected voids, made-up ground or services are encountered. Seal off the ends of drains or remove to territorial authority approval.

3.7 STOCKPILE TOPSOIL

Stockpile excavated topsoil on site where directed. Keep separate from other excavated materials. Spread and level where directed before completion of the works.

3.8 SHORING AND UNDERPINNING

Carry out shoring and underpinning shown on the drawings and as necessary to prevent subsidence of adjoining public or private property and to ensure the safety of the public and site personnel. Maintain protection throughout the progress of the works, or until foundations and subgrade structures have been completed and the stability of adjoining public and private property secured.

3.9 GENERAL EXCAVATION

Trim ground to required profiles, batters, falls and levels. Remove loose material. Protect cut faces from collapse. Keep excavations free from water.

3.10 ROCK EXCAVATION

If rock is found at any level above the underside of the structural foundations, or above required base levels for site service trenches, immediately notify the owner. Obtain written instructions from the owner on the proposed approach to rock excavation, or consequent alterations to subgrade construction. Confirm any changes with the territorial authority.

3.11 FOUNDATION EXCAVATION

Take foundation excavations to depths shown. Keep trenches plumb and straight, bottoms level and solid, stepped as detailed and clean and free of water.

3.12 INADEQUATE BEARING

If bearing is inadequate then excavate further and backfill with material as follows. Confirm any changes with the territorial authority.

Below slabs on grade:	Hardfill
Below footings:	10 MPa concrete
Service trenches:	Hardfill

If excavation exceeds the required depths, backfill and compact to the correct level with material as listed.

3.13 GRANULAR BASE FOR SLABS

To conform with NZS 3604, section 7.5.3, Granular base. Consolidate with a vibrating roller. Blind the surface with coarse sand or sand/cement and roll ready to receive a dampproof membrane.

3.14 GENERAL BACKFILLING

Obtain written confirmation from the owner before using any excavated material. Compact approved backfilling in 150 mm layers with the last 200 mm in clean topsoil, lightly compacted and neatly finished off.

3.15 RETAINING WALLS
N/A

3.16 SURPLUS MATERIAL
Remove surplus and excavated material from the site.

2301 FOUNDATIONS

Refer in first instance to engineering drawings and specification.

1. GENERAL

Refer to 3101 CONCRETE for poured concrete footings, foundations, foundation walls and floor slabs. Refer also to engineering specification for concrete foundations.

1.1 DOCUMENTS
Documents referred to in this section are:

NZS 3104	Specification for concrete production
NZS 3109	Concrete construction
NZS 3602	Timber and wood-based products for use in building
NZS 3604	Timber framed buildings
NZS 3605	Timber piles and poles for use in buildings
NZS 3631	New Zealand national timber grading rules

2. PRODUCTS

2.1 CONCRETE PILES IN SITU
To NZS 3604 for concrete, reinforcement, footing and type.

2.9 CONCRETE
For piles and footings, 17.5 MPa prescribed mix concrete to NZS 3104, section 3, Provisions for prescribed mix concrete, and NZS 3604, section 6.4.5, Pile footings.

3. EXECUTION

3.1 FOUNDATIONS GENERALLY
Comply with NZS 3602 and NZS 3604 except as varied by this specification. Execution to include those methods, practices and processes contained in the unit standards for the National Certificate in Carpentry and the National Certificate in Joinery (cabinetry, exterior joinery, stairs).

3.2 EXCAVATIONS
Refer to 2201 PREPARATION AND GROUNDWORK.

3101 CONCRETE

Refer in first instance to engineering drawings and specification.

1. GENERAL

1.1 DOCUMENTS
Documents referred to in this section are:

AS 1366	Rigid cellular plastics for thermal insulation Part 3 Rigid cellular polystyrene – Moulded (RC/PS – M)
NZS 3101	Concrete structures standard Part 1 The design of concrete structures
NZS 3104	Specification for concrete production
NZS 3109	Concrete construction
NZS 3114	Specification for concrete surface finishes
NZS 3604	Timber framed buildings
AS/NZS 4671	Steel reinforcing materials

Documents listed above and cited in the clauses that follow are part of this specification. However, this specification takes precedence in the event of it being at variance with the cited document.

2. PRODUCTS

2.1 NORMAL CONCRETE
Normal concrete 20 MPa grade, maximum aggregate size 19 mm ready-mixed to NZS 3104. Provide delivery dockets listing mix and despatch details.

2.2 PRESCRIBED MIX CONCRETE
Prescribed mix concrete 17.5 MPa grade minimum strength, using either separate batching of sand and builder's mix or coarse aggregate to NZS 3104: table 3.1, Grading recommendations for combined and uncombined coarse aggregates.

2.3 SITE CONCRETE
Special concrete 10 MPa with minimum water for workability, all materials and batching to NZS 3104: table 3.1, Prescribed mixes (P).

2.4 REINFORCEMENT
Bars to AS/NZS 4671. Grade 300E deformed, other than for ties, stirrups and spirals, unless shown otherwise on the drawings. Welded reinforcing mesh to AS/NZS 4671.

2.5 TYING WIRE
Mild drawn steel wire not less than 1.2 mm diameter.

2.6 SPACERS AND CHAIRS
Precast concrete or purpose made moulded PVC to approval. Where concrete spacer blocks are used in exposed concrete work use blocks matching surrounding concrete.

3. EXECUTION

3.1 HANDLE AND STORE
Handle and store reinforcing steel and accessories without damage or contamination. Store on timber fillets on hard ground in a secure area clear of any building operation. Lay steel fabric flat.

Ensure reinforcement is clean and remains clean so that at the time of placing concrete it is free of all loose mill scale, loose rust and any other contamination that may reduce bonding capacity.

3.2 FALSEWORK AND FORMWORK

Use falsework and formwork of sufficient strength to retain and support the wet concrete to the required profiles and tolerances. Select formwork finish to produce the specified finished quality. Ensure timber or plywood used for formwork is non-staining to the set concrete.

Securely fix and brace formwork sufficiently to support loads and with joints and linings tight enough to prevent water loss. Do not use tie wires or rods unless approved in writing by the owner. Unless detailed otherwise, provide a 19 mm chamfer or fillet strip at all interior and exterior angles of beam and column forms. Mitre at intersections.

Water blast to clean formwork. Keep formwork wet before concrete is placed.

Unless detailed otherwise, set up soffit boxing for beams and slabs to provide a camber when forms are stripped, of 3 mm rise for every 3 metres of total clear span.

3.5 CUT AND BEND REINFORCEMENT

Cut and bend bars using proper bending tools to avoid notching and to the requirements of NZS 3109: 3.3 Hooks and bends. Minimum radii of reinforcement bends to NZS 3109: table 3.1, Minimum radii of reinforcement bends. Do not rebend bars. Where rebending is necessary, use a purpose built tool, proper preparation and preheating.

3.6 ADJUSTMENTS

Use a purpose built tool for on site bending and to deal with minor adjustments to steel reinforcement.

3.7 TOLERANCES, BENDING

To NZS 3109: clause 3.9, Tolerances for reinforcement.

3.8 SECURE REINFORCEMENT

Secure reinforcement adequately with tying wire and place, support and secure against displacement when concreting. Bend tying wire back well clear of the formwork. Spacing as dimensioned, or if not shown, to the clear distance minimums laid down in NZS 3109: clause 3.6, Spacing of reinforcement.

3.9 LAPPED SPLICES

Length of laps where not dimensioned on the drawings in accordance with the 4. SELECTIONS. Increase laps of plain round steel by 100%. Provide laps only where indicated on the drawings. Tie all lapping bars to each other.

3.10 REINFORCEMENT COVER

Minimum cover to all reinforcing bars, stirrups, ties and spirals, as shown on the drawings. Where cover is not shown on drawings provide minimum cover to NZS 3101: table 5.5, Minimum required cover. Fix chairs for top reinforcement in slabs at 1.0 metre centres or to ensure adequate support. Cover tolerances to NZS 3109: clause 3.9, Tolerances for reinforcement.

3.11 CASTING IN

Build in all grounds, bolts and fixings for wall plates and bracing elements, holding down bolts, pipes, sleeves and fixings as required by all trades and as shown on the drawings, prior to pouring the concrete.

Do not use grounds exceeding 100 mm in length. Location and form of conduits to be approved in writing by the owner. Minimum cover 40 mm. Do not encase aluminium items in concrete. Do not paint steel embedded items more than 25 mm into the concrete encasement. Cut back form ties to specified cover and fill the cavities with mortar.

Form all pockets, chases and flashing grooves as required by all trades and as shown on the drawings.

Wrap all pipes embedded in concrete with tape to break the bond and to accommodate expansion. Do not embed pipes for conveying liquids exceeding a temperature of 50°C in concrete.

3.12 CONSTRUCTION JOINTS

Locate and construct as shown on the drawings or in accordance with **NZS 3109: clause 5.6, 5.6.3 Type B.**

3.13 PRE-PLACEMENT INSPECTION

Do not place concrete until all excavations, boxing and reinforcing have been inspected and passed by the territorial authority inspector and or engineer.

3.14 SURFACE FINISHES

To NZS 3114: clause 105, Specification of finishes, as scheduled or as denoted on the drawings.

3.15 EXPOSED CONCRETE

Formwork linings and surface finishes as nominated for both fair face and concealed or exposed surfaces. Unless detailed, obtain written confirmation of the type and pattern of all joints.

3.16 CONCRETE SURFACE TOLERANCES

To NZS 3114: clause 104, Surface tolerances and clause 105, Specification of finishes, with the suggested tolerances becoming the required tolerances.

3.17 PUMPING CONCRETE

Set up and supervise pump operation, placing and compaction of the mix to NZS 3109: clause 7.4, Handling and placing and clause 7.6, Compaction Advise the ready-mix supplier of the type of pump and the slump required, in addition to the concrete grade, strength and quantity.

3.18 COMPACTION

Use power operated vibrators on foundations, vertical constructions and beams.

3.19 RESIDENTIAL FLOOR SLABS

Construct to NZS 3604: clause 7.5, Concrete slab-on-ground floors in timber buildings. Lay to true and straight surfaces, screeded, floated and steel (manual or power) trowelled finish. Tolerance on flatness: maximum 3 mm gradual deviation over a 3 metre straight-edge, to NZS 3109: clause 104, Surface tolerances.

3.20 SAW CUTS

Cut slabs as required to control shrinkage cracking. Carry out cutting as soon as possible, without causing tear-out of aggregate and before shrinkage cracking has occurred, generally within 24 hours of pouring. Where saw cuts are made, cut out 100 mm of every second wire of the mesh for a length of 50 mm each side of the saw cut position. Saw cuts: $^{1}/_{3}$ slab depth or 30 mm minimum.

3.21 SURFACE DEFECTS

Make good surface defects immediately after forms are stripped. Make good hollows or bony areas with 1:2 mortar or plaster, finished to the same tolerances as the parent concrete. Fill any tie rod holes with 1:2 mortar.

3.22 CURING OF CONCRETE

Keep damp for not less than seven days. Ensure curing of slabs commences as soon as possible after final finishing, by the use of continuous water sprays, or ponding. Alternately, apply a curing membrane. Ensure any membrane used will not affect subsequent applied finishes.

3.23 STRIKE FORMWORK

Strike formwork without damaging or overloading structure. Do not remove formwork before the following minimum periods:

12 hours:	Sides of beams, walls and columns
4 days:	Slabs in beam and slab construction (leave props under slab spans over 2 metres)
10 days:	Props from under slab spans over 2 metres

18 days: Beams, soffits and slab spans over 5 metres

3.24 CLEAN OUT
Clean out saw cuts. Fill with cement grout where the floor will be covered with carpet or vinyl.

3.25 REMOVE
Remove all unused materials and all concrete and reinforcing debris from the site.

4. SELECTIONS

4.3 REINFORCEMENT LAPS
Where reinforcement laps are not shown on the drawings, lap as follows:

Bar diameter	Grade 300E deformed
10 mm	400 mm
12 mm	500 mm
16 mm	650 mm

4.4 CONCRETE

Normal concrete:
17 MPa: As indicated by engineering drawings.

Prescribed concrete:
10 MPa: Site concrete, bedding concrete and for setting posts
17.5 MPa: As required by NZS 3604
25 MPa: As required by NZS 3604 and for exposed concrete in sea spray zone

4.5 SURFACE FINISHES FLOOR SLABS AND PAVEMENTS
Surface finish class to NZS 3114: table 2, Classes of floor, exterior pavement and invert finishes

Finish class	Location
U3	General floor slabs. Confirm with engineering

4.6 SURFACE FINISHES VERTICAL FINISHES, COLUMNS AND BEAMS
Surface finish class to NZS 3114: table 1, Classes of surface finish

Finish class	Location
F4	Exposed concrete surfaces.

3401C CSP GALVANIZING CORROSION PROTECTION

1. GENERAL

1.1 DOCUMENTS REFERRED TO
Documents referred to in this section are:

AS/NZS 2312	Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings	
AS/NZS 4680	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles	
AS 1627	Metal finishing - Preparation and pretreatment of surfaces - Method selection guide	
	1627.1:	Removal of oil, grease and related contamination
	1627.2:	Power tool cleaning
	1627.4:	Abrasive blast cleaning
	1627.5:	Pickling
	1627.9:	Pictorial surface preparation standards for painting steel surfaces
AS 1897	Electroplated coatings on threaded components (metric coarse series)	
AS/NZS ISO 9002	Quality systems - Model for quality assurance in production, installation and servicing	
OSH	Guidelines for the provision of facilities and general safety in the construction industry	

1.2 MANUFACTURER'S DOCUMENTS
Manufacturer's and supplier's documents relating to work in this section are:

CSP Galvanizing Design for hot dip galvanizing

Copies of the above literature are available on the Galvanizers Association of Australia website www.gaa.com.au or by phoning **CSP Galvanizing** on 0800 468 347.

1.3 QUALIFICATIONS
Galvanizers and other specialist coating applicators to be experienced, competent workers, qualified and familiar with the materials and techniques specified.

1.4 QUALITY ASSURANCE
Maintain quality assurance programmes to AS/NZS ISO 9002 for both galvanizing and other specialist coatings as necessary to assure that work is performed in accordance with this specification and the qualifying requirements of the contract documents.

1.5 INSPECTION
Inspection of the galvanized coatings by nominated personal must take place at the **CSP Galvanizing** works prior to dispatch to the site.

1.6 TEST CERTIFICATE
Where scheduled provide a **CSP Galvanising** certificate stating that the galvanizing complies with the requirements of AS/NZS 4680.

1.7 LABELLING
Where scheduled attach a **CSP Galvanising** label to finished work identifying the **CSP Galvanizing** plant, galvanizing thickness and the date of galvanizing.

2. PRODUCTS

2.1 GALVANIZED COATING
Zinc coating by the hot-dip process to the requirements of AS/NZS 4680.

2.2 BOLTS, NUTS AND WASHERS
Hot-dip galvanize to AS/NZS 4680, bolts, nuts and washers forming a permanent part of a structure subject to a protective coating. Alternatively electrogalvanize to AS 1897.

2.3 STEELWORK BEING ZINC OR ALUMINIUM SPRAYED
To AS/NZS 2312 with clear seal finish.

3. EXECUTION

3.1 GENERALLY
The galvanized coating on all steel articles shall conform to the requirements of AS/NZS 4680 and as specified.

3.2 DEFECTS
Discard any material or fabricated items showing defects affecting its structural integrity.

3.3 SURFACE PREPARATION
Grind off burrs, welding slag and sharp arrises and all other defects that could affect appearance.

Galvanizing and zinc spraying

3.4 STEELWORK BEING GALVANIZED
Clean sections thoroughly and apply zinc coating by the hot-dip process to the requirements of AS/NZS 4680. Average zinc coating to be not less than the following:

Structural steelwork	Average coating	Minimum coating
≤ 1.5 mm	45 microns	35 microns
> 1.5 mm – ≤ 3 mm	55 microns	45 microns
> 3 mm – ≤ 6 mm	70 microns	55 microns
> 6 mm	85 microns	70 microns
Bolts and washers		
< 8 mm	35 microns	25 microns
≥ 8 mm	55 microns	40 microns

Ensure that tolerances in screw cutting have made allowance for galvanizing.

Degrease and sweep abrasive blast using a non metallic media galvanized steelwork to be painted.

Preparation for coating systems

3.6 PREPARATION FOR CORROSION PROTECTION
Remove all slag.

For welds exposed to view:	Remove splatter and slag holes in welds, and grind to a neat clean finish.
For steelwork cast in concrete:	Remove rust and mill scale by power or manual wire brushing. Leave unprimed.
For fire protection coating:	Remove rust and mill scale by power or manual wire brushing.

Carry out sand blasting or wire brushing after completion of the fabrication. Steelwork to be precleaned to AS 1627 Part 1 followed by acid pickling to AS 1627 Part 5. Then apply the required coating to the coating manufacturers' requirements. Apply coating within 4 hours of preparation. Work off site wherever possible. Surfaces that are in contact or near contact to receive specified coating before assembly.

3.7 CONDITIONS FOR PREPARING STEELWORK BEING PAINTED
Prepare steelwork in conditions approved for the application of coatings. Carry out off-site preparation and coating applications under cover, in a controlled environment and with adequate lighting.

3.8 BRUSHING AND POWER TOOL CLEANING
Remove oil and grease by the use of solvents. Scrape and power wire brush to a minimum class 2 finish to AS 1627.2. Clean to bright metal, but avoid producing a

polished surface. Check that no burrs or sharp arrises remain which may prevent the full coating thickness being attained.

3.9 ABRASIVE BLASTING
Remove oil and grease by the use of solvents. Abrasive blast clean to a class 2½ finish to AS 1627.4. Clean to bright metal, but avoid producing a polished surface. Select grit type and equipment such that the cleaned surface profile between peaks and valleys does not exceed one third of the dry film thickness. Check that no burrs or sharp arrises remain which may prevent the full coating thickness being attained.

Coating systems

3.10 PRIMING GENERALLY
Coat steelwork, unless specifically noted otherwise, with the specified priming paint, including patch priming on site after erection.

3.11 SHOP PRIMING
Carefully prepare the surface and apply a coat of primer. Refer to 4. SELECTIONS for dry film build.

3.12 PATCH PRIMING
Clean areas of damaged priming and areas left clear for site jointing to a standard comparable with the shop cleaning specified. Wash off chemical deposits from welding fumes. Apply priming coats to the same standard as shop primers, ensuring thorough coating of bolts, nuts and connection areas. Reprime if the primer fails, or more than 4 weeks elapse before the final coating system is applied.

Finishing

3.13 FINISHING CONCEALED INTERIOR STEELWORK
- Flame clean, chip and power wire brush to remove scale and rust to pictorial standard St3 of AS 1627.9.
- Apply one coat of red oxide zinc phosphate alkyd primer to a minimum dry film thickness of 75 microns.

3.14 FINISHING EXPOSED INTERIOR STEELWORK
Abrasive blast clean to AS 1627.4, class $2^1/_2$, near white standard.

3.15 FINISHING EXPOSED EXTERIOR STEELWORK
- Abrasive blast clean to AS 1627.4, class $2^1/_2$, near white standard.
- Apply one coat of inorganic zinc silicate primer to a minimum dry film thickness of 75 microns.
- Apply an intermediate coat of high build epoxy to a further minimum dry film thickness of 125 microns.
- Apply a top coat of a catalysed acrylic to a further dry film thickness of 75 microns.

3.16 FINISHING GALVANIZED STEELWORK
- Degrease to AS 1627.1 and sweep abrasive blast the entire surface using non metallic media.
- Apply one coat of epoxy primer to a minimum dry film thickness of 50 microns.
- Apply a top coat of a catalysed acrylic to a further dry film thickness of 75 microns.
- Apply one coat of epoxy mastic to a minimum dry film thickness of 125 microns.

Completion

3.17 ENSURE
Ensure all elements are free of marks or blemishes.

3.18 REPLACE
Replace damaged, cracked or marked elements.

3.19 LEAVE
Leave work to the standard required by following procedures.

4. SELECTIONS

4.1 STEELWORK BEING GALVANIZED
Fixings to interior environment, including bolts, plates and brackets.

NOTE: Exterior fixings in contact with treated timber to be 316 stainless steel finish

3701 METALWORK

1. GENERAL

1.1 DOCUMENTS
Documents referred to in this section are:

NZS/BS 1387	Screwed and socketed steel tubes and tubulars and for plain end steel tubes suitable for welding or screwing to BS 21 pipe threads
AS/NZS 1554	Structural steel welding 1554.1 Welding of steel structures
AS 1566	Copper and copper alloys - Rolled flat products
AS/NZS 1567	Copper and copper alloys - Wrought rods, bars and sections
AS 1572	Copper and copper alloys - Seamless tubes for engineering purposes
AS 1594	Hot-rolled steel flat products
AS 1627	Metal finishing - Preparation and pretreatment of surfaces 1627.4: Abrasive blast cleaning
AS 1650	Hot-dipped galvanized coatings on ferrous articles
AS 1734	Aluminium and aluminium alloys - Flat sheet, coiled sheet and plate
AS/NZS 3750	Paints for steel structures 3750.9: Organic zinc-rich primer 3750.15: Inorganic zinc silicate paint
AS/NZS 4680	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles
AS/NZS 4792	Hot-dip galvanized (zinc) coatings on ferrous hollow sections, applied by a continuous or a specialized process
NZS/BS 4848	Specification for hot-rolled structural steel sections 4848.2: Hollow sections 4848.4: Equal and unequal angles
BS 6497	Powder organic coatings for application and stoving to hot-dip galvanized hot-rolled steel sections and pre-formed steel sheet

1.2 MANUFACTURER'S DOCUMENTS
Refer to all manufacturer's and supplier's documents relating to work in this section.

1.3 QUALIFICATIONS
Welders to be qualified and experienced in working with the various metals.

1.4 FINISHES SAMPLES
Prepare and submit samples of proposed finishes for review before fabrication.

2. PRODUCTS

2.1 STEEL SECTIONS
Hot-rolled steel to NZS/BS 4848.4.

2.2 HOLLOW STEEL SECTIONS
N/A

2.3 STEEL FLAT
N/A

2.4 STEEL PIPE
N/A

2.5 GALVANIZED STEEL PIPE
N/A

2.6 ALUMINIUM SECTIONS
Plates/tubes/square tubes/flat bars/square bars/rods/angles/channels and sections.

2.7 ALUMINIUM SHEET AND PLATE
N/A

2.8 BRASS SECTIONS
N/A

2.9 BRASS SHEET AND PLATE
N/A

2.10 COPPER SECTIONS
N/A

2.11 COPPER SHEET AND PLATE
New or recycled copper sheet

2.12 STAINLESS STEEL SECTIONS
N/A

2.13 STAINLESS STEEL SHEET AND PLATE
N/A

2.14 STEEL PRIMER
Inorganic zinc silicate primer to AS 3750.15. Zinc rich epoxy primer to AS 3750.9.

2.15 EXTERNAL ORGANIC COATING
Polyester exterior grade coating to BS 6497.

3. EXECUTION

3.1 CORNERS
Unless specified or detailed otherwise, mitre junctions of identical sections.

3.2 HOLES
Form without distortion of surrounding metal.

3.3 PREPARATION FOR WELDING
Remove grease, dirt, moisture and oxide from edges to be welded. Remove scale and residue from arc and power cutting by machining or hand grinding. Ensure accurate fit using clamps and jigs where practical. Use tack welds for temporary attachment where jigging is not practical.

3.4 WELD QUALITY
Make joints with parent and weld metal fully fused throughout with no inclusions, holes, porosity or cracks. Prevent weld spatter falling on surfaces of materials which will be self finished and visible in completed work. Ensure complete removal of flux residues and slag. Butt welds which will be visible in completed work to be ground smooth and flush with adjacent surfaces.

3.5 WELDING STEEL
By one of the following methods:
- gas welding
- metal-arc welding to AS/NZS 1554.1 for mild steel
- seam welding
- other methods subject to approval.

3.6 WELDING STAINLESS STEEL
N/A

3.9 PREPARATION FOR COATINGS
Before applying coatings remove welding slag, weld spatter, anti-splatter compounds, paints, grease, flux, rust, burrs and sharp arrises. Make good defects which would show after application of coating. Remove burrs and sharp arrises which would be visible after fixing, or which could be a hazard to the user. Finish surfaces smooth.

3.10 GALVANIZING
After fabrication, completely remove surface contaminants and hot-dip galvanize to AS 1650, AS/NZS 4680 (fabricated articles) and AS/NZS 4792 (hollow sections).

3.11 ZINC SPRAYING
N/A

3.12 STEEL PRIMING
After fabrication prepare steel by blast cleaning to Class 2-1/2 of AS 1627.4. Apply inorganic zinc silicate primer to AS 3750.15. Apply high-build epoxy tie-coat immediately after primer.

Alternatively prime the prepared steel with zinc rich epoxy primer to AS 3750.9.

3.13 HANDLING
Avoid distortion of elements during transit, storage and handling. Prevent pre-finished surfaces rubbing together, and any contact with mud, plaster or cement. Keep protective coverings dry.

3.14 SUBSTRATE
Ensure location and substrate is ready to receive the fabricated metalwork elements.

3.15 INSTALLATION
Locate fixings accurately and use in accordance with the metalwork manufacturer's requirements. Fix to comply with the specified standards and installation details, including bedding compounds and sealants, and with work plumb, level and true to line.

3.16 MOVING PARTS
When assembled, moving parts to move freely and without binding.

3.17 LEAVE CLEAN
Ensure elements are free of marks or blemishes.

4. SELECTIONS

4.1 STEEL SECTIONS
Refer to drawings

4.3 ALUMINIUM SECTIONS
Refer to drawings

4.8 COPPER SHEET AND PLATE
Provide copper sheet end cappings to treated glulam beams where indicated on drawings

3800 LAMINATED TIMBERWORK

a. **Scope of work**

Design, Supply.
All laminated timber structures, complete with connections and the supply of embedded anchors to be fixed in place by others.

b. The design of the timber shall be in accordance with the regulations as advised by the Consultants and the following New Zealand Standards:
NZS 3603 - Timber Structures Code.
ASNZS 1491 - Finger Jointed Timber Code.
NZS 3631 - New Zealand National Timber Grading Code.
ASNZS 1328 - The Manufacture of Glue Laminated Timber.

c. **Materials**

Laminated Timber Structures and Material
All laminated timber members shall be supplied by McIntosh Timber Laminates Ltd of East Tamaki, Auckland, New Zealand as licensed manufacturers (Lic No 2061) under Australia and NZ Standard 1328 - Manufacture of Glue Laminated Timber - who are able to demonstrate extensive international experience in similar types of projects.

Laminated structural material shall comply with ASNZS 1328.

Non laminated material shall comply with NZS 3631.

d. **Design**

Design of Structural Timber shall be carried out by McIntosh Timber Laminates Ltd using a Specialist Registered Engineer who can demonstrate competence in the design of timber structures in the International market.

I. **Manufacture of Laminated Timber**

D.01 General

The preliminaries section of this specification and the General conditions of Contract shall be read in conjunction with the special clauses below.

D.02 Timber

.01 Timber for use in glue laminated members shall be plantation grown NZ Radiata Pine *(pressure treated to H3 CCA prior to laminating to Hazard class H3 for protection against termite and fungal attack.)*

.02 Characteristic Strengths and Stiffness for Glulam shall be GL8, GL10 or GL12 as required by the engineer. Ref. Table 1.2 ASNZS 1328:2

.03 Laminated members shall be fabricated from laminations not exceeding 45mm in thickness.

.04 Moisture content of laminations at the time of gluing shall be between 12 to 14 per cent. The moisture content of adjacent laminations shall not vary by more than 2 percent and the total range of moisture content of all laminations in any single member shall not exceed 4 percent.

D.03 Service Class

The Service Class defines the environmental conditions in which the laminated beams may be used.

Definition of Environmental Conditions for Glulam Service Classes

Service Class	Description	Environmental Conditions
1	**Interior**	Service Class characterised by moisture content in the materials corresponding to a temperature of 30ºC and relative humidity of the surrounding air only exceeding 65% for a few weeks per year. For example: Domestic Houses, Commercial Offices.
2	**Exterior, under cover**	Service Class characterised by moisture content in the materials corresponding to a temperature of 20ºC and relative humidity of the surrounding air only exceeding 85% for a few weeks per year. For example: Open sheds, exposed beams under soffits, porches, wool scouring plants, laundries.
3	**Exterior, fully exposed**	Service Class characterised by climatic conditions leading to higher moisture content than Service Class 2, or where timber is directly exposed to sun and/or rain. For example: Marine structures, bridges.

D04 Adhesive

.01 The adhesive used in fabrication shall be Type II (such as melamine fortified urea) for Service Class 1 & 2 (interior use) and Type I (such as unmodified resorcinol) for Service Class 3 (exterior use). Adhesive components shall be stored, mixed, handled, spread and cured in accordance with the adhesive manufacturer's instructions.

D.05 Fabrication

.01 General

Fabrication shall be in accordance with recognised sound practice, using adequate plant and equipment under the supervision of qualified personnel and shall comply with the recommendations of ASNZS 1328.

.02 Laminations

Laminations shall be planed within 48 hours prior to gluing. The variation in thickness over the entire lamination shall not exceed 0.5mm.

.03 Joints

Laminations shall be pre-glued to the full length required. All end joints in laminations shall be structural finger joints complying with the requirements of ASNZS 1491 Concentrations of end joints shall be avoided. End joints shall, as a minimum, be dispersed so as to avoid stacking of joints. The average distance between finger joints in the same lamination shall be approximately 2.0m

.04 Assembly

It is especially important that machining of laminations be precise, glue spread adequate and uniform and clamping sequences and pressures correct.

.05 Appearance of Finished Members

Appearance Grade A shall be a filled and sanded finish where appearance is important. All surface voids are plugged or filled.
Appearance Grade B shall be a machine planed finish with occasional skips, blemishes and voids.
Appearance Grade C is intended for use in applications where appearance is not important. All blemished and voids are acceptable
Special finishes such as band-sawn shall be nominated by the specifier.

.06 Connections

All connection hardware shall be prefitted where possible with end cutting and slotting being carried out in the factory.

.07 Protection of Finished Members

(1) All glue-laminated members shall be weather protected with a minimum of one coat of approved sealer applied in accordance with the manufacturer's recommendations. End grain shall be sealed with a minimum of two coats of sealer.

(2) All surfaces to be coated should be clean, dry and free from all mould, fungi, etc.

(3) Members may be individually or bulk wrapped and during handling and delivery to site care shall be taken to avoid damage that will allow moisture penetration or impair structural efficiency.

D.06 Testing

.01 Quality Control Testing During Manufacture.

The manufacturer shall supply the results of routine tests done in compliance with requirements for checking glue quality and laminate end joint strength.

D.07

Handling and Installation

Handling:

.01 Glulam shall not be dropped, jarred or dragged. Care shall be taken to prevent damage to surfaces.

.02 Glulam shall be loaded, unloaded and secured during transport by means which does not damage the edges, surfaces or packaging.

.03 Care shall be taken not to over-stress Glulam members during transport and erection.

Note:

Use webbing slings for lifting to avoid damaging Glulam members. Where chains or wire ropes are necessary adequate corner protection must be used.
Glulam should be lifted on its edge wherever possible with a suitable spreader used on long members.
Locate slings carefully to ensure balanced support and control the Glulam with guy lines when lifting.

Installation

The specialist Contractor shall supply an erection supervisor to oversee the installation of the laminated timber structures. A suitable erection method shall be proposed by the installer. Cranage, scaffolding and erection equipment shall be provided by the Main Contractor.

3801 CARPENTRY

1. GENERAL

1.1 DOCUMENTS
Documents referred to in this section are:

AS/NZS 1748	Mechanically stress-graded timber
AS/NZS 1860	Particleboard flooring, 1860.1: Specifications
AS/NZS 2269	Plywood - Structural
AS/NZS 2918	Domestic solid fuel burning appliances - Installation
NZS 3602	Timber and wood-based products for use in building
NZS 3603	Timber structures standard
NZS 3604	Timber framed buildings
NZS 3606	Manufacturer of glue-laminated timber
NZS 3631	New Zealand national timber grading rules
NZS 3640	Chemical preservation of round and sawn timber

BRANZ Bulletin 453: Fasteners selection
BRANZ Bulletin 368: Preventing moisture problems in timber framed skillion roofs

1.2 MANUFACTURER'S DOCUMENTS
Refer to manufacturer's and supplier's documents relating to work in this section.

1.3 SAMPLES
Provide samples of the following for review prior to ordering:
- Boarding for exterior decks
- Bamboo timber strip flooring.

2. PRODUCTS

2.1 BUILDING WRAPS AND UNDERLAYS
Refer to 4201 WALL CLADDING and 4701 THERMAL INSULATION for the supply of wall wraps, underlays and sheet insulation products.

2.2 TIMBER FRAMING, TREATED
Species, grade and in service moisture content to NZS 3602 and treatment to NZS 3640. Either mechanically stress graded to AS/NZS 1748, or visual grading to NZS 3631.

2.3 TIMBER FRAMING, CHEMICAL FREE, MECHANICALLY STRESS GRADED
Species, grade and moisture content in service as set out in NZS 3602. Machine stress graded to AS/NZS 1748, with an average moisture content at supply of 16% or less.

2.4 LAMINATED TIMBER
Radiata pine laminations to NZS 3606, table 1; treated as required by NZS 3602, to the requirements of NZS 3640, with special attention to Appendix B "Specification advisory notes". Supply weather resistant sealed.

2.5 TIMBER TRUSSES
N/A

2.6 TIMBER TRUSSES, CHEMICAL FREE
N/A

2.7 TIMBER STRIP FLOORING
Bamboo overlay timber floor system. Refer to appendix

2.8 PARTICLE BOARD FLOORING
Flooring grade high density resin bonded to AS/NZS 1860.1.

2.9 PLYWOOD
Structural plywood to AS/NZS 2269 for bracing, bracketing.

2.10 COMPRESSED FIBRE CEMENT SHEET FLOORING
Refer to compressed fibre cement sheet underlay under tiles.

2.11 HARDWOOD SPACED BOARDING FOR EXTERIOR DECKS
N/A

2.12 SOFTWOOD SPACED BOARDING FOR EXTERIOR DECKS
Selected radiata pine, treated to H3.2 CCA to NZS 3640, clause 6.3.1, Round, part round, or sawn timber. Dressed four sides and with arrises removed.

2.13 DAMPPROOF COURSE
2-ply/3-ply kraft felt strip saturated and coated with bitumen.

2.14 NAILS
Steel, stainless steel and galvanized steel of pattern to suit the location and to BRANZ Bulletin 453 Fasteners selection.

2.15 BOLTS AND SCREWS
Steel, stainless steel and galvanized steel of pattern to suit the location and to BRANZ Bulletin 453 Fasteners selection.

2.16 NAIL PLATES
Stainless steel and/or galvanized steel toothed or nailed plates to the plate manufacturer's design for the particular locations as shown on the drawings.

2.17 CONNECTORS
Galvanized steel connectors and structural brackets to the connector manufacturer's design for particular locations shown on drawings.

3. EXECUTION

3.1 ATTENDANCE
Provide and fix blocks, nogs, openings and other items as required by other trades.

3.2 MOISTURE CONTENT
Maximum allowable equilibrium moisture content (EMC) for non air-conditioned or centrally heated buildings for framing to which linings are attached.

Framing at erection:	24% maximum
Framing at enclosure:	20% maximum
Framing at lining:	16% maximum
Timber strip flooring:	10% at time of laying

3.3 EXECUTION GENERALLY
To NZS 3603 and NZS 3604 except as varied in this specification. Execution to include those methods, practices and processes contained in the unit standards for the National Certificate in Carpentry and the National Certificate in Joinery (cabinetry, exterior joinery, stairs).

3.4 DIMENSIONS
All timber sizes are nominal sizes.

3.5 SET-OUT
Set out framing in accordance with the requirements of NZS 3604 and as required to support sheet linings and claddings.

3.6 FRAMING SUB-FLOOR
Frame up off foundation walls and piles, all fabricated, fastened and braced to NZS 3604, section 6.10, Framed subfloor walls.

3.7 FRAMING FLOORS
Framed and fastened to NZS 3604, section 7, Floors.

3.8 FRAMING WALLS
Frame to required loading and bracing complete with lintels, sills and nogs, all fabricated and fastened to NZS 3604, section 8, Walls.

3.9 FRAMING ROOFS
Frame to required loading and bracing complete with purlins. Refer to NZS 3604, section 10, Roof framing.

3.10 FRAMING CEILINGS
Frame to required loading and bracing complete with runners and battens set out to support ceiling lining. All fabricated and fastened to NZS 3604, section 13, Ceilings. Trim for openings in ceilings and hatches to NZS 2604 section 13.3, Openings in ceilings.

3.11 INSTALLING WALL WRAPS, UNDERLAYS AND SHEET INSULATION PRODUCTS
Refer to 4201 WALL CLADDING and 4701 THERMAL INSULATION for the installation of wall wraps, underlays and sheet insulation.

3.12 INSTALLING DECK UNDERLAY
Lay and secure in accordance with BRANZ Bulletin 368 “Preventing moisture in timber framed skillion roofs”.

3.13 LAYING TIMBER STRIP FLOORING
Bamboo overlay timber floor system. Refer to appendix for laying instructions.

3.14 LAYING PARTICLE BOARD FLOORING
Lay and fasten to the flooring manufacturer's requirements and NZS 3604, section 7.2.3, Wood-based sheet flooring. Punch nails, fill holes for clear finishing, then sand with one coarse and one fine paper, hand sanding into corners.

3.15 LAYING PLYWOOD FLOORING
Lay and countersink screw fix to the plywood manufacturer's requirements and to NZS 3604, section 7.2.3, Wood-based sheet flooring.

3.16 LAYING COMPRESSED FIBRE CEMENT SHEET FLOORING
Refer to fibre cement tile underlay sheet manufacturer installation instructions and 3.18 below.

3.17 LAYING HARDBOARD UNDERLAY
N/A

3.18 LAYING FIBRE CEMENT UNDERLAY
Punch existing floor fixings and course sand level. Set out and fix strictly in accordance with the underlay manufacturer’s requirements, using 25 mm x 2.5 mm annular-threaded underlay nails. Drive heads flush with the sheet surface.

3.19 LAYING TIMBER SPACED BOARDING FOR EXTERIOR DECKS
Grooved side of the boards are to be face down. Avoid excessively short or long lengths, drill for all fixings, stagger end joints and space boards a maximum of 2 mm apart in general conditions, or maximum 3 mm apart if boards are likely to swell after fixing. Fix using annular grooved galvanized jolt head nails, heads driven flush with the board surface.

3.20 INSTALL PROPRIETARY FIREPLACE
Prepare for the installation as detailed and as required by the manufacturer. Install strictly in accordance with AS/NZS 2918 and the manufacturer’s stated and detailed requirements.

4. SELECTIONS

NOTE:
All timber framing to be Carter Holt Harvey plantation grown treated LASERFRAME
External timber decking to be Carter Holt Harvey plantation grown PINEX treated decking.

Wet areas plywood flooring to be Carter Holt Harvey treated EcoPly.

4.1 FLOOR FRAMING

Member	Timber species and grade	Treatment
Mid floor joists:	Radiata pine structural grades	H1.1
Boundary joists:	Radiata pine structural grades	H1.2

4.2 EXTERIOR WALL FRAMING

Member	Timber species and grade	Treatment
Exterior walls:	Radiata pine structural grades	H1.2

4.3 ROOF FRAMING

Member	Timber species and grade	Treatment
Skillion roof framing (<10°):	Radiata pine structural grades	H3.1
Enclosed flat roof framing:	Radiata pine structural grades	H3.1

4.4 EXTERIOR EXPOSED TIMBERS

Member	Timber species and grade	Treatment
Posts:	Radiata pine Glulam	H3.2
Beams	Radiata pine Glulam	H3.2
Joists:	Radiata pine structural grades	H3.2
Softwood decking:	Radiata pine structural grades	H3.2
Exterior stairs and steps:	Radiata pine structural grades	H3.2

4.6 EXTERIOR FINISHING TIMBERS

Member	Timber species and grade	Treatment
Weatherboards:	Heart Macracarpa	none
Fascia/barge/cover boards:	Heart Macracarpa	none
Exterior trim:	Heart Macracarpa	none

4.7 LAMINATED TIMBER

Member	Timber/grade/treatment	Finish
Posts:	Radiata pine Glulam	H3.2
Beams	Radiata pine Glulam	H3.2

4.8 INTERIOR FRAMING

Member	Timber species and grade	Treatment
Non structural walls:	Radiata pine structural grades	H1.1
Structural and braced walls:	Radiata pine structural grades	H1.1

4.09 TIMBER STRIP FLOORING

Bamboo overlay timber floor system. Refer to appendix for laying instructions.

4.10 PARTICLE BOARD FLOORING

Brand/type	Fixing method	Thickness
Laminex Group -Pynefloor	Green toungue - nail fixed	20mm

4.11 PLYWOOD

Member	Brand/type	Treatment
Plywood flooring – wet areas:	Carter Holt Harvey EcoPly	H3
Plywood bracing:	Carter Holt Harvey EcoPly	H3

4.12 INTERIOR FINISHING TIMBERS

Member	Timber species and grade
Architraves:	Macracarpa – heart dressing **(confirm with client)**
Skirtings:	Macracarpa – heart dressing **(confirm with client)**
Cornices:	Macracarpa – heart dressing **(confirm with client)**

4.13 FLOORING UNDERLAYS - TILING

Brand/type:	James Hardies Tile Underlay
Thickness:	6 mm

4.17 NAILS

Location	Type	Material	Finish
Exterior	As specified	Stainless steel	316
Interior	As specified	Steel	Galvanised

4.18 BOLTS AND SCREWS

Location	Type	Material	Finish
Exterior	As specified	Stainless steel	316
Interior	As specified	Steel	Galvanised

4.19 NAIL PLATES

Location	Type	Material	Finish
Exterior	As specified	Stainless steel	316
Interior	As specified	Steel	Galvanised

4.20 CONNECTORS

Location	Type	Material	Finish
Exterior	As specified	Stainless steel	316
Interior	As specified	Steel	Galvanised

4.21 PROPRIETARY INSTALLATIONS

Type:	Recessed Jetmaster
Brand/model:	850mm wide gas model complete with bend kit, stainless steel flue and rotating cowl
Type:	28W Ecco Pacific extract fans
Brand/model:	D011133
Type:	Proprietary solar panel
Brand/model:	Solar system designed by others

3802P PYNEFLOOR™ PARTICLE BOARD FLOORS

1. GENERAL

1.1 DOCUMENTS REFERRED TO
Documents referred to in this section are:

AS/NZS 1860 Particleboard flooring,1860.1: Specifications
NZS 3604 Timber framed buildings

BRANZ Appraisal 254 (2002):
Pynefloor and Pynefloor Green Tongue particleboard flooring

Documents listed above and cited in the clauses that follow are part of this specification. However, this specification takes precedence in the event of it being at variance with the cited document.

1.2 MANUFACTURER'S DOCUMENTS
The Laminex Group documents relating to work in this section are:
Pynefloor Green Tongue particleboard flooring November 2001
Pynefloor April 2005
Pynefloor Design Manual September 2005

Copies of the above technical literature are available by phoning 0800 303 606 or from the web site www.thelaminexgroup.co.nz. This literature gives in depth details of design and installation methods referred to in this specification. For specific design applications contact THE LAMINEX GROUP technical division.

2. PRODUCTS

2.1 PYNEFLOOR GREEN TONGUE PARTICLE BOARD
Pynefloor Green Tongue 20 mm particle board flooring to AS/NZS 1860.1 (class 2)

2.2 PYNEFLOOR SQUARE EDGE PARTICLE BOARD
N/A

2.3 PYNEFLOOR GOLD PARTICLE BOARD
N/A

2.4 NAILS
60 mm annular grooved gun nails or annular grooved particleboard flooring nails.

2.5 SCREWS
45 mm x 8g Type 17 countersunk head self drilling screws.

2.6 ADHESIVE
Flexible, solvent based, elastomatic, construction adhesive.

3. EXECUTION

3.1 STORAGE
Take delivery of and accept packets of particle board, dry and undamaged. Reject all damaged material. Store on a level, firm base, well ventilated and completely protected from weather and damage.

3.2 HANDLING
Avoid distortion and contact with damaging substances. Protect edges and surfaces from damage. Use a sufficient number of people to lift and lay sheets with ease.

3.3 SUBSTRATE
Do not commence work until the substrate is plumb and level, in true alignment and to the particle board manufacturer's requirements.

3.4 PLAN LAYOUT

Use The Laminex Group "Plan-A-Floor" to plan layout and determine quantities.

3.5 ADHESIVE FASTENING

Use construction adhesive to joists in conjunction with mechanical fixing. Apply adhesive in a continuous 5 mm bead to all floor joists. For **Pynefloor Green Tongue** and **Pynefloor Gold**, apply a 2 mm bead of construction adhesive to the top of the tongue prior to insertion into the groove. Remove excess adhesive.

3.6 NAIL FIXING

Nail panel ends (and panel edges for **Pynefloor** square edge) at 150 mm centres 10 mm from the edge. Nail intermediates at maximum 200 mm, with all nails slightly skewed except for corner vertical nails. Where T & G material is used nails must be 15 mm from the edge to avoid tongue damage.

3.7 SCREW FIXING

Screw panel ends (and panel edges for **Pynefloor** square edge) at 150 mm centres 10 mm from the edge. Screw intermediate support at maximum 200 mm. For Pynefloor **Green Tongue** and **Pynefloor Gold**, locate screws 15 mm from the edge to avoid tongue damage. Pre-drill for screw fixing.

3.8 LAYING PYNEFLOOR GREEN TONGUE AND PYNEFLOOR GOLD.

- Programme work for minimal exposure to weather and lay sheets across the joists in a staggered pattern.
- Panels to span at least 3 joists.
- Lay panels with brand name down.
- Allow 8 mm minimum clearance between panel edges and fixed objects including columns and bottom plates.
- Provide continuous edge support at building perimeter.
- Provide continuous tongue and groove edge support (nogs) in wet areas or where rigid floor finishes (ceramic tiles) are used.
- Do not allow fixings to initially penetrate the surface of the panel by more than 1 mm. Tighten fixings; punch nails and tighten screws prior to sanding.
- Close butt edges and ends of panels. Do not cramp.
- Do not allow water to remain ponded on the floor surface – remove as soon as possible.
- Do not cover panels with polythene or apply liquid sealers, while exposed to weathering.

3.9 LAYING PYNEFLOOR, SQUARE EDGE

N/A

3.10 LEAVE

Leave work to the standard required by following procedures.

3.11 REMOVE

Remove all debris, unused materials and elements from the site.

3.12 SURFACE FINISHING

Carpet: Single cut with a drum or belt sander – 60 to 80 grit

3.13 PROTECTION

Once the structure is enclosed and weather tight, protect the surfaces of the finished work until coatings are applied or coverings laid.

4. SELECTIONS

4.1 PARTICLE BOARD FLOORING

Type:	The Laminex Group Pynefloor Green Tongue
Thickness:	20 mm
Location:	To ground and first floor levels over timber joists
Fixing method:	Adhesive and nail
Exceptions:	Provide 18mm H3.2 treated ply sheets to tiled areas in ground floor bathroom and laundry, and first floor dressing room and shower enclosure.

4201S SHADOWCLAD® PLYWOOD CLADDING

1. GENERAL

This section deals with the use of the CHH Woodproducts' Shadowclad® range of shiplap plywood exterior claddings.

1.1 DOCUMENTS

Documents referred to in this section are:

AS/NZS 1604.3	Specification for preservative treatment - Plywood
AS/NZS 2269	Plywood – structural
NZS 3602	Timber and wood-based products for use in building
NZS 3604	Timber framed buildings
NZS 4203	General structural design and design loadings for buildings

Documents listed above and cited in the clauses that follow are part of this specification. However, this specification takes precedence in the event of it being at variance with the cited document.

1.2 MANUFACTURER'S DOCUMENTS

CHH Woodproducts documents relating to work in this section are:

Shadowclad® specification and installation manual August 2005
Shadowclad® flashings August 2005
Ecoply® bracing manual March 2005

Copies of the above literature are available at
Web: www.shadowclad.co.nz
Telephone: 0800 326 759

1.3 NO SUBSTITUTIONS

Substitutions are not permitted to any specified system, or associated components and products.

Performance

1.4 FIXINGS, WIND

Design and use the fixings appropriate for the wind zone (R) and topographical classification (T) of this site and building height; as required by NZS 3604 and the wind loads on various wall areas as given by NZS 4203.

1.5 PERFORMANCE

Accept responsibility for the weather-tight performance of the completed cladding system, including all penetrations.

2. PRODUCTS

2.1 SHADOWCLAD® PLYWOOD CLADDING

Radiata pine veneer ply sheet to AS/NZS 2269. Treated LOSP H3 to AS/NZS 1604.3.

2.2 EXTERIOR CAVITY WALL BATTENS

Radiata pine battens, minimum 20 mm thickness, width and height to match timber framing studs. To NZS 3602, table 1, reference 1D.10.

2.3 EXTERIOR CAVITY VERMIN-PROOFING

Shadowclad® cavity base closure with upstand one side 10 mm and the other 75 mm. Length to suit cavity.

2.4 EXTERIOR TRIM

Radiata pine battens, trim and covers to profiles as detailed or as required by the cladding manufacturer. Clears grade or finger-jointed, treated H3.1.

Components

2.5 NAILS

Refer to the **Shadowclad®** specification and installation manual, 5.0 Sheet fixing requirements for size and use. Refer to SELECTIONS for material and type.

- Minimum 40 mm x 2.5 mm flathead nails for direct fixing.
- Minimum 50 mm x 2.8 mm for bracing applications for direct fixing.
- Minimum 60 mm x 2.8 mm for cavity construction.

2.6 SCREWS

Refer to the **Shadowclad®** specification and installation manual, 5.0 Sheet fixing requirements for size and use. Refer to SELECTIONS for material and type.

- Minimum No. 8 x 40 mm galvanized steel countersunk screws to timber for direct fixing.
- Minimum 10 -16 - 45 self-drilling galvanized steel countersunk screws to steel.

2.7 FLASHINGS

Refer to the **Shadowclad®** flashings manual. **Shadowclad®** aluminium flashings compatible with adjacent materials and fixings.

2.8 FLASHING TAPE

Flexible flashing tape to NZBC E2/AS1, 4.3.11 Flexible flashing tape, UV resistant for exposed applications.

2.9 SEALANT

Refer to the plywood manufacturer's requirements for elastomeric sealant to waterproof penetrations.

3. EXECUTION

3.1 HANDLE

Handle sheets carefully and reject all those with damaged faces or edges.

3.2 STORE

Store sheets in stacks clear of the ground, supported without sagging on evenly spaced horizontal bearers. Protect from damage and weather.

3.3 SUBSTRATE

To NZS 3604 and the manufacturer's requirements.

3.4 SUPPORT

Fully support all edges and joints.

3.5 EXPANSION

Provide 2-3 mm gap at all edges of cladding for sheet expansion.

Shadowclad® Groove:	Use a 9 mm packer in the groove of the shiplap joint to create an adequate expansion allowance.
Shadowclad® Texture:	Maintain 2 mm minimum expansion gap.

3.6 FRAMING MOISTURE CONTENT

Maximum moisture content 18%.

3.7 FIX WRAPS AND UNDERLAYS

Fix to framing, with laps and fixing to the cladding manufacturer's requirements. Make good any damage before or during fixing of boarding before fixing continues.

3.8 INSTALL DRAINED CAVITY

20 mm minimum thickness drained cavity to NZBC E2/AS1: 9.0 Wall claddings, where required. Fix vertical cavity battens to wall framing studs and to nogs to achieve battens at 450 mm centres maximum. The battens are fixed by the cladding fixings which will penetrate the wall framing studs over the building wrap. Seal the top of the cavity and install vermin-proofing at base. Do not use horizontal cavity battens. Use cavity spacers where fixing is required between cavity battens.

3.9 PENETRATIONS

Confirm that exterior wall openings have been prepared ready for the installation of all window and door frames and other penetrations through the cladding. Required preparatory work includes the following:

- wall cladding underlay/building wrap to openings finished and dressed off ready for the installation of window and door frames and other penetrations
- claddings neatly finished off to all sides of openings
- installation of flashings (those required to be installed prior to installation of penetrating elements).

3.10 SEALING

Seal cut edges of plywood before fixing with Metalex clear or primer to suit the surface finish being used.

3.11 FIXING SHADOWCLAD® PLYWOOD CLADDING

Fix at 150 mm centres at sheet edges and no closer than 7 mm to the sheet edge, except for the following: -

Sheet edge with top lap:	Place fixings the width of the top lap plus minimum 7 mm from the edge of the sheet.
Sheet edge with bottom lap:	Place fixings through the bottom lap to the sheet side of the capillary groove.

Fix intermediate supports at 300 mm centres. With the exception of bottom laps, fix through the full sheet thickness. Do not fix through grooves.

3.12 INSTALL BATTENS, COVERS AND TRIMS

Install as detailed on the drawings and in accordance with the cladding manufacturer's requirements.

3.13 INSTALL FLASHINGS

Install flashings and covers as detailed on the drawings and in accordance with **Shadowclad®** recommended details.

3.14 COMPLETE

Ensure the work is complete with all flashings, finishings and trim properly installed so the cladding system is completely weathertight.

3.15 REPLACE

Replace all damaged or marked elements.

3.16 LEAVE

Leave work to the standard required for following procedures.

3.17 REMOVE

Remove debris, unused materials and elements from the site.

3.18 PROTECTION

Protect this work as it proceeds, and when completed, from the weather and until it is covered, coated or sealed.

4. SELECTIONS

4.1 BUILDING WRAPS/UNDERLAYS

Brand/weight: Thermakraft Cover Up
Flashing tape: Brand matched to underlay

4.2 CAVITY BATTENS

Timber species: Radiata pine
Timber grade: masg8
Treatment: H3.1

4.3 VERMIN-PROOFING

Brand/type: **Shadowclad**® cavity base closure
Material: Anodised aluminium

4.4 SHADOWCLAD® PLYWOOD CLADDING

Cladding type: **Shadowclad**® plywood – refer to elevations for type and position
Finish type: Oil finish
Thickness: 12 mm

4.5 SHADOWCLAD® PLYWOOD STRUCTURAL BRACING

Bracing sheet: **Shadowclad**® plywood
Paint: Refer to PAINTING
Thickness: 12 mm
Fastener type: Stainless steel annular groove nails

4.6 FLASHINGS

	Type	Finish
Horizontal joints:	Aluminium Z flashing	Anodised for exposed applications
Inter storey junction:	Aluminium Z flashing	Anodised for exposed applications
Internal angle:	Internal 90 degree angle	Anodised for concealed applications
External angle:	Aluminium 90 degree box angle	Anodised for exposed applications
Cavity base closure:	Aluminium J mould with drainage holes	Anodised for concealed applications

4221 TIMBER BOARD CLADDING

1. GENERAL

Related work

1.1 RELATED SECTIONS

Documents

1.2 DOCUMENTS REFERRED TO
Documents referred to in this section are:

NZS 3602	Timber and wood-based products for use in building
NZS 3604	Timber framed buildings
NZS 3617	Profiles of weatherboards, fascia boards and flooring

BRANZ Bulletin 304: Flashing design
BRANZ Bulletin 305: Domestic flashing installation
BRANZ Publication: Good timber cladding practice

Documents listed above and cited in the clauses that follow are part of this specification. However, this specification takes precedence in the event of it being at variance with the cited document.

1.3 MANUFACTURER'S DOCUMENTS
Refer to manufacturer's and supplier's documents relating to work in this section.

Performance

1.4 FIXINGS, WIND
Design and use the fixings appropriate for the wind zone (R) and topographical classification (T) of this site and building height; as required by NZS 3604.

1.5 PERFORMANCE
Accept responsibility for the weather-tight performance of the completed cladding system, including all penetrations.

2. PRODUCTS

Materials

2.1 BUILDING WRAPS AND UNDERLAYS
Breather type, waterproof.

2.2 WEATHERBOARDS
In long lengths to NZS 3617 profile (unless detailed otherwise) with species and grading to requirements of NZS 3602 but with all knots excluded.

2.3 BOARD AND BATTEN
N/A

2.4 COVER BOARDS, BOXED CORNERS AND SCRIBERS
To profiles as detailed, with species and grading to NZS 3602, but with all knots excluded.

Components

2.5 NAILS, GALVANISED
N/A

2.6 NAILS, STAINLESS STEEL
60 mm x 2.8 mm and 75 mm x 3.15 mm stainless steel.

2.7 FLASHINGS
Material, grade and colour as detailed and scheduled. Ensure that materials used for flashings are compatible with the window frame materials and fixings and cladding materials and fixings.

2.8 SHARKS TOOTH FLASHING
PVC compressible flashing strip.

2.9 SOAKERS, ALUMINIUM/ZINC COATED STEEL
N/A

2.10 SOAKERS, COPPER
Provide copper sheet soaker flashings to ends of glulam beams as indicated on drawings.

Finishes

2.11 PRIMER
Water borne acrylic or solvent borne oil-alkyd primer to suit the timber and proposed painting system.

2.12 SEMI-TRANSPARENT STAIN
Water borne acrylic stain, solvent borne semi-transparent oil stain, or solvent-borne semi-transparent oil-alkyd stain to suit the timber.

3. EXECUTION

Conditions

3.1 GENERALLY
Execution in accordance with the BRANZ Publication: Good timber cladding practice.

3.2 STORAGE
Take delivery of timber, dry, unmarked and undamaged. Store on site under cover.

3.3 SUBSTRATE
Before starting fixing ensure that the substrate conforms with NZS 3604, section 2, table 2.1 (tolerances) and the requirements of NZS 3604, sections 6 and 11 governing support for timber board cladding.

3.4 MOISTURE CONTENT
Immediately before starting fixing, test the moisture content of the boards. Use an electrical moisture meter to test 5% of boards, but not less than 10 boards in the centre of the length. Do not start fixing until 90% of the values obtained are within the range specified.

Application - preparation

3.5 PRIMING AND SEALING
If not pre-finished before delivery, coat all faces and edges immediately the block stack is opened. Then fillet stack until fixed. Keep dry and undamaged. Coat to suit the paint system specified in 6711 PAINTING. Allow to re-coat if exposed for more than one month before the final coating is applied.

3.6 FIX WRAPS AND UNDERLAYS
Fix to framing, with laps and fixing to the cladding manufacturer's requirements. Make good any damage before or during fixing of boarding before fixing continues.

3.7 PENETRATIONS

Confirm that exterior wall openings have been prepared ready for the installation of all window and door frames and other penetrations through the cladding. Required preparatory work includes the following:

- wall cladding underlay/building wrap to openings finished and dressed off ready for the installation of window and door frames and other penetrations
- claddings neatly finished off to all sides of openings
- installation of flashings, including flexible flashing tapes (those required to be installed prior to installation of penetrating elements).

3.8 SET OUT

Using laser or mechanical devices set-out the overlap boards to ensure dimension to weather is constant and that boards remain horizontal/vertical. Use a string line to set out all nailing that will be visible in the finished work. Align all nailing accurately in straight lines.

Application - fixing

3.9 FIXING, PAINT FINISH

N/A

3.10 FIXING, CLEAR OR OIL FINISH

Coat all cut ends before fixing. Drill all fixings located within 20 mm of board ends. Finish fixings flush.

3.11 FIXING BEVEL BACK WEATHERBOARDS

Nail weatherboards to every fixing point with one nail just clear of the lap. Butt end joints, mitre external corners and scribe internal corners. Back flash internal corners. Fit soakers to end joints and external corners, nailed under lap. Random stagger end joints across adjacent boards.

3.12 FIXING RUSTICATED WEATHERBOARDS

N/A

3.13 FIXING VERTICAL SHIPLAP WEATHERBOARDS

N/A

3.14 FIXING BOARD AND BATTEN

N/A

3.15 INSTALL FLASHINGS

Install flashings, covers and soakers as detailed on the drawings and to BRANZ Bulletins 304 “Flashing design” and 305 “Domestic flashing installation.”

3.16 COMPLETE

Ensure the work is complete with all flashings, finishings and trim properly installed so the cladding system is completely weathertight.

Completion

3.17 REPLACE

Replace all damaged or marked elements.

3.18 LEAVE

Leave work to the standard required for following procedures.

3.19 REMOVE

Remove all debris, unused materials and elements from the site.

4. SCHEDULES

4.1 BUILDING WRAPS/UNDERLAYS

Brand/weight:	Thermakraft cover up
Flashing tape brand:	Thermakraft

4.2 WEATHERBOARDS

Species:	Macracarpa
Grade:	dressing heart
Treatment:	none
Profile:	200x25mm rebated profile to NZS3617:1979
Dimensions:	180 x 19 mm (confirm with client)
Surface finish:	oil based stain finish

4.3 COVER BOARDS, BOXED CORNERS AND SCRIBERS

Species:	Macracarpa
Grade:	dressing heart

4.6 FLASHINGS

Location	Material	Brand	Colour
To ply cladding	aluminium	Shadowclad	Anodised

4.9 SEMI-TRANSPARENT STAIN

Brand/type:	Natural Oils Limited – Organoil
Colour:	To be advised

4301D DIMOND PROFILED ROOFING

1. GENERAL

1.1 DOCUMENTS REFERRED TO
Documents referred to in this section are:

AS/NZS 2728	Prefinished/pre-painted sheet metal products for interior/exterior building applications - performance requirements
AS 3566	Self-drilling screws for the building and construction industries
NZS 3604	Timber framed buildings
AS/NZS 4534	Zinc and zinc/aluminium-alloy coatings on steel wire

NZ Metal Roofing Manufacturers Inc: NZ metal roofing & wall cladding code of practice

Documents listed above and cited in the clauses that follow are part of this specification. However, this specification takes precedence in the event of it being at variance with the cited document.

1.2 MANUFACTURER'S DOCUMENTS
Manufacturer's and supplier's documents relating to work in this section are:

Dimond Roofing and Cladding Systems Manual, September 2001

Copies of the above literature are available on the **Dimond** website www.dimond.co.nz or by phoning **Dimond** on 0800 DIMOND (0800 346 663).

1.3 QUALIFICATIONS
Roofers to be Dimond Certified Installer, or experienced, competent roofers familiar with **Dimond** products.

1.4 WARRANTY
Warrant this work under normal environmental and use conditions against:

Coating:	15 year Failure of coating adhesion (manufacturer's standard warranty)
Penetration:	15 year weatherproofing by material penetration (manufacturer's standard warranty)
Execution:	5 year weatherproofing by substandard workmanship
From:	Date of completion of installation

Refer to the PRELIMINARIES AND GENERAL section for details of when completed warranty must be submitted.

1.5 WIND LOADINGS
Use fixings and methods capable of sustaining the wind loads appropriate to the area as set out in NZS 3604, section 5.

1.6 CO-ORDINATE
Co-ordinate to ensure substrate and preparatory work is complete and other work programmed in the order required for access and completion of the roof.

1.7 PERFORMANCE
Accept responsibility for the weather-tight performance of the completed roofing system, including all penetrations through the roof and junctions with walls and parapets.

2. PRODUCTS

2.1 WIRE NETTING
Galvanized hexagonal 75 mm mesh from 1 mm steel wire to AS/NZS 4534.

2.2 UNDERLAY
Breather type kraft paper laminates.

2.3 DIMOND ROOFING
Refer to 4. SELECTIONS / drawings

2.4 FLASHINGS GENERALLY
Formable grade 0.55 mm BMT for galvanized, Zincalume® and pre-coated steel, and 0.90 mm BMT for aluminium to the same standards as the profiled sheets, notched where across profile or provided with a soft edge.

2.5 FLASHINGS TO VERGE, RIDGE AND HIP
Supplied by **Dimond** to match or to suit the roofing.

2.6 FASTENERS GENERALLY
Durability of all fasteners not less than the roofing material being fixed.

2.7 FIXING CLIPS TO TROUGH SECTION ROOFING
N/A

2.8 FIXING SCREWS
To AS 3566. Screws appropriate to the roofing material and the supporting structure, and wind load as required by **Dimond,** and with a durability not less than the material fixed.

2.9 RIVETS
Sealed aluminium, minimum diameter 4.8 mm.

2.10 SEALANT
Neutral curing silicone or polymer sealant as required by **Dimond** and used as directed.

2.11 CLOSURE STRIPS
Non-bituminous compressible, profiled closed cell foam strips to fit the sheet profile.
Brand: Ecofoam
Profile: To suit selected cladding profile

3. EXECUTION

Conditions

3.1 INSPECTION
Inspect the roof framing and supporting structure to ensure that it is complete and fully braced ready for roofing and free from any misalignments or protrusions that could damage the roofing.

3.2 STORAGE
Take delivery of and accept packs of roofing dry and undamaged on delivery. Reject all damaged material. Store on a level firm base clear of the ground, with packs well ventilated and completely protected from weather and damage. Do not allow moisture to build up between sheets.

3.3 HANDLING
Avoid distortion and contact with damaging substances, including cement. Do not drag sheets across each other or other materials. Protect edges and surface finishes from damage. Use soft, flat sole shoes when fixing and for all other work on the roof.

3.4 SEPARATION
Isolate dissimilar materials in close proximity as necessary by painting the surfaces or fitting separator strips of compatible materials. Place isolators between metals and treated timber and cement based materials. Do not use unpainted lead sheet in contact with or allow water run-off onto galvanized steel or Zincalume®.

3.5 SET-OUT & LAYING
Carefully set out to allow cover flashings of equal width at the ends of the building. Lay sheets with side laps away from the line of sight ensuring ends of sheets are true to line. Check during fixing to eliminate creep or spread and use string lines along purlin centres to keep fastenings in line.

3.6 FORMING
Form stop-ends and downturns to **Dimond** recommendations.

3.7 SEAL CUT EDGES
Seal cut edges of pre-coated steel sheet with edge protection lacquer before fixing to **Dimond** requirements.

3.8 END LAPS
End laps are not permitted, except where specifically detailed to **Dimond** requirements.

3.9 THERMAL MOVEMENT
Roof fixing and jointing to conform with **Dimond** requirements for thermal movement.

3.10 FIXING GENERALLY
Install and fix in accordance with the Dimond Roofing and Cladding Systems Manual and the NZ Metal Roofing Manufacturers Inc: NZ metal roofing & wall cladding code of practice and to **Dimond** required fixing patterns and details for each area of the building roofing. Use only screws as required by **Dimond**. Paint colour matched fixings and accessories before installation.

3.11 FIX UNDERLAY
Fix wire netting where specified, drawn tight and nailed or screwed to purlins with edges butted and wired together to form a complete net. Fit and lap roofing underlay over the netting to suit roofing sheets, with 40 mm oversail into gutter, to the underlay manufacturer's requirements.

3.12 MARKING AND CUTTING
Cut only by shearing tools. Do not use black lead pencils for marking Zincalume®, Colorsteel® or ColorCote® products.

3.13 FIX SHEETS
Fix sheets in place using the fastening system required by **Dimond** for specified profiles, making due allowance for dynamic local wind pressures on the building and thermal movement in the sheet.

3.14 FLASH
Flash roof to parapets, walls and penetrations to detail in the Dimond Roofing and Cladding Systems Manual and to the New Zealand Metal Roofing Manufacturer's Association Inc: NZ metal roofing & wall cladding code of practice. Cut accurately and fix using sealant and rivets to detail and to **Dimond** requirements to form a weatherproof cover. Ensure flashings are designed and installed to avoid water ponding.

3.15 FIX RIDGES AND HIPS
Cut accurately and fix using primary fasteners to the purlins. Join using sealant and rivets to detail and to the New Zealand Metal Roofing Manufacturers Inc: NZ metal roofing & wall cladding code of practice. Ensure flashings are designed and installed to avoid water ponding.

3.16 FIX VERGE AND CAP FLASHINGS
Cut accurately and fix using primary fasteners to the purlins. Join using sealant and rivets to detail and to the New Zealand Metal Roofing Manufacturers Inc: NZ metal roofing & wall cladding code of practice. Ensure flashings are designed and installed to avoid water ponding.

3.17 PENETRATIONS
Flash and overflash all penetrations through the roof.

3.18 PENETRATIONS AND JUNCTIONS

Check that adjoining walls and parapets are prepared ready for the installation of the roofing. Confirm that openings have been prepared ready for the installation of skylights and other penetrations through the roof. Required work includes the following:

- underlay turned up at wall and parapet lines
- underlay finished and dressed off to all openings, ready for the installation of skylights and other penetrations
- roofing installation neatly finished to all sides of openings and to all wall and parapet junctions
- installation of flashings (those required to be installed prior to installation of penetrating elements and/or wall linings).

3.19 REPLACE

Replace damaged or marked elements.

3.20 LEAVE

Leave this work complete with all necessary flashings, undercloaks, valleys, ridges and hips all properly installed as the work proceeds so the finished roof is completely weathertight.

3.21 REMOVE

Remove all trade rubbish, swarf and unused materials from the roof and surrounds daily during the work. Sweep down at the end of each day, and clean out spoutings, gutters and rainwater pipes on completion of the roof. Remove debris, unused materials and elements from the site.

3.22 PROTECTION

Protect the completed work from damage for the remainder of the construction period. If access is given to the roof for later work, provide properly constructed walkways or platforms to eliminate damage.

4. SELECTIONS

4.1 UNDERLAY

Brand/type: Thermakraft 213 butuminous heavy duty roof underlay

4.2 DIMOND SYMMETRICAL RIB PROFILE ROOFING

Profile name: **Styleline**
Metal: Steel
BMT: 0.55 mm
Coating system: Coloursteel Maxx or Endura (site is not coastal)
Dimond colour: To be advised

4502 ALUMINIUM WINDOWS AND DOORS

1. GENERAL

1.1 RELATED SECTIONS
Refer to 4601 GLAZING for glazing.

1.2 DOCUMENTS
Documents referred to in this section are:

NZS 3604	Timber framed buildings
AS 3715	Metal finishing - Thermoset powder coatings for architectural applications
WANZ	Aluminium Window Handbook
WANZ	Specification for powder coatings on architectural aluminium products
WANZ	Installation code for aluminium joinery products
WANZ	Window installation system: An Alternative Solution for the installation of Windows and doors

BRANZ Bulletin 349: Finishes for aluminium

1.3 MANUFACTURER'S DOCUMENTS
Refer to manufacturer's and supplier's documents relating to work in this section.

1.4 SUBMIT SAMPLE SECTIONS
Submit full size section samples, with the selected finish of all profiles offered.

1.5 SHOP DRAWINGS
Shop drawings to show, but not be limited to:
- Fully dimensioned elevations of all elements (minimum scale 1:20)
- Dimensions of all typical elements and of any special sizes and shapes
- Glazing specification and details

Provide a copy of shop drawings revised to include required modifications, before proceeding with any fabrication or erection.

1.6 CERTIFICATION
Provide a certificate from a laboratory accredited by International Accreditation of New Zealand that the windows and doors offered comply with the performance requirements of NZS 4211.

1.7 QUALIFICATIONS
Fabrication by a member of WANZ.

1.8 PERFORMANCE
The structural and weather-tight performance of the completed window installation, the glazing and infill panels is the responsibility of the window manufacturer.

2. PRODUCTS

2.1 WINDOW AND DOOR SECTIONS
Form all aluminium members from extruded sections. Folded sections are restricted to flashings and concealed members only.

2.2 FLASHINGS GENERALLY
Material, grade and colour of head flashings to match the window frames. Ensure that materials used for head, jamb and sill flashings are compatible with the window frame materials and fixings and cladding materials.

Components – for direct fix systems

2.3 SILL PAN FLASHING
N/A

Components – for cavity systems

2.4 WANZ CAVITY CLOSER
Flashing device to close the cavity above the window or door unit to direct water that occasionally penetrates the wall cladding into the cavity spaces adjacent to the window.

2.5 WANZ SUPPORT BAR
Extruded aluminium support bar with built in drainage and ventilation to NZBC E2, to provide continuous support to the window unit.

2.6 WANZ SUPPORT ANGLE
Support angle for use with the sill pan for deeper claddings to transfer the weight of the window back to the frame.

Components

2.7 WINDOW HARDWARE
Fasteners, stays, locks, vents and other hardware as scheduled. Refer to 4. SELECTIONS. Where hardware is not scheduled, use hardware from window manufacturer's standard range. Key alike all lockable window hardware able to be keyed alike.

2.8 DOOR HARDWARE
Locks, bolts, door rollers, door restrictors, hinges and other hardware as scheduled. Refer to 4. SELECTIONS. Where hardware is not scheduled, use hardware from door manufacturer's standard range. Key alike all door locks able to be keyed alike.

2.9 SAFETY STAYS
Stainless steel non releasable restrictors to limit window opening to NZBC F4/AS1, Table 2, Acceptable opening sizes for barriers.

2.10 FABRICATION SEALANT
To the window manufacturer's requirements.

2.11 GLAZING TAPE AND GASKETS
To the window manufacturer's requirements.

2.12 FIXINGS
Ensure all fixings and bracketing are compatible with aluminium. Do not use electroplated zinc fasteners or brass fastenings.

Finishes

2.13 ORGANIC POWDER COATING FINISH
To AS 3715 and WANZ Specification for powder coatings on architectural aluminium products. All finished surfaces to show uniformity of gloss and colour (to match approved sample) free of all coating defects.

3. EXECUTION

3.1 CONFIRM
Confirm all framing openings on site for dimension, plumb and straightness prior to fabrication or ordering of aluminium joinery.

3.2 EXECUTION GENERALLY
Execute all fabrication and installation work in accordance with the requirements of NZS 4211, WANZ Aluminium window handbook and WANZ Installation code for aluminium joinery products.

3.3 HARDWARE GENERALLY
Factory fit all required and scheduled hardware. Account for all keys and deliver separately to the site manager.

3.4 SAFETY STAYS
Factory fit safety stays to all windows scheduled for safety stays and to all windows where safety stays are required to comply with NZBC F4/AS1 4.0, Opening windows.

3.5 HANDLING
Avoid distortion of elements during transit, handling and storage. Prevent pre-finished surfaces from rubbing together. Prevent contact with mud, plaster and cement. Do not deliver to site any elements which cannot be immediately unloaded into suitable conditions of storage.

3.6 CORROSION PROTECTION
Seal or suitably coat cut ends and holes drilled in aluminium before the frames are installed. Before fixing, apply bituminous coatings, slips or underlays between dissimilar metals in contact, or aluminium in contact with concrete.

3.7 CONFIRM PREPARATION OF WALL OPENINGS
Confirm that wall openings have been prepared ready for the installation of all window and door frames. Do not proceed with the window and door installation until required preparatory work has been completed.

Required preparatory work includes the following:
- wall cladding underlay/building wrap to openings finished and dressed off ready for the installation of window and door frames
- claddings neatly finished off to all sides of openings
- interior linings neatly trimmed ready for installation of jamb liners and completion of air seals to all sides of openings
- installation of flashings (those which are required to be installed prior to frames).

3.8 FIX FRAMES
Fix frames rigidly in place without distortion, to the window manufacturer's and WANZ Aluminium window handbook requirements, plumb, true to line and face, weathertight and with all openings operating freely.

3.9 DRAINAGE
Provide anti-condensation channels to all sills. Sills to sashes and fixed lights to incorporate positive drainage to the exterior.

3.10 INSTALLATION GENERALLY
Fix to comply with the reviewed shop drawings and installation details including flashings and bedding compounds, pointing sealants and weathering sealants.

3.11 INSTALLATION DIRECT FIX
N/A

3.12 INSTALLATION CAVITY CONSTRUCTION
Install to WANZ Installation System details and drawings including WANZ cavity closers, support bars and support angles

Flashings and air seals

3.13 INSTALL FLASHINGS
Install flashings to heads, jambs and sills of frames as supplied and required by the window manufacturer and as detailed on the drawings. Finish head flashings to match window finish.

Place all flashings so that the head flashing weathers the jamb flashings, which in turn weathers over the upstand of the sill flashing. Ensure that sill flashings drain to the outside air.

Except where window/door frames are recessed, ensure that head flashings over-sail jamb facings by 15 mm at each end.

3.14 COMPLETE AIR SEAL
Form an air-tight seal by means of proprietary expanding foam, compressible foam strips, or sealants used with backing rods, applied deep within the reveal to completely fill the gap between joinery and structural framing. Ensure that in combination with the internal linings a complete air seal is created.

Completion items

3.15 SEAL FRAMES ON SITE
Seal frames to each other and to adjoining structure and finishes, all as required by the window manufacturer and to make the installation weathertight. Do not seal the junction between the sill member and the cladding or sill flashing which must remain open.

3.16 PROTECTIVE COVERINGS
Retain protective coverings and coatings and keep in place during the fixing process. Provide protective coverings and coatings where required to prevent marking of surfaces visible in the completed work and to protect aluminium joinery from following trades. Remove protection on completion.

3.17 SAFETY
Indicate the presence of transparent glasses for the remainder of the contract period, with whiting, tape or signs compatible with the glass type. Indicators other than whiting must not be applied to the glass surface. Masking tape must not be used for this purpose.

3.18 MANIFESTATIONS
To NZS 4223, part 3, 303.1.

3.19 TRADE CLEAN
Clean off or remove safety indicators at completion of the building.

3.20 CLEAN FRAMES
On completion clean down both sides of window and door frames using the methods required by the window and door manufacturer.

3.21 CONFIRM
Confirm the proper operation of hardware and operating systems on completion of the installation and again at completion of the contract works.

4. SELECTIONS

Materials

Note: all bedroom windows to have retractable insect screens fitted.

4.2 WINDOWS AND DOORS TYPE
Manufacturer: To be confirmed
Type/model: Powder coated double glazed - Architectural Profiles

4.3 WINDOW AND DOOR JAMB LINERS, TIMBER
Timber species: Macracarpa
Grade/treatment: heart
Thickness: 19 mm
Finish: clear finished

4.4 ORGANIC POWDER COATING FINISH
Thickness: 40 microns minimum
Colour: To be advised

4.5 FLASHINGS

Material/type: Aluminium

Pattern: Formed to suit details provided

Components

4.6 HARDWARE **(Confirm all hardware with client)**

	Brand/style	Material/finish
Sash stays:	Miro	Satin chrome
Sash fasteners:	Miro	Satin chrome
Sash locks:	Miro	Satin chrome
Security locks:	Miro	Satin chrome
Door locks:	Miro	Satin chrome
Door handles:	Miro	Satin chrome

4601 GLAZING

1. GENERAL

1.1 DOCUMENTS
Documents referred to in this section are:

NZBC B1/AS1	Structure, 7.0 Glazing
NZBC F2/AS1	Hazardous building materials, 1.0 Glazing
NZBC F4/AS1	Safety from falling, 1.0 Barriers in buildings
NZS 3604	Timber framed buildings
NZS 4223	Glazing in buildings
	Part 1: The selection and installation of glass in buildings
	Part 3: Human impact safety requirements
	Part 4: Dead, wind and snow loading
AS/NZS 2208	Safety glazing materials in building
AS/NZS 4666	Insulating glass units
AS/NZS 4667	Quality requirements for cut-to-size and processed glass

1.2 MANUFACTURER'S DOCUMENTS
Refer to manufacturer's and supplier's documents relating to work in this section

2. PRODUCTS

2.1 GLASS
Processed glass to AS/NZS 4667, thickness to NZS 4223 parts 1, 3 and 4 unless otherwise specified:

Clear float glass:	Clear annealed transparent float glass
Patterned glass:	Translucent, annealed, rolled glass with a decorative pattern on one surface.
Wired glass:	With 13 mm square welded, treated steel wire mesh in the centre.
Laminated glass:	Grade A safety glazing material to AS/NZS 2208 with PVB or CIP resin interlayer.
Toughened glass:	Grade A safety glazing material to AS/NZS 2208.
Tinted float glass:	Body tinted float glass

Special glass, thickness to NZS 4223 parts 1, 3 and 4 unless otherwise specified:

Solar float glass:	Coated glass and low-E glass made from float glass
Insulating glass units (IGU's):	To AS/NZS 4666 and IGU Manufacturer's Association (IGUMA) requirements.

2.2 TEMPORARY PROTECTION FILM
Factory applied UV resistant film to protect the glass from construction damage.

2.3 MIRROR GLASS
Float mirror glass to NZS 4223, part 1, clause 101.2.2.2: (b) Silvering quality (selection S), with silver and copper plating and 2 coats of protective paint.

2.4 SAFETY MIRROR GLASS
Float mirror glass with silver plating and vinyl backing, safety glazing material to AS/NZS 2208.

2.5 GLASS SCREENS
Proprietary shower/bath screens, formed to shape before toughening, complete with matching hardware.

Components, timber glazing
N/A

Components, aluminium glazing

2.11 GLAZING TAPE AND GASKETS
Single/double sided pressure sensitive self-adhesive low/medium/high density foam tapes/butyl tapes selected to suit the glazing detail to window manufacturers' requirements.

2.12 SETTING BLOCKS
Santoprene/Neoprene, 80-90 Shore A hardness, set at quarter points or to detail, to support the weight of glass panes.

Components, mirrors

2.13 MIRROR ADHESIVE
Adhesive mirror-mastic and double-sided adhesive tape.

3. EXECUTION

3.1 GLAZING GENERALLY
To NZS 4223, part 1, and for human impact safety glazing to NZS 4223, part 3.
To AS/NZS 4666 for IGU's.

Application timber

3.2 INSTALL GLASS, EXTERIOR TIMBER FRAME, PUTTY
N/A

3.3 PRIME PUTTY
N/A

3.4 INSTALL GLASS, EXTERIOR TIMBER FRAME, BEADED
N/A

3.5 INSTALL GLASS, CLEAR OR NATURAL FINISH JOINERY
N/A

3.6 INSTALL GLASS, INTERIOR JOINERY
Remove temporarily pinned beads; fit tape, set glass on setting blocks and refit beads with or without tape to suit detail.

3.7 INSTALL SAFETY GLASS
To NZS 4223, part 3, as modified by NZBC F2/AS1.

Application mirrors

3.8 MIRRORS, SCREW FIXED
Fix with proprietary countersunk-head screws, fitted with black neoprene washers with fine-threaded upstands to receive chrome plated dome screw covers.

3.9 MIRRORS, CHANNEL MOUNTED
Fix with proprietary mounting channels, to the channel manufacturer's requirements.

3.10 MIRRORS, ADHESIVE FIXED
Fix with adhesive mirror-mastic and double-sided adhesive tape.

Application miscellaneous

3.11 INSTALL GLASS BALUSTRADES
N/A.

3.12 INSTALL GLASS SCREENS
Install shower and bath screens and doors to manufacturer's requirements. Fix wall channel with silicone sealant.

Finishing

3.13 SAFETY
After glazing indicate the presence of transparent glasses, with whiting, tape or signs compatible with the glass type.

3.14 MANIFESTATIONS
To comply with NZS 4223, part 3, 303.1.Manifestations (making glass visible)

3.15 TRADE CLEAN
Clean off or remove safety indicators and any temporary protection film at completion of the building.

4. SELECTIONS

NOTE: All glazing to ground floor bathroom, laundry and first floor ensuite to be grade A safety glass.

Glass by type

4.1 INSULATING GLASS UNITS

Brand/type:	double sealed with brand to be advised
Inner glass:	6 mm
Air gap:	12 mm with argon gas
Outer glass:	6 mm
Location:	All exterior windows and doors

Mirrors

4.2 MIRROR, SELECTIONS

Location:	bathroom
Dimensions:	to be advised
Thickness:	6 mm
Fixing method:	adhesive
Screw holes (number):	As required
Edgework:	perimeter channel

Glass screens

4.3 FRAMELESS SHOWER SCREENS AND DOORS

Location:	bathroom
Brand/type:	proprietary
Glass:	as supplied – toughened
Thickness:	6 mm minimum
Hardware:	as supplied

4711 THERMAL INSULATION

1. GENERAL

Related work

1.1 RELATED SECTIONS
Refer to 3111 FORMWORK FOR CONCRETE for insulation under concrete slabs.
Refer to 4721 ACOUSTIC INSULATION for acoustic insulation.

Documents

1.2 DOCUMENTS REFERRED TO
Documents referred to in this section are:

NZBC	H1/AS1	Energy efficiency, 2.0 Building thermal envelope
AS 1366	Rigid cellular plastic sheets for thermal insulation 1366.3: Rigid cellular polystyrene - Moulded (RC/PS - M)	
NZS 3602	Timber and wood-based products for use in building	
NZS 4218	Energy efficiency – Housing and small building envelope	

Documents listed above and cited in the clauses that follow are part of this specification. However, this specification takes precedence in the event of it being at variance with the cited document.

1.3 MANUFACTURER'S DOCUMENTS
Refer to manufacturer's and supplier's documents relating to work in this section.

2. PRODUCTS

Materials

2.1 WIRE NETTING
Galvanised hexagon wire netting, 42 mm mesh, 1 mm diameter steel wire.

2.2 REFLECTIVE FOIL
Aluminium foil laminated with thermo-setting adhesives to kraft paper incorporating inert fibre reinforcing.

2.3 REFLECTIVE FIRE RETARDANT FOIL
Aluminium foil laminated with thermo-setting adhesives to kraft paper incorporating inert fibre reinforcing.

2.4 PERFORATED REFLECTIVE FOIL
Aluminium foil laminated with thermo-setting adhesives to kraft paper incorporating inert fibre reinforcing, perforated to avoid trapping of moisture.

2.5 PERFORATED REFLECTIVE FIRE RESISTANT FOIL
Aluminium foil laminated with thermo-setting adhesives to kraft paper incorporating inert fibre reinforcing, perforated to avoid trapping of moisture and with a non scuff surface.

2.6 BUILDING PAPER
Breather type kraft paper laminates.

2.7 FIRE RETARDANT BUILDING PAPER
Breather type kraft paper laminates.

2.8 SOLVENT FREE FIRE RETARDANT BUILDING PAPER
Breather type kraft paper laminates.

2.9 FIRE RETARDANT REINFORCED BUILDING PAPER
Breather type kraft paper laminates treated with fire retardant chemicals and laminated with fire retardant adhesives incorporating inert fibre reinforcement.

2.10 SOLVENT FREE FIRE RETARDANT REINFORCED BUILDING PAPER
Breather type kraft paper layers, coated with solvent free fire retardant chemicals, laminated with fire retardant thermosetting adhesives incorporating inert fibre reinforcement.

2.11 POLYTHENE FILM
Single layer polyethylene film complete with adhesive pressure-sensitive tape required by the polythene film manufacturer.

2.12 GLASS FIBRE THERMAL INSULATING PADS
Glass fibres bonded with a thermosetting resin to form a rectangular insulating pad.

2.13 GLASS FIBRE THERMAL BLANKET
Glass fibres bonded with a thermosetting resin to form a flexible blanket roll.

2.14 GLASS FIBRE, FOIL-FACED FACED THERMAL BLANKET
Glass fibres bonded with a thermosetting resin to form a flexible blanket roll with a facing sheet/foil lightly adhered to one side.

2.15 POLYESTER FIBRE THERMAL INSULATING PADS
Polyester fibres bonded together to form a rectangular insulating pad.

2.16 POLYESTER FIBRE THERMAL BLANKET
Polyester fibres bonded together to form a flexible blanket roll.

2.17 WOOL FIBRE THERMAL BLANKET
Wool fibres bonded with a polymer fibre to form a flexible blanket roll.

2.18 WOOD FIBREBOARD SUB-SHEATHING
N/A

2.19 CELLULAR POLYSTYRENE INSULATION
Proprietary expanded polystyrene (EPS) foam board to AS 1366 part 3.

Components

2.20 NAILS, NETTING AND PAPER
Galvanised steel clouts, 25 mm gauge.

2.21 NAILS, SUB-SHEATHING
Galvanised 30 mm x 2.5 mm flat head nails to the board manufacturer's requirements.

2.22 SCREWS, SUB-SHEATHING
30 mm x 6 mm zinc-plated pan head screws to the board manufacturer’s requirements.

2.23 SCREWS, POLYESTER THERMAL BLANKET
Specially coated self drilling screws with embossed or profiles washer system suitable to cover oversize predrilled holes.

2.24 TAPES
Proprietary plastic tape, stapled across framing to retain insulation in unlined wall and ceiling locations.

2.25 ADHESIVE TAPE
Pressure sensitive adhesive tape.

3. EXECUTION

Conditions

3.1 STORAGE
Accept materials undamaged and dry and store in a location that protects them from the weather and damage. Avoid distortion, stretching, puncturing and damage to edges of sheet materials. Do not use damaged sheets.

3.2 HANDLING
Wear protective clothing as necessary and when handling, avoid delamination or distortion of the rectangular form. Maintain full thickness unless compression is an installation system requirement.

3.3 INSPECTION
Before starting installation of blankets and pads, check that the location and framing are free from moisture, that the cavities are not interconnected and that mesh, building papers and vapour barriers are in place.

Application

3.4 INSTALL INSULATION
Lay, install, fit and fix to NZBC acceptable solution H1/AS1 section 2.0 and to the insulation manufacturers requirements. Install in housing to NZS 4218.

3.5 WIRE NETTING TO SUBSTRATE
Lay at right angles across the rafters/roof joists. Pull tight and temporarily fix. Tie edges of netting together with galvanised wire clips.

3.6 LAY WIRE NETTING
Lay at right angles across the purlins with enough slack to allow insulation to retain its nominal thickness between. Tie edges of netting together with galvanised wire clips.

3.7 LAY FOIL ROOF INSULATION
Pre-cut foil to required lengths. Lay horizontally starting at the gutter line with succeeding sheets in true alignment and lapping 150 mm. Carefully scribe around and fit neatly to all penetrations. Keep dry and clean until covered in.

3.8 LAY FOIL ROOF INSULATION AS VAPOUR BARRIER
Pre-cut foil to required lengths. Lay horizontally starting at the gutter line with succeeding sheets in true alignment and lapping 150 mm. Carefully scribe around and fit neatly to all penetrations. Fully seal all laps and all penetrations with adhesive tape. Keep dry and clean until covered.

3.9 LAY BUILDING PAPER AS ROOF UNDERLAY
Pre-cut underlay to required lengths. Lay horizontally starting at the gutter line with succeeding sheets in true alignment and lapping 150 mm. Carefully scribe around and fit neatly to all penetrations. Keep dry and clean until covered in.

3.10 INSTALL FOIL WALL INSULATION
Fix horizontally to inside face of substrate in true alignment, with succeeding sheets overlapping 150 mm. Fix with staples through polyethylene tape to the insulation manufacturer's requirements. Scribe neatly around penetrations and openings to leave no gaps. Keep clean and undamaged until closed in. Close in as soon as possible after fixing.

3.11 INSTALL WALL BUILDING PAPER
Fix horizontally to outside face of substrate in true alignment, with succeeding sheets overlapping 150 mm. Fix to the building paper manufacturer's requirements. Scribe neatly around penetrations and openings to leave no gaps. Keep clean, undamaged and without visible weather deterioration until closed in.

3.12 FIX POLYTHENE FILM VAPOUR BARRIER
Fit and fix between insulation and lining with joints lapped and sealed with pressure-sensitive tape.

3.13 INSTALL PERFORATED FOIL FLOOR INSULATION
Pre-cut foil to length. Lay across the substrate members in true alignment, lapped 150 mm with a sag of 100 mm between and laps in full contact. Cut over nogs and ensure a tight, neat fit of all foil edges to the adjacent member. Keep foil clean and dry and free of any sawdust and shavings until flooring is laid. Lay flooring as soon as possible after fixing.

3.14 FIT GLASS FIBRE THERMAL INSULATING PADS
Friction fit insulating pads in place to completely fill the whole of the cavities. Carefully scribe cut insulating pads slightly oversize to maintain friction fit to each other, to smaller spaces and around penetrations. Leave no gaps between, and maintain full thickness of the insulating pads over the whole of the installation. Do not cover vents and leave a 150 mm gap around recessed light fittings and metal flues.

3.15 FIT GLASS FIBRE THERMAL INSULATING BLANKET
Lay blanket in the same direction and over the mesh/vapour barrier, firmly butting edges together. Carefully scribe cut blanket to maintain firmly butted edges and ends. Maintain full thickness of the blanket over the whole installation except where detailed otherwise.

3.16 FIT POLYESTER FIBRE THERMAL INSULATING BLANKET (BIB)
Friction fit between studs. Hand tear across pad to fit nogs and small spaces round penetrations. Leave no gaps and maintain full thickness of blanket over the whole of the installation. Leave a 150 mm gap around recessed light fittings and metal flues.

BIB application:	Lay blanket in the same direction as and over the mesh/vapour barrier, firmly butting edges together. Tear blanket at end for length.
Non-BIB application:	Lay blanket parallel to ceiling joists to cover battens, tear end for length.

3.17 FIT POLYESTER FIBRE THERMAL INSULATING PADS
Friction fit insulating pads in place to completely fill the whole of the cavities. Slightly oversize length for friction fit and tear by hand across pad and fill cavity. Tear to smaller pieces for smaller spaces and around penetrations. Leave no gaps between, and maintain full thickness of the insulating segments over the whole of the installation. Do not cover vents. Leave a clear 150 mm clear gap around recessed light fittings and metal flues.

3.18 FIT WOOL FIBRE THERMAL INSULATING BLANKET
Hang between studs stapled to top plate, drop, tear at required length and staple to bottom of nog, repeating process down the wall. Leave no gaps and maintain full thickness of blanket over the whole of the installation. Lay at right angles to ceiling joists allowing the blanket to sag into the cavities. Tear around rafters/struts and again drop into cavities. Lay between purlins with a snug fit and staple if necessary to hold position. Leave a clear 150 mm gap around recessed light fittings.

3.19 FIT EPS INSULATION
Fit EPS between floor joists and timber framing. Ensure separation from electric cabling.

Application - sub-sheathing

3.20 FIXING SUB-SHEATHING TO TIMBER FRAMING
N/A

Completion

3.21 CLEAN UP
Clean up as the work proceeds, so no spare offcuts or any other matter or item remain behind claddings or linings.

3.22 CHECK FOILS
Ensure foils are dry, clean, bright, undamaged and free of debris before being covered.

3.23 CHECK PAPERS
Ensure these are dry, clean, undamaged and free of debris before being covered.

3.24 CHECK VAPOUR BARRIERS
Ensure these form one homogeneous sheet vapour barrier and remain as such throughout the ensuing construction process.

3.25 LEAVE
Leave work to the standard required by following procedures.

3.26 REMOVE
Remove debris, unused materials and elements from the site.

4. SCHEDULES

Refer to appendix for eco wall and ceiling insulation specification and to Negawatt specification for insulation generally.

5101G GIB® PLASTERBOARD LININGS

1. GENERAL

1.1 DOCUMENTS REFERRED TO
Documents referred to in this section are:

NZBC G6/VM1	Airborne and impact sound 1.0 Airborne sound insulation field tests 2.0 Impact sound insulation field tests
NZS/ISO 140	Acoustics Part 4: Field measurements of airborne sound insulation between rooms
AS/NZS 2588	Gypsum plasterboard
AS/NZS 2589	Gypsum linings - Application and finishing
AS/NZS 2753	Adhesives-Mastic-For bonding gypsum plaster linings to wood or metal framing members.
NZS 3604	Code of practice for light timber framed buildings not requiring specific design.

BRANZ technical paper P21: A wall bracing test and evaluation procedure

Documents listed above and cited in the clauses that follow are part of this specification. However, this specification takes precedence in the event of it being at variance with the cited document.

1.2 MANUFACTURER'S DOCUMENTS
Manufacturer's and supplier's documents which refer to work in this section are:

General:	GIB® Site Guide (September 2003 v2)
Wet areas:	GIB Aqualine® Wet Area Systems book (October 2002 v2)
Bracing:	GIB® Bracing Systems book (July 2003)
Lift Shafts and ducts:	
	GIB® Shaft Wall literature (September 2004)
Ceilings:	GIB® Rondo™ Metal Ceiling Batten Systems literature
Accessories:	GIB® Goldline™ Tape-on Trims literature
	GIB® UltraFlex high impact corner mould literature

Copies of the above literature are available by phoning 0800 100 442 or through the GIB® website www.gib.co.nz.

1.3 INSTALLER WORK SKILLS AND QUALIFICATIONS
GIB® plasterboard fixers and plasterers to be experienced competent workers, familiar with GIB® plasterboard lining systems installation and finishing techniques. Submit evidence of experience on request. (Association of Wall & Ceiling Industries NZ (AWCINZ) Platinum and Gold card holders).

Performance

1.4 DECORATED SURFACE FINISH QUALITY
Level 4 finish for walls and level 5 finish for ceilings

1.5 INSPECTIONS AND ACCEPTANCE
Allow for inspection of the finished plasterboard surface:
- before applying sealer and
- before applying finish coatings or decorative papers,
so that after assessment of the type and/or angle of illumination and its effect on the completed decorative treatment, group approval and acceptance of the surface can be given.

1.6 LIGHTING DESIGN
Refer to electrical lighting design by others

1.7 BOARD ORIENTATION
horizontal

1.8 SERVICEABILITY LIMITS
Deflection of wall and ceiling linings shall not exceed the limits for the specified level of plasterboard finish to AS/NZS 1170.0; Table C1: Suggested serviceability limit state criteria.

1.9 FIRE RATING REQUIREMENTS
N/A

1.10 SOUND INSULATION REQUIREMENTS
N/A

1.11 BRACING REQUIREMENTS
Provide braced wall systems using bracing rated plasterboard sheet to meet the requirements of NZS 3604 when tested to BRANZ technical Paper P21: A wall bracing test and evaluation procedure.

2. PRODUCTS

Materials

2.1 NO SUBSTITUTIONS
Substitutions are not permitted to any specified GIB® systems, GIB® system components, GIB® Plasterboard, associated GIB® products or GIB® accessories.

2.2 GIB® PLASTERBOARD
Gypsum plaster core encased in a face and backing paper formed for standard and water resistance use to AS/NZS 2588, Refer to 4. SELECTIONS for location, type, thickness and finish.

GIB® Standard Plasterboard
GIB Braceline® wall bracing Plasterboard
GIB Aqualine® wet area Plasterboard

2.3 CORNICE
None – square stopped corners

Components

2.4 CEILING BATTENS
GIB® Rondo™ galvanised steel ceiling battens, batten joiners and perimeter channel where indicated. 70x35 msg8 timber battens where noted.

2.5 SCREWS
GIB® Grabber™ drywall screws.

2.6 NAILS
GIB® Nails (gold passivated).
Size: 30 mm, 40 mm, 50 mm

2.7 METAL ANGLE TRIMS
GIB® galvanised steel slim angle trims.

2.8 CONTROL JOINTS
GIB® Rondo™ P35 control joints.

2.9 TAPE ON TRIMS AND EDGES
GIB® Goldline™ tape-on paper tape and galvanised steel trims and edges or GIB® UltraFlex high impact corner mould.

Accessories

2.10 ADHESIVE

Timber frame:	GIBFix® Wood Bond wallboard adhesive.

2.11 JOINTING COMPOUND

Bedding compound:	GIB Tradeset®, GIB® Lite Blue, GIB® Promix All Purpose, GIB® Aquamix
Finishing compound:	GIB ProMix®, GIB ProMix® Lite, GIB® All Purpose and GIB Plus 4®, GIB® Promix All Purpose
Cove:	GIB-Cove® Bond

2.12 JOINTING TAPE
GIB® paper jointing tape.

2.13 ACOUSTIC SEALANT
N/A

Finishes

2.14 SKIMCOAT
Resene Broadwall Surface Preparation.

2.15 SEALER
Resene Broadwall acrylic based surface sealer for general areas and Resene SureSeal for wet areas.

3. EXECUTION

Conditions

3.1 HANDLE AND STORE
Handle and store GIB® Plasterboard sheets and accessories in dry conditions stored indoors out of direct sunlight in neat flat stacks on either an impervious plastic sheet or clear of the floor with no sagging and avoiding damage to ends, edges and surfaces. Reject damaged material (Refer to **GIB® Site Guide September 2003 v2**).

3.2 SUBSTRATE
Do not commence work until the substrate is plumb, level and to the standard required by the sheet manufacturer's requirements (Refer to **GIB® Site Guide September 2003 v2**).

3.3 TIMBER FRAME MOISTURE CONTENT
Maximum allowable moisture content to AS/NZS 2589 for timber framing at lining:
12 - 16% for plasterboard linings (Refer to **GIB® Site Guide September 2003 v2**).

Timber framing to which gypsum lining is fixed shall comply with NZS 3603, NZS 3602 and NZS 3604. Where adhesion of gypsum linings is required, surfaces shall be free of oil, grease, dust and other foreign materials. The substrate members which are to support a joint (parallel to the member such as required for butt joints) shall have a minimum fixing face width of 35 mm. This is to facilitate the fixing of board linings. All other substrate members shall not be less than 30 mm

- The permissible range of moisture content is specified on the basis that 90% of pieces should be within the specified range with the remainder within a further ± 2% moisture content.

- The above range reflects the requirements for an intermittently heated building such as from open fires or electrical heaters in residential dwellings. In situations where air-conditioned or centrally heated installations are planned, a lower timber framing moisture content range at the time of installation of linings should be contemplated (8 to 14%).The objective should always be to install linings to timber framing at a moisture content as close as possible to the final equilibrium level of the completed and occupied building.

- The moisture content of timber framing should be measured to NZ Forest Research Bulletin No. 200 'Measuring the moisture content of wood'.

3.4 METAL FRAMING
N/A

3.5 PROTECT
Protect surfaces; cabinetwork, fittings, equipment and finishes already in place from the possibility of water staining and stopping damage (Refer to **GIB® Site Guide September 2003 v2**).

3.6 LEVELS OF PLASTERBOARD FINISH
Provide the scheduled plasterboard surfaces to the pre decorative levels of finish specified in AS/NZS 2589 (Refer to **GIB® Site Guide September 2003 v2**).

3.7 LEVELS OF PLASTERBOARD FINISH ACCEPTANCE
Before commencing work, agree in writing upon the surface finish assessment procedure necessary to ensure that the levels of finish specified, along with the effect of the type and/or angle of illumination on them, are obtained and are acceptable.

Do not apply decorative treatment until it is agreed in writing by the contractor, subcontractors and decorator that the required plasterboard level of finish has been achieved.

"Levels of plasterboard finish" is a tool for specifying the required quality of finish when installing and flush stopping GIB® Plasterboard **prior** to the application of a range of decorative finishes under various lighting conditions (Refer to **GIB® Site Guide September 2003 v2**).

Application

3.8 INSTALL CEILING BATTENS
Install to **GIB® Rondo™ Ceiling Systems book**.

3.9 LINING WALLS AND CEILINGS GENERALLY
Form to GIB® Site Guide (September 2003 v2). Ensure Bulk insulation thickness shall not exceed that of the wall framing.

3.10 FORM SOUND INSULATION SYSTEMS
N/A

3.11 FORM WET AREA SYSTEMS
Form to **GIB Aqualine® Wet Area Systems book (October 2002 v2)**

3.12 FORM BRACING SYSTEMS
Form to **GIB® Bracing Systems book (July 2003)**

3.13 FORM FIRE RATED SYSTEMS
N/A

3.14 FORM CONTROL JOINTS
Form to **GIB® Site Guide (September 2003 v2).**

3.15 INSTALL COVES
N/A

3.16 INSTALL TAPE-ON TRIMS
Install to **GIB® Goldline™ Tape-on trims literature** and/or **GIB® Ultraflex high impact corner mould literature.**

Finishing

3.17 FINISHING GENERALLY
To **GIB® Site Guide (September 2003 v2)** and AS/NZS 2589

Completion

3.18 REPLACE
Replace damaged sheets or elements.

3.19 CLEAN DOWN
Clean down completed surfaces to remove irregularities and finally sand down with fine paper to the sheet manufacturer's requirements, to leave completely smooth and clean.

3.20 REMOVE
Remove debris, unused materials and elements from the site.

3.21 LEAVE
Leave work to the standard required by following procedures.

4. SELECTIONS

4.1 NO SUBSTITUTIONS
Substitutions are not permitted to any specified GIB® systems, GIB® system components, GIB® Plasterboard, associated GIB® products or GIB® accessories.

Plasterboard

4.2 STANDARD SYSTEMS

Location	Plasterboard type / Lining requirements	Thickness	Finish level
Walls generally	GIB® Standard Plasterboard	10 mm	4
Ceilings generally	GIB® Standard Plasterboard	13 mm	5
Bathroom walls	GIB Aqualine® Plasterboard	10 mm	4
Bathroom ceilings	GIB Aqualine® Plasterboard	13 mm	5

4.6 BRACING SYSTEMS
To **GIB® Bracing Systems book (July 2003)**

Location	Plasterboard type / Lining requirements	Bracing rating / System specification	Finish level
Refer to engineering			
As indicated by engineering	Gib Braceline	As advised	4

Accessories

4.7 CORNICE
N/A

4.8 EDGE PROFILES
Brand/type: square stopped corners

5502 JOINERY FIXTURES

1. GENERAL

1.1 DOCUMENTS
Documents referred to in this section are:

NZBC D1/AS1	Access routes, 4.0 Stairways
AS/NZS 1859	Reconstituted wood based panels, 1859.2: Dry processed fibreboard
AS/NZS 1860	Particleboard flooring, 1860.1: Specifications
NZS 3602	Timber and wood-based products for use in building

1.2 MANUFACTURER'S DOCUMENTS
Refer to manufacturer's and supplier's documents relating to work in this section.

2. PRODUCTS

2.1 TIMBER BOARDS AND FRAMES
Carefully sawn to minimise the inherent warping, twisting and bowing of the selected species and to give a finish suitable for clear finishing.

2.2 STAIRCASE ELEMENTS
Timber selections to NZS 3602.

2.3 PLYWOOD PANEL
Low-formaldehyde resin hot-press bonded timber veneers, select grade interior.

2.4 PARTICLE BOARD
Low-formaldehyde resin bonded medium density particle board to AS/NZS 1860.1.

2.5 MEDIUM DENSITY FIBRE BOARD
Low-formaldehyde resin bonded wood fibre sheet to AS/NZS 1859.2.

2.6 MEDIUM DENSITY FIBRE BOARD, PRINTED
N/A

2.7 MEDIUM DENSITY FIBRE BOARD, MELAMINE
Low-formaldehyde resin bonded wood fibre sheet to AS/NZS 1859.2 overlaid both sides with melamine resin impregnated sheet.

2.8 MEDIUM DENSITY FIBRE BOARD, WOOD VENEER
Low-formaldehyde resin bonded wood fibre sheet to AS/NZS 1859.2 overlaid with natural wood veneer.

2.9 BACKING BOARD
Resin bonded very fine wood fibre sheet to AS/NZS 1859.2.

2.10 PRE-FINISHED BACKING BOARD
N/A

2.11 BENCHTOPS
As detailed on the drawings and as required for specified fittings and appliances.

2.12 CARCASE CONNECTORS
One-piece steel, straight deep-cut thread, fibre board screws with press fit plastic trim cap or tight joint connectors.

2.13 CARCASE FASTENERS
Knock down type centric sphere zinc alloy connectors with connecting bolts, sleeves and dowels, to suit each particular fastening location.

2.14 BUTT HINGES
Butt, broad butt, flush butt or overlay, steel, zinc-plated steel, stainless steel, or brass, to suit the location, or as detailed.

2.15 CONCEALED HINGES
All-metal zinc alloy with automatic spring and screw-fixed. Plastic button door stops.

2.16 DRAWER RUNNERS
Single action under mounted or side mounted powder coated runners or groove mounting type, precision running ball-mounted single-stage extension, bright steel finish system.

2.17 GLUES AND ADHESIVES
As approved by the manufacturer for the timber, timber product, or pre-finished timber product joint being used.

2.18 LIGHT DUTY COATING SYSTEM
Single pack, clear or pigmented nitro-cellulose or pre-catalysed lacquer.

2.19 MEDIUM DUTY COATING SYSTEM
Two pack, clear or pigmented acid catalysed coating.

2.20 HEAVY DUTY COATING SYSTEM
Two pack, clear or pigmented polyurethane coating.

3. EXECUTION

3.1 JOINERY FIXTURES GENERALLY
Execution to include those methods, practices and processes contained in the current syllabus for the National Certificate in Carpentry and the National Certificate in Joinery (cabinetry, exterior joinery, stairs). Take responsibility for the completed joinery fixtures including fittings included within fixtures and the on site installation.

3.2 SITE MEASURE
Site check and confirm dimensions after wall linings have been fixed. Verify positions of electric power outlets, wiring to light fittings included in joinery fixtures, water supplies and waste pipe locations.

3.3 FABRICATION QUALITY
Carry out machining within the practices required for the particular timber, wood product or pre-finished wood product being used. Machine drill and cut holes and recesses and form joints to the componentry manufacturer's requirements. Ensure work is accurate, square and true to line and face.

3.4 FABRICATE JOINERY FIXTURES
Carry out jointing, dowelling and other operations necessary for the proper assembly of the fittings as detailed, with fixings concealed unless otherwise detailed. Use glue joints where provision for shrinkage is not required, with contact surfaces, glueing and pressure all applied to the glue manufacturer's requirements. Locate and drive connectors and fasteners to the bolt manufacturer's requirements. Scribe fit adjustable shelves with 4 shelf pins and locate force fit pin holes at 50 mm maximum centres in solid cheeks. Hang doors on concealed hinges.

3.5 MAKE CUT OUTS FOR APPLIANCES AND FITTINGS
Obtain fitting templates from the appliances and other fittings to be installed within joinery fixtures and bench tops. Ensure appliances and fittings can be installed with the required tolerances and clearances. Where bench tops are being provided under other work sections, provide templates and confirm dimensions to others.

3.6 FABRICATE DRAWERS
Construct drawers as detailed, using proprietary metal section drawer runners. Fit drawers with 3 mm clearance into the drawer space.

3.7 FABRICATE TIMBER STAIRS

To NZBC D1/AS1: 4.0 Closed type, unless detailed otherwise. House and wedge treads and risers 15 mm into strings, all glued, wedged and blocked. Form nosing overhangs of 25 mm by splaying risers forward to finish flush with the front of the treads. Fabricate and install the handrails and balustrading as detailed, complete with associated metal componentry and hardware.

3.8 TRANSIT AND DELIVERY

Load, transport and unload fittings without distortion or damage and keep covered to protect from the weather. Do not deliver fittings until floor, wall and ceiling surfaces are in place and the fittings can be placed in their final location.

3.9 INSTALL JOINERY FIXTURES

Scribe fit on site and install level, square, plumb and true to line and face.

3.10 WARDROBE AND COAT CUPBOARD

Fit out with 300 mm wide melamine faced board shelf, on ex 25 mm scotia bead to back and ends. Exposed edges clashed to match. Fit a selected white powder-coated aluminium coat rail to the front edge of the shelf. Shelf heights as shown on the drawings.

3.11 STORAGE CUPBOARD

Fit out with 5 full depth melamine faced board shelves of thickness to suit span supported on ex 25 mm beads along back and ends. Exposed edges clashed to match. Shelf heights as shown on the drawings.

3.12 LINEN CUPBOARD

N/A

3.13 COATING SYSTEM, PREPARATION

- Fill timber defects with proprietary wood filler. (e.g. cracks, holes, etc)
- Sand timber to a smooth even finish using 180 grit paper.
- Remove all sanding dust using air guns and tack rags.
- Ensure substrate is free from dust, grease, dirt and other contaminants.
- Ensure moisture content of the timber is less than 15% immediately before commencing coating operations.

3.14 COATING SYSTEM, APPLICATION

To coating manufacturer's requirements.

4. SELECTIONS

4.2 STAIRCASE ELEMENTS

Strings:	ex 50 mm macracarpa
Treads:	ex 50 mm macracarpa
Risers:	ex 25 mm macracarpa
Handrail:	50mm dia macracarpa
Balusters:	vertical ex25x25macracarpa balusters with max 100mm gaps
Finish:	clear fnished

4.7 MEDIUM DENSITY FIBRE BOARD, MELAMINE

Manufacturer:	To be advised
Product name:	To be advised
Thickness:	18 mm
Pattern/colour:	To be advised
Clashing:	solid timber

4.8 MEDIUM DENSITY FIBRE BOARD, WOOD VENEER

Manufacturer:	To be advised
Product name:	To be advised

	Species/cut:	To be advised
	Thickness:	18mm
	Clashing:	solid timber
4.11	BENCHTOPS, FINISH	
	Brand/material:	To be advised
	Colour:	To be advised
	Finish:	To be advised
4.12	CARCASE CONNECTORS	
	Manufacturer:	Hettich
	Finish:	to match carcass colour
	Cap colour:	To be advised
4.13	CARCASE FASTENERS	
	Manufacturer:	Hettich
	Product name:	To be advised
4.15	CONCEALED HINGES	
	Manufacturer:	Hettich
4.16	DRAWER RUNNERS	
	Manufacturer:	Hettich soft close

5503 BATHROOM AND TOILET FIXTURES

1. GENERAL

1.1 RELATED SECTIONS
Refer to 4601 GLAZING for mirrors and frameless shower and bath screens.

1.2 DOCUMENTS REFERRED TO
Documents referred to in this section are:

NZS 4121	Design for access and use of buildings and facilities by disabled persons

Documents listed above and cited in the clauses that follow are part of this specification. However, this specification takes precedence in the event of it being at variance with the cited document.

1.3 MANUFACTURER'S DOCUMENTS
Refer to manufacturer's and supplier's documents relating to work in this section.

2. PRODUCTS

Refer to 4. SELECTIONS/drawings.

3. EXECUTION

3.1 RETAIN
Retain fixtures, fittings and hardware in the manufacturer's original packaging and ensure that units are complete with associated fixings and installation instructions.

3.2 INSPECTION
Before starting the installation of proprietary items, check relevant spaces and wall and floor finishes for any condition that would not allow the proper installation of any unit. Do not proceed until such conditions have been remedied.

3.3 LOCATE
Locate units at heights and/or locations shown on the drawings, or as required to comply with relevant Codes and Standards. For any dimension not shown or known, request direction before proceeding.

3.4 CUTTING AND FITTING
Where cutting and fitting of the substrate is necessary for installing any unit, carry out this work before the painting or finishing of that surface. Remove any hardware when required for painting.

3.5 INSTALLING UNITS
Install each unit in accordance with the proprietary fixture manufacturer's requirements, using the templates and tools supplied or recommended by them. Set units level, plumb and true to line and required location, with moving parts and actions freely and easily operating. Do not make any modifications to supplied units.

3.6 ADJUST
Adjust and check each operating unit for correct and smooth functioning. Replace those units that cannot be adjusted if they do not function correctly. Clean units and adjoining surfaces upon completing their installation.

3.7 REPLACE
Replace damaged or marked elements.

3.8 LEAVE
Leave work with parts fully and freely working and to the standard required by following procedures.

3.9 REMOVE
Remove debris, unused materials and elements from the site.

3.10 PROTECT
Protect units from damage or marking.

3.11 FINAL ADJUSTMENT
Where units are installed more than a month prior to project completion, return and make a final check and adjustment of units just prior to hand over, to ensure that they are operating correctly, fitted properly and are undamaged.

4. SELECTIONS

4.1 PROPRIETARY FIXTURES AND FITTINGS
Complete with matching screws.

Fixture	Location	Make, model and finish
Towel rails	bathroom	Proprietary chrome (TBA)
Toilet roll holders	bathroom	Proprietary chrome (TBA)
Coat hooks	bathroom	Proprietary chrome (TBA)
Soap dishes	bathroom	Proprietary chrome (TBA)
Vanity shelf	bathroom	Proprietary chrome (TBA)

4.2 ELECTRIC POWERED APPLIANCES
Complete with matching screws.

Fixture	Location	Make, model and finish
Heated towel rails	bathroom	Proprietary chrome (TBA)

6201 TILING

1. GENERAL

1.1 DOCUMENTS
Documents referred to in this section are:

AS 2358	Adhesives - For fixing ceramic tiles
AS 3740	Waterproofing of wet areas within residential buildings
AS 3958	Ceramic tiles, 3958.1: Guide to the installation of ceramic tiles
BS 6431	Ceramic floor and wall tiles

BRANZ Good practice guide: Tiling

1.3 QUALIFICATIONS
Carry out tiling work using competent tilers, experienced with the materials and techniques specified.

1.4 ADHESIVES COMPATIBILITY
Adhesives selected for use on proprietary substrates or waterproof membranes to have documented compatibility approval from the respective manufacturers.

1.5 SAMPLES
Submit samples of the tiles specified, sufficient to show the pattern and the range of colour finish.

2. PRODUCTS

2.1 TILES
To BS 6431, parts 1 to 23 inclusive. Refer to 4. SELECTIONS.

2.2 RIGID SHEET UNDERLAYS
Refer to 3801 CARPENTRY.

2.3 SHEET WATERPROOFING MEMBRANE
Proprietary sheet waterproofing system.

2.4 LIQUID WATERPROOFING MEMBRANE
To AS 3740.

2.6 CEMENT BASED SCREED
Mix of 3:1 Portland cement, wash-mix sand, gauged with liquid polymer additive to the tile manufacturer's requirements.

2.7 TILE ADHESIVE
To AS 2358.

2.8 GROUT
Cement based, compressible and to suit the particular location and use.

2.9 MOVEMENT CONTROL JOINT SEALANT
To BRANZ Good practice guide: Tiling, section 5.0.

3. EXECUTION

3.1 HANDLING AND STORAGE
Take delivery of packets of tiles undamaged and dry. Handle tiles with care to avoid chipping, soiling and damage. Store on hard level standings in non-traffic, non work areas that are enclosed, clean and dry.

3.2 CHECK TILES
Check tiles to ensure that they are as specified, from the same batch, of a consistent colour and pattern and sufficient to complete the work. Reject tiles that vary widely in colour or pattern. Reject tiles that are damaged.

3.3 CONFIRM LAYOUT
Before commencing work confirm the proposed layout of tiles and expansion joints and other visual considerations of the finished work.

3.4 SETTING OUT
Before commencing the setting out confirm the number and location of cut tiles. Minimise in number with no cut tiles less than half size and only at the perimeter of the work.

3.5 SUBSTRATE
Ensure that all services and accessories are in place and located to suit the tile layout, with the substrate required for tiling work. Commencement of the work means the substrate and environment are accepted by the tile layer as satisfactory.

3.6 TEMPERATURE
Do not carry out tiling where the ambient temperature is below 5°C, or onto a substrate with a temperature higher than 40°C.

3.7 TILING GENERALLY
Prepare surfaces and carry out the tiling work in accordance with AS 3958, part 1, as modified by BRANZ Good practice guide: Tiling.

3.12 TIMBER FLOORS PREPARATION
Confirm with the owner that the deflection of the timber floor is within the range of $^{1}/_{360}{}^{th}$ span. Remove from the surface all existing finishes, punch nail heads and sand to a smooth, clean, dust-free surface.

3.13 LAYING SHEET WATERPROOFING MEMBRANE
Install to manufacturers requirements and to BRANZ Good tiling practice, 7.0 Waterproofing interior wet areas.

3.14 APPLYING LIQUID WATERPROOFING MEMBRANE
Apply the selected liquid waterproof membrane system to the membrane manufacturer's requirements and in accordance with AS 3740 and to BRANZ Good tiling practice, 7.0 Waterproofing interior wet areas.

3.15 INSTALL WATERPROOFING MEMBRANE
Install waterproofing membrane between the tile adhesive and the substrate. Reinforce all junctions of the waterproofing membrane to BRANZ Good tiling practice; 7.0 Waterproofing interior wet areas. Unless otherwise specified or shown on the drawings, install waterproof membranes as follows: -

<u>Unenclosed shower cubicle</u>
To 1800 mm above floor and 300 mm above shower rose.
To at least 1500 mm from shower rose.
To the floor within 1500mm of the shower rose.

<u>Bath with a shower over and no shower screen</u>
To 1500 mm from the shower rose and top edge.
To 1800 mm above base of bath.
To the floor within 1500mm of the shower rose.

<u>Bath with shower over and a screen for the shower</u>
To 1800 mm height around sides of bath.

<u>Bath</u>
To 150 mm minimum around the sides and along walls horizontally 150 mm minimum.

<u>Splashback to a vanity</u>

To 300 mm minimum up wall behind the vanity.
To the floor level at least twice the width of the vanity and 500 mm min beyond it at each

3.17 LAYING CEMENT SCREED

Apply a proprietary cement slurry bond coat over the whole of the floor to the tile manufacturer's requirements. Mix and place a 40 mm thick mortar bed over the bond coat and firmly tamp, screed and compact to the required level. Form screeds with a deviation from plane of not more than 5 mm over 3 metres.

In waterproofed areas where the cement screed has been laid over the waterproofing membrane, prepare the screed surface by applying a further waterproof coating before laying tiles.

3.18 FALLS

Form screeds in areas where water is used in significant amounts with a deviation from plane of not more than 5 mm over 3 metres. Unless otherwise specified form screeds with the following falls:

1 : 40 minimum	For tiled decks which also act as a roof
1 : 40 minimum	For paving over ground
1 : 40 minimum	For shower bases
1 : 40	For shower bases for people with disabilities
1 : 50 minimum	For commercial kitchens

3.19 TILE FIXING GENERALLY

Apply adhesive, prepare and fix tiles by the method required by the adhesive manufacturer and tap them firmly into place.

3.20 TILE FIXING, CONCRETE, CEMENT-BASED ADHESIVE, THICK BED

N/A

3.21 TILE FIXING, CONCRETE, CEMENT-BASED ADHESIVE, THIN BED

N/A

3.22 TILE FIXING, RIGID SHEET LININGS

Refer to 3801 CARPENTRY for the installation of rigid sheet linings.

Prime the surface after the curing of any waterproof membrane. Spread adhesive to a uniform minimum thickness of 3 mm and rib it with a notched trowel to the tile manufacturer's requirements. Press tiles and beat it into place to obtain the required coverage by adhesive on the back of each tile.

3.23 TILE FIXING, INTERIOR TIMBER FRAMED FLOORS

Refer to 3801 CARPENTRY for the installation of rigid sheet underlays.

After the curing of any waterproof membrane, prime the surface, spread adhesive to a uniform minimum thickness of 3 mm and rib it with a notched trowel to the tile manufacturer's requirements. Press tiles and beat it into place to obtain the required coverage by adhesive on the back of each tile.

3.24 GROUTING

Remove spacers. Prepare joints, mix and apply proprietary grout and finish off to the grout manufacturer's requirements. Grout to finish uniform in colour, smooth and without voids, pinholes or low spots.

3.25 MOVEMENT CONTROL JOINTS

Minimum width of 6 mm, carried through tile and bedding. Where substantial movement is anticipated, carry through the rigid sheet to the structure. Install joints over expansion joints in structure, at junctions between different backgrounds, where abutting other materials, at storey heights horizontally and 3.0 metres vertically, at internal corners and at junctions with floors and columns.

Ensure joints are clean, formed, filled, and the sealant inserted to the sealant manufacturer's requirements.

3.26 CLEAN
Upon completion of setting and grouting, thoroughly sponge and wash the tiles to leave clean and free of blemish. Finally polish tiles with a clean dry cloth.

3.27 REMOVE
Remove unused materials from the site.

4. SELECTIONS

4.1 TILES

Location	Brand	Pattern/code number
Ensuite	To be advised	To be advised
Bathroom	To be advised	To be advised
Laundry	To be advised	To be advised

4.2 LIQUID WATERPROOFING MEMBRANE
Brand/type: Construction Chemicals Liquid Flash

4.4 PRIMER
Brand/type: Construction Chemicals Primer and Grout Additive

4.6 TILE ADHESIVE
Brand/type: Construction Chemicals Gripflex
Details 6mm walls, 10mm floor thickness

4.7 GROUT
Brand/type: Construction Chemicals Kemgrout Flexible

4.8 MOVEMENT CONTROL JOINTS
Brand: Construction Chemicals
Type: Construction Chemicals Kemgrout Flexible
Bond breaker: 50mm reinforced plastic tape applied to wall/wall floor junctions

4.9 MOVEMENT CONTROL JOINT SEALANT
Brand: Construction Chemicals
Type: Colour Seal

4.10 COMPRESSED FIBRE CEMENT SHEET FLOORING
Brand/type: James Hardies Ezi grid tile underlay
Thickness: 6 mm
To AS/NZS 2455.1.

6501 CARPETING

1. GENERAL

1.1 DOCUMENTS
Documents referred to in this section are:

AS/NZS 2455.1 Textile floor coverings - Installation practice, Part 1: General

The New Zealand Carpet Manufacturers' Association Conditions of Warranty and installation guide

1.2 MANUFACTURER'S DOCUMENTS
Refer to manufacturer's and supplier's documents relating to work in this section .

1.3 QUALIFICATIONS
Carpet layers to be experienced competent workers, familiar with the materials and the techniques specified and with AS/NZS 2455.1.

2. PRODUCTS

2.1 UNDERLAY
Refer to 4. SELECTIONS.

2.2 CARPET
Refer to 4. SELECTIONS.

2.3 EDGE GRIPPER, TAPES, FIXING BARS
To AS/NZS 2455.1.

2.4 BINDER BARS
Anodised aluminium section with a fluted face.

2.5 ADHESIVE, UNDERLAY
N/A

2.6 ADHESIVE, CARPET
N/A

3. EXECUTION

3.1 COMPLY
Comply with the requirements of the carpet manufacturer including preparation of and procedures over the various substrates.

3.2 SUBSTRATE
Before starting work inspect the substrate to ensure it will allow work of the required standard and that all fittings and fixtures around which the carpet is to be scribed, are in place.

3.3 PROTECTION
Protect adjoining work surfaces and finishes during installation and make good any damage to same.

3.4 TAPE
Tape for binding and seaming to be the type and width required by AS/NZS 2455.1 to suit the specified carpet and the standard of performance required.

3.5 LAYOUT
Plan the carpet layout so that: -
- seams run lengthways
- traffic runs along the seam

- light from windows is not across the seam
- pile faces away from the main natural light source.

3.6 TEMPERATURE
Acclimatise carpet to a room temperature above 15°C through the whole of the installation.

3.7 STORAGE
Keep carpet dry and protected from damage, sharp bending or folding.

3.8 PREPARE FLOOR SURFACE
Prepare floors for laying to AS/NZS 2455.1 requirements.

3.9 INSTALLATION, UNDERLAY
Installation to AS/NZS 2455.1. Lay at right angles to the carpet direction.

3.10 INSTALLATION, TAPED JOINTS
Tape carpet joints, fix grippers to floor, install underlay and carpet, to AS/NZS 2455.1.

3.11 INSTALLATION, DIRECT STICK
N/A

3.12 INSTALLATION, DOUBLE BOND SYSTEM
N/A

3.13 INSTALLATION, PRE APPLIED ADHESIVE SYSTEM
N/A

3.14 FIT STAIR NOSINGS
N/A

3.15 FIX TRIMS
Fix binder bars, carpet to carpet bars, and trims to all junctions with other materials and to carpet edges, to AS/NZS 2455.1. Ensure that all junctions with other materials are neatly formed, with bars and trims securely fastened to the substrate, 20 mm from each end and at maximum 100 mm centres.

3.16 TAKE AWAY
Take away from the site all plant and all materials not used, leaving finished floor clean and without blemish.

3.17 CLEAN
On completion thoroughly vacuum the finished carpet.

4. SELECTIONS

4.1 UNDERLAY

Brand:	To be advised
Type:	To be advised

4.2 CARPET

Location:	To ground floor bedroom, snug room, master bedroom.
Brand/type/weight/code:	To be advised

6701 PAINTING AND PAPERHANGING

1. GENERAL

1.1 DOCUMENTS
Documents referred to in this section are:

OSH publication: Guidelines for the management and removal of asbestos
Health and Safety in Employment Act 1992
BRANZ Bulletin 314: Removing paint coatings from houses

1.2 MANUFACTURER'S DOCUMENTS
Refer to manufacturers installation instructions

1.3 QUALIFICATIONS
Carry out work using competent and experienced painters and paperhangers.

1.4 HEALTH AND SAFETY
Refer to the requirements of the Health and Safety in Employment Act 1992 and if elimination or isolation is not possible, then minimise the hazards in this work.

Refer to BRANZ Bulletin 314 "Removing paint coatings from houses" for the required procedures and precautions when:
- Treating or removing lead based paint.
- Burning off paint.
- Sanding off paint.
- Using solvent based paint removers.

2. PRODUCTS

2.1 PAINT
To the paint manufacturer's standards for exterior and/or interior primers, undercoats, sealers, stains, clear coatings, solvent-borne and water-borne paints.

2.2 GAP FILLERS
Linseed oil, putty, plastic wood, wood filler or plastic filler, to suit and to match the surface being prepared.

3. EXECUTION

3.1 INSPECT
Inspect surfaces for painting and report to the owner any that will not, after the preparatory work laid down by the paint manufacturer, allow work of the required standard. Confirm that all areas have adequate lighting and are sufficiently free of other construction activities to enable painting and/or paperhanging work to proceed.

3.2 PROTECT
Cover up adjoining surfaces and areas liable to damage or over-painting.

3.3 REMOVE HARDWARE
Remove hardware and door/window furniture and replace on completion. Do not paint over permanently attached hinges, or any hardware items which cannot be removed.

3.4 PRIMING AND SEALING
Ensure that priming and sealing work needed before or during construction is carried out when required.

3.5 ENVIRONMENTAL CONDITIONS
Carry out work within acceptable temperature and humidity limits, with timber dry, all to the requirements of the paint manufacturer.

3.6 SELECTIONS
Confirm all selections, colours and finishes for both paint and wallpaper with the owner, before commencing work.

3.7 LEAD
Lead-based paint: treat as set out in BRANZ Bulletin 314 “Removing paint coatings from houses”.

3.8 ASBESTOS
Removal of coatings containing asbestos: conform with the requirements set out in the OSH publication: “Guidelines for the management and removal of asbestos”.

Preparation and painting of surface materials containing asbestos: conform with the recommendations and requirements of the paint manufacturer.

3.9 SHARP EDGES, CRACKS AND HOLES
Repair as required by the paint manufacturer.

3.10 PREPARE SURFACES
Prepare surfaces to be coated as required by the paint manufacturer. Make good all damage and defects.

3.11 PAINT APPLICATION
Apply paint by brush and/or roller to suit the location of the coating and to the paint manufacturer’s requirements. Do not spray on site without express permission.

3.12 MANUFACTURER’S MANUALS
Refer to the paint manufacturer’s manuals and follow their preparation, sequence and application requirements applying to each system. Ensure all paint coats in any system are supplied by the same manufacturer.

3.13 DEFECTIVE WORK
Correct defective work immediately. Recoating to follow the selected paint system’s requirements.

3.14 SCUFF BETWEEN COATS
Scuff between all coats to remove any dust pick-up, protruding fibres and coarse particles.

3.15 FINISHED PAINT SURFACES
Finished paint surfaces to show uniformity of gloss and colour, with the correct thickness for each coat, and freedom from painting defects. Ensure finished work is clean and free of any disfigurement.

3.16 CONFIRM WALLPAPER
Confirm that all rolls of each pattern are from the same batch.

3.17 WALLPAPER INSTALLATION
Seal or size walls. Use only full length drops, completely glued, pattern matched and hung vertically without bubbles or visible butt joints. Scribe cut paper onto surrounding trim.

3.18 CLEAN
Clean adjoining surfaces, glass and fittings of any paint contamination.

3.19 REPLACE
Replace hardware without damage to the hardware or the adjoining surfaces.

3.20 TAKE AWAY
Take away from the site unused painting materials and equipment.

4. SCHEDULES
Refer to finishes plan in drawings for painting extent. Colours to be advised.

7101 HOT AND COLD WATER SYSTEM

1. GENERAL

1.1 DOCUMENTS
Documents referred to in this section are:

NZBC G12/AS1	Water supplies
NZBC H12/AS1	Energy Efficiency
AS/NZS 2642	Polybutylene pipe fittings 2642.2: Polybutylene (PB) pipe for hot and cold water applications 2642.3: Mechanical jointing fittings for use with polybutylene (PB) pipes for hot and cold water applications
NZS 3501	Specification for copper tubes for water, gas and sanitation
NZS 4602	Low pressure copper thermal storage electric water heaters
NZS 4606	Storage water heaters 4606.3: Specific requirements for water heaters with composite shells
NZS 4607	Installation of thermal storage electric water heaters: valve-vented systems
NZS 4617	Tempering (3-port mixing) valves
DIN 8077	Polypropylene (PP) Pipe dimensions
DIN 8078	Polypropylene (PP) Pipes Types 1, 2 & 3, General Quality Requirements and Testing.

Plumbers, Gasfitters and Drainlayers Act 1976

1.2 MANUFACTURER'S DOCUMENTS
Refer to manufacturer's and supplier's documents relating to work in this section

1.3 QUALIFICATIONS
Plumbers to be experienced competent workers, familiar with the materials and the techniques specified. Carry out all work under the direct supervision of a plumber registered under the Plumbers, Gasfitters and Drainlayers Act 1976.

2. PRODUCTS

2.1 POLYETHYLENE WATER PIPE
N/A

2.2 COPPER WATER PIPE
N/A

2.3 POLYBUTYLENE WATER PIPE
N/A

2.4 POLYPROPYLENE WATER PIPE
Polypropylene pipes to DIN 8077 and DIN 8078 complete with fusion welded fittings and accessories brand-matched.

2.5 WATER METER
N/A

2.6 VALVES
Pressure reducing or limiting valve, filter, non-return valve, cold water expansion valve, pressure relief or temperature valve, pressure relief valve and isolating valves to NZBC G12/AS1: Water supplies.

2.7 TEMPERING VALVE
Tempering valve to NZS 4617 to NZBC G12/AS1: Water supplies.

2.8 TANKS
Pre-formed black polyethylene complete with access opening and lid and overflow tray.

Materials - hot water heating appliances

2.9 ELECTRIC HOT WATER CYLINDER, MAINS PRESSURE
N/A

2.10 ELECTRIC HOT WATER CYLINDER, LOW PRESSURE
N/A

2.11 ELECTRIC HOT WATER CYLINDER, UNDER-SINK, LOW PRESSURE
N/A

2.12 ELECTRIC BOILING CYLINDER, WALL MOUNTED
N/A

2.13 HOT WATER HEATER, STORAGE TYPE
Insulated cylinder as part of solar hot water system.

2.14 GAS HOT WATER HEATER, CONTINUOUS FLOW TYPE
N/A

Components

2.15 INSULATION
Pre-formed pipe sections complete with bends and fittings, with fixing tape to the manufacturer's requirements.

2.16 PROTECTIVE TAPE
Plasticised PVC tape system with primer, mastic fixing and outer coating.

3. EXECUTION

3.1 HANDLE AND STORE
Handle and store pipes, fittings and accessories to avoid damage. Store on site, under cover on a clean level area, stacked to eliminate movement and away from work in progress.

Store tapware in a shelved, dry and securely locked area. Retain tapware in the manufacturer's original packaging, complete with all fixings and installation instructions. Label each unit separately with its space/fixture number to match.

3.2 EXECUTION GENERALLY
Generally carry out the whole of this work and tests to NZBC G12/AS1.

3.3 CORE HOLES AND SLEEVES
Review location and fit core holes and sleeves as needed throughout the structure in conjunction with the boxing, reinforcing and placing of concrete. Strip core holes and make good after installation of pipework.

3.4 CONCEAL
Conceal pipework within the fabric of the building unless detailed otherwise. Satin finish chrome plate exposed work, complete with matching ferrule at the surface penetration.

3.5 CORROSION
Separate all metals subject to electrolytic action from each other and from treated timber, concrete and other lime substances by space, painting of surfaces, taping, or separator strips.

3.6 THERMAL MOVEMENT
Accommodate movement in pipes resulting from temperature change by the layout of the pipe runs, by expansion joints and by sleeving through penetrations.

3.7 PIPE SIZE
Flow rates to each outlet to be no less than those given in NZBC G12/AS1: Water supplies, table 3, Acceptable flow rates to sanitary fixtures. Pipe size as determined in table 4, Tempering valve and nominal pipe diameters.

3.8 ELECTROLYTIC ACTION
Avoid electrolytic action by eliminating contact or continuity of water between dissimilar metals.

3.9 EXCAVATE
Excavate for the water main to a firm, even trench base in straight runs. Allow to backfill.

Application – pipework installation

3.10 WATER MAIN
Lay a minimum of 500 mm below ground level (600 mm under driveways) from the bore, through a gate valve.

3.11 COPPER WATER SUPPLY
N/A

3.12 POLYBUTYLENE/POLYETHYLENE WATER SUPPLY
N/A

3.13 POLYPROPYLENE WATER SUPPLY
Size the piping layout to eliminate loss of pressure at any point by simultaneous draw-off. Run pipes complete with all fittings, support and fixing, fusion weld joins and install to manufacturers specifications, all to NZBC acceptable solution G12/AS1. Conceal pipework and pressure test before the wall linings are fixed.

3.14 OUTLET LOCATIONS
Ensure wall outlets for exposed pipes are level and centred on the fixture to ensure the neat installation of exposed pipework.

Application - hot water systems

3.15 INSTALLING HOT WATER PIPE INSULATION
Insulate all hot water pipes to NZBC H12/AS1 and to the insulation manufacturer's instructions. Cut insulation sections tight between timber framing and tight between the webs of steel studs. Where hair felt is used, wrap around pipes in two layers in opposite directions and secure with galvanized steel wire ties.

3.16 INSTALL ELECTRIC HOT WATER CYLINDERS AND BOILING CYLINDERS
N/A

3.17 INSTALL HOT WATER HEATER, STORAGE TYPE
Install where shown complete with all the necessary fittings to the cylinder manufacturer's requirements and in accordance with NZBC G12 and solar system manufacturers installation instructions.

3.18 INSTALL GAS HOT WATER HEATER, CONTINUOUS FLOW TYPE
N/A

3.19 INSTALL TEMPERING VALVE
Install 1 metre minimum from outlet of hot water cylinder and to manufacturer's instructions.

3.20 PENETRATIONS
Provide and fit collars and escutcheon plates to match the pipework at all penetrations through constructions.

Installation – tapware

3.21 INSTALLING APPLIANCE ISOLATING VALVES - CONCEALED
Install isolating valves for appliances in accessible positions. Locate in adjacent cupboards and position to allow for easy connection and operation.

3.22 INSTALL TAPWARE
Install taps and faucets to the manufacturer's requirements. Flush out on completion. Check that washers or ceramic discs are operating correctly.

3.23 INSTALL HOT WATER CYLINDER OVERFLOW TRAY
Install drained overflow tray to hot water cylinder to NZBC G12/AS1.

3.24 LEAVE
Leave water services in proper working order. Pressure test to ensure no leakage and leave in proper working order.

3.25 CLEAN
Clean tapware and fittings. Remove unused materials from the site.

4. SELECTIONS

Refer to specific solar specification in appendix also

Water main

4.2 WATER PIPE
Material: polypropelene

4.9 HOT WATER HEATER, STORAGE TYPE AS PART OF COMPLETE SOLAR SYSTEM

Brand:	Solar system to be advised
Cylinder model number and capacity:	220 litre stainless steel – confirm with chosen system
Pump	As supplied with above system
Probes/sensors	As supplied with above system
Controller	As supplied with above system
Solar panel	3000x1200mm – confirm with chosen system

4.18 TAPS AND FAUCETS

Note: Selections to be advised. All fittings to be low water usage type

Fitting location	Tap type	Brand
Basins:	Pillar taps 15 mm	TBA
	Faucet 15 mm	TBA
Shower:	Rose	TBA
	Mixer	TBA
Bath:	Bib taps 20 mm	TBA
	Faucet 20 mm	TBA
Sink:	Bib taps 15 mm	TBA
	Faucet 15 mm	TBA
WC cisterns:	Stop tap 15 mm	Proprietary
Washing machine:	Stop taps 15 x 20 mm	Proprietary
Dishwasher:	Stop taps 15 x 20 mm	Proprietary
Waste disposer:	Stop cock	Proprietary
Standpipes:	Hose tap 15 mm	Proprietary
Hot water cylinder:	Stop cock	Proprietary

7401 RAINWATER SYSTEMS

1. GENERAL

1.1 DOCUMENTS
Documents referred to in this section are: -

AS 1397 Steel sheet and strip - hot-dipped, zinc-coated or aluminium/zinc-coated

BRANZ Bulletin 304: Flashing design.
BRANZ Bulletin 465: Domestic flashing installation.

1.2 MANUFACTURER'S DOCUMENTS
Refer to manufacturer's and supplier's documents relating to work in this section .

1.3 QUALIFICATIONS
Workers to be either competent craftsman plumbers, or registered plumbers working under the direction of a craftsman plumber, or roofers, familiar with the materials and techniques specified.

2. PRODUCTS

uPVC

2.1 uPVC SPOUTING
Rainwater system to AS 1273, profile, jointing, brackets, rainwater heads and fittings brand matched and complete to the manufacturer's requirements.

2.2 uPVC DOWNPIPES
To suit the spouting system, pipes solvent cement jointed and complete with stand-off brackets, galvanised screws and accessories, brand matched and complete to the manufacturer's specifications.

Galvanized steel

2.3 GALVANIZED SHEET STEEL
N/A

2.4 GALVANIZED STEEL SPOUTING
N/A

2.5 GALVANIZED STEEL DOWNPIPES
N/A

Aluminium/zinc alloy coated steel

2.6 ALUMINIUM/ZINC ALLOY COATED SHEET STEEL
N/A

2.7 ALUMINIUM/ZINC ALLOY COATED STEEL SPOUTING
N/A

2.8 ALUMINIUM/ZINC ALLOY COATED STEEL DOWNPIPES
N/A

Aluminium/zinc alloy coated pre-painted steel

2.9 ALUMINIUM/ZINC ALLOY PRE-PAINTED SHEET STEEL
N/A

2.10 ALUMINIUM/ZINC ALLOY COATED PRE-PAINTED STEEL SPOUTING
N/A

2.11 ALUMINIUM/ZINC ALLOY COATED PRE-PAINTED STEEL DOWNPIPES
N/A

Copper

2.12 COPPER SHEET
N/A

2.13 COPPER SPOUTING
N/A

2.14 COPPER DOWNPIPES
N/A

Materials - concealed spouting system

2.15 CONCEALED FASCIA/BARGE SPOUTING SYSTEM
N/A

Materials - fascia/barge system

2.16 EXTERNAL FASCIA/BARGE SPOUTING SYSTEM
N/A

2.17 METAL FASCIA AND BARGE CONCEALED SPOUTING
N/A

General

2.18 RAINWATER HEADS, DROPPERS, OVERFLOWS
N/A

2.19 FLASHINGS GENERALLY
0.55 mm sheet steel galvanized to AS 1397, aluminium/zinc coated to AS 1397, 1.8 mm (20 kg/m^2) copperised pure lead, 0.5 mm half hard copper sheet, or proprietary rubberised perforated aluminium strip, all to location, compatibility and design requirements of BRANZ Bulletin 304 Flashing design.

2.20 DOMES
Wire mesh in round form with legs to clip inside the outlet opening to the downpipe.

3. EXECUTION

3.1 ELECTROLYTIC ACTION
Avoid electrolytic action by eliminating contact or continuity of water between dissimilar metals.

Check compatibility of metals used for rainwater goods, against the materials used for roofing and flashings. Notify any incompatibility to the owner and obtain written approval for amendments to selections.

3.2 LIAISON
Ensure liaison with associated installations to confirm material selections are compatible and required flashing work is completed.

3.3 INSTALLATION GENERALLY
Install and fix spouting and downpipes to the manufacturers requirements. Install system to properly drain water from the roof area and so that water will not enter the building under overflow conditions.

uPVC

3.4 FIT uPVC SPOUTING
From high points fix brackets true-to-line to give a fall of 5 mm every 10 metres to outlets. Allowing for necessary expansion, fit expansion joiners, assemble and fit spouting to brackets complete with all accessories solvent welded or rubber sealed.

3.5 FIT uPVC DOWNPIPES
Assemble downpipes, solvent welded complete, fit to outlets, galvanised screw fix with pipe clips to rigidly stand 25 mm off the wall, plumb and discharging into the stormwater gully or pipe inlet to the downpipe manufacturer's required practice.

Galvanized steel

3.6 FIT GALVANIZED STEEL SPOUTING
N/A

3.7 FIT GALVANIZED STEEL DOWNPIPES
N/A

Aluminium/zinc alloy coated steel

3.8 FIT ALUMINIUM/ZINC ALLOY COATED STEEL SPOUTING
N/A

3.9 FIT ALUMINIUM/ZINC ALLOY COATED STEEL DOWNPIPES
N/A

Aluminium/zinc alloy coated steel pre-painted

3.10 FIT ALUMINIUM/ZINC ALLOY COATED STEEL PRE-PAINTED SPOUTING
N/A

3.11 FIT ALUMINIUM/ZINC ALLOY COATED STEEL PRE-PAINTED DOWNPIPES
N/A

Copper

3.12 FIT COPPER SPOUTING
N/A

3.13 FIT COPPER DOWNPIPES
N/A

Application - fascia and barge concealed spouting system

3.14 INSTALL FASCIA AND BARGE CONCEALED SPOUTING SYSTEM
N/A

3.15 INSTALL RAINWATER HEADS
N/A

3.16 INSTALL OVERFLOWS
N/A

General

3.17 FLASHINGS
Scribe fit, fold, lap, seam, or run solder as required by the metal, to flash all roof penetrations, roofing and exterior joinery to prevent weather penetration. Except at expansion joints, provide 2 rows of rivets to overlapping sheet joints. Install and fix flashings and flashing joints to the criteria stated in BRANZ Bulletins 304 Flashing design and 465 Domestic flashing installation.

3.18 INSTALL DOMES
Install wire mesh domes at the top of downpipes.

3.19 INSTALL SPOUTING MESH
Install mesh into spoutings, strictly in accordance with the mesh manufacturer's requirements.

3.20 FLASH ROOF LIGHTS
Flash to roofing to the manufacturer's specifications.

3.21 LEAVE
Leave rainwater services in proper working order and all flashing work completed to keep the building weathertight.

3.22 CLEAN UP
Wash out gutter daily and on completion to remove swarf. Take away from the site unused materials and elements.

4. SELECTIONS

uPVC

4.1 uPVC SPOUTING
150mm half round marley magnum spouting

4.2 uPVC DOWNPIPES

Brand/type:	Marley
Size:	80 mm

7402 SANITARY PLUMBING

1. GENERAL

1.1 DOCUMENTS
Documents referred to in this section are:

NZBC G1/AS1	Personal hygiene 2.0 Fixture construction and installation 3.0 Location of sanitary fixtures
NZBC G13/AS1	Foul water - sanitary plumbing
AS/NZS 1260	PVC pipes and fittings for drain, waste and vent applications
AS/NZS 3500	Plumbing and drainage Part 2: Sanitary plumbing and drainage
NZS 7641	Unplasticised PVC waste and ventilating pipe, fittings and accessories, 32 mm, 40 mm and 50 mm

Plumbers, Gasfitters and Drainlayers Act 1976

1.2 MANUFACTURER'S DOCUMENTS
Refer to manufacturer's and supplier's documents relating to work in this section.

1.3 QUALIFICATIONS
Carry out work by or under the direct supervision of a person registered under the Plumbers, Gasfitters and Drainlayers Act 1976.

2. PRODUCTS

2.1 uPVC WASTE, SOIL AND VENT PIPES
uPVC pipe to NZS 7641 and AS/NZS 1260 complete with fittings brand-matched to the pipe manufacturer's requirements.

2.2 EXPOSED PIPES AND TRAPS
Chrome plate on copper pipes and associated copper and brass fittings.
White polybutylene or PVC, including all associated fittings.

2.3 SEALANT, SANITARY FIXTURES
For between sanitary fixtures and accessories and adjacent floor or wall surfaces.
1-part, silicone, containing mildew resistant agents.
Colour: White

3. EXECUTION

3.1 EXECUTION GENERALLY
Carry out this work and complete all tests to AS/NZS 3500 Part 2
Carry out this work and complete all tests to NZBC G1/AS1: 2.0, 3.0 and G13/AS1.

3.2 ELECTROLYTIC ACTION
Avoid electrolytic action by eliminating actual contact or continuity of water between dissimilar metals.

3.3 INSTALL SANITARY FIXTURES
Fit and install sanitary fixtures and associated screens, elements and hardware, plumb, true to line and rigid, to the fixture manufacturer's requirements. Supply standard chrome plated brass wastes and plastic plugs on chrome plated chains with all basins, tubs and baths.

3.4 INSTALL TRAPS, WASTE AND VENT PIPES
Connect waste outlets to traps and run waste pipes and back vents concealed, sized and fixed to AS/NZS 3500 Part 2/NZBC G13/AS1. Discharge wastes into the drainage

system stack, soil pipe, or gully trap as shown. Bird proof mesh to all roof vents and vermin proof mesh to all untrapped waste pipes.

3.5 INSTALL ELECTRIC PAN VENTS
N/A

3.6 PENETRATIONS
At penetrations through constructions provide and fit collars and escutcheon plates to match pipework.

3.7 INSTALL SANITARY ACCESSORIES
Install sanitary accessories as selected.

3.8 TEST
Test soil and waste disposal systems to ensure no leakage exists and leave in proper working order.

3.9 CLEAN UP
Remove labels and clean fittings. Remove unused materials from the site.

4. SELECTIONS

4.1 COPPER WASTE, SOIL AND VENT PIPES
N/A

4.2 uPVC WASTE, SOIL AND VENT PIPES
Brand/type: Marley

4.3 SANITARY FIXTURES
Refer to 4601 GLAZING for frameless shower and bath screens.
Refer to 5503 BATHROOM AND TOILET FIXTURES for bathroom and toilet accessories.

Note: All selected fittings to be low water usage type.

Fixture	Location	Model Size Colour
WC pans:	Upstairs ensuite, downstairs bathroom, laundry	TBA
WC cisterns:	Upstairs ensuite, downstairs bathroom, laundry	TBA
WC seats:	Upstairs ensuite, downstairs bathroom, laundry	TBA
Wash hand basins:	Upstairs ensuite, downstairs bathroom,	TBA
Shower bases:	Downstairs bathroom	TBA
Shower traps:	Downstairs bathroom	TBA
Shower cubicles:	Downstairs bathroom	TBA
Shower door/surrounds:	Downstairs bathroom, upstairs bathroom	TBA
Baths:	Upstairs ensuite,	TBA
Waste disposer:	Kicthen	TBA
Sink bench:	Kitchen	TBA
Floor wastes:	Upstairs ensuite,	Dux
Laundry Tub	Laundry	TBA

7403 DRAINAGE

1. GENERAL

1.1 DOCUMENTS
Documents referred to in this section are:

NZBC B1/AS1	Structure – general, 6.0 Drains
NZBC E1/AS1	Surface water
	3.0 Drainage system materials and construction
NZBC G13/AS2	Foul Water – drainage
AS/NZS 1254	PVC pipes and fittings for storm and surface water applications
AS/NZS 1260	PVC pipes and fittings for drain, waste and vent applications
AS/NZS 1546.1	Septic tanks
AS/NZS 1547	On site domestic wastewater management
AS/NZS 4130	Polyethylene pressure pipes (PE)
AS/NZS 4671	Steel reinforcing materials
NZS 3107	Precast concrete drainage and pressure pipes
NZS 3104	Specification for concrete production
AS/NZS 3500	Plumbing and drainage
	Part 2: Sanitary plumbing and drainage
	Part 3: Stormwater drainage
NZS 7643	Installation of unplasticised PVC pipe systems

Plumbers, Gasfitters and Drainlayers Act 1976

1.2 MANUFACTURER'S DOCUMENTS
Refer to manufacturer's and supplier's documents relating to work in this section.

1.3 AS-BUILT DRAWINGS
Supply a 1:100 scale as-built drawing of drains and fittings to the territorial authority and to the owner on completion.

1.4 QUALIFICATIONS
Drainlayers to hold a current licence within the terms of the Plumbers Gasfitters & Drainlayers Act 1976 and be experienced, competent and familiar with the materials and techniques specified.

2. PRODUCTS

2.1 CONCRETE
17.5 MPa prescribed mix to NZS 3104.

2.2 REINFORCEMENT
Plain round and/or deformed steel bars, Grade 300 to AS/NZS 4671

2.3 uPVC PIPES
uPVC Pipes bends, junctions, fittings and joints to AS/NZS 1254 and AS/NZS 1260.

2.4 FIELD DRAINS
Plastic piping for field drains perforated (straight sections or coiled) with filter fabric to prevent silting of the pipe.

2.5 GULLY TRAPS
To NZBC G13/AS2: 3.3, complete with grating.

2.6 SURFACE WATER SUMP GRATINGS
Cast iron frame with lift-up grating.

2.7 STRIP DRAIN CHANNEL
Proprietary, modular, variable invert, PVC or precast concrete drainage channel sections and drainage sump, embedded in site concrete and fitted with selected metal gratings.

2.8 INSPECTION COVERS
Cast iron frame with screw-down cover.

2.9 DRAINAGE AND FILLING MATERIALS

Granular:	Clean gravel or crushed stone or a blend of these. Particle size from minimum 7 mm to maximum 20 mm.
Selected:	Fine grain soil or granular material suitable for bedding; excluding topsoil.
Ordinary:	Top soil or other excavated materials.

2.10 SEPTIC TANKS
N/A

3. EXECUTION

3.1 EXCAVATE
Excavate for drains to a firm even base with correct gradients set in straight runs.

3.2 MANUFACTURER'S REQUIREMENTS
All drainage installations to the pipe and fitting manufacturer's requirements.

3.3 DRAINAGE GENERALLY
Carry out drainage work and tests to AS/NZS 3500 Part 2 (sanitary drainage) AS/NZS 3500 Part 3 (stormwater drainage) as modified by NZBC B1/AS1: 6.0. Lay uPVC pipe systems to relevant sections of NZS 7643.

3.4 LAY FOUL WATER DRAINS
Lay drains in straight runs to correct gradients, to discharge into the network utility operator's sewer. Set inspection fittings on a concrete base.

3.5 INSTALL GULLY TRAPS
Set on concrete 50 mm above the surrounding ground or paving and brought up to protect the top of the fitting. Trowel off.

3.6 LAY STORMWATER DRAINS
Confirm the required location of downpipes and finished ground levels before commencing pipework. Set downpipe bends in concrete with the concrete brought up to protect the top of the bend from damage. Lay drains in straight runs to correct gradients to discharge into the network utility operator's stormwater system.

3.7 LAY SUBSOIL DRAINS
N/A

3.8 LAY SUBSOIL DRAINS TO BASEMENT WALLS
N/A

3.9 INSTALL STRIP DRAIN CHANNEL
N/A

3.10 INSTALL SURFACE WATER SUMP
To NZBC E1/AS1, complete with ceramic half-siphon pipe and cast iron frame with a lift out grating.

3.11 INSTALL STORMWATER INSPECTION CHAMBERS
To NZBC E1/AS1, with a 75 mm fall across the chamber and with channels to form a cascade where necessary. Channel top should be 100 mm above the pipe soffit. Bench from channels at 1V on 10H. Benching should be made of 17.5 MPa concrete vibrated to smooth finish. Plastering is not allowed. Fit a cast iron cover and frame.

3.12 INSTALL FOUL WATER INSPECTION CHAMBERS
To NZBC G13/AS2, with ceramic channels to form a 75 mm fall across the chamber. Channel top should be 100 mm above the pipe soffit. Bench from channels 1V on 10H. Benching should be made of 17.5 MPa concrete vibrated to smooth finish. Plastering is not allowed. Fit a cast iron cover and frame.

3.13 SOAKHOLES OR TRENCHES
Dispose of stormwater on site as shown on the drawings, by soakage, to suit local geology and soil structure; all as directed by the territorial authority.

3.14 CONCRETE ENCASEMENT
Concrete encase shallow drains and drains under driveways, on a 100 mm deep 17.5 MPa concrete bed reinforced with three 10 mm mild steel bars. Surround pipes with a polythene membrane to allow movement and encase in 100 mm 17.5 MPa concrete.

3.15 FIELD TEST
Field test drains for watertightness (UPVC to NZS 7643 section 11) to the satisfaction of the territorial authority inspector.

3.16 BACKFILL
Backfill drain lines in 150 mm layers, well tamped but without disturbing the drains. Finish off with 150 mm of topsoil, slightly mounded above the finished ground line.

3.17 INSTALL SEPTIC TANK SYSTEM
N/A

3.18 INSTALL AERATED WASTEWATER TREATMENT SYSTEM
N/A

4. SELECTIONS

4.2 uPVC PIPES
Brand/type: Marley

7701 ELECTRICAL

1. GENERAL

1.1 DOCUMENTS
Documents referred to in this section are:

NZBC F6/AS1	Lighting for emergency
NZBC F7/AS1	Warning systems, 3.1 Domestic smoke alarms
NZBC F8/AS1	Signs
AS/NZS 2293	Emergency evacuation lighting for buildings
AS/NZS 3000	Electrical regulations - Buildings, structures and premises
AS/NZS 3008	Electrical installations - Selection of cables 3008.1.2: Typical New Zealand installation conditions
AS/NZS 3086	Telecommunications installations – Integrated telecommunications cabling systems for small office/home office premises.
AS 3786	Smoke alarms
NZS 6401	PVC-insulated cables for electric power and lighting

Electricity Regulations 1997
New Zealand electrical codes of practice (ECP)

1.2 MANUFACTURER'S DOCUMENTS
Refer to manufacturer's and supplier's documents relating to work in this section.

1.3 COMPLY
Comply with the Electricity Regulations 1997, AS/NZS 3000, AS/NZS 3008.1.2 and the New Zealand electrical codes of practice for listed and prescribed work and with the utility network operator's requirements. Apply for the service connection. Arrange for the required inspections of listed work. Pay all fees.

1.4 QUALIFICATIONS
Carry out work by or under the direct supervision of a holder of a practising licence under the Electricity Regulations 1997.

1.5 CERTIFICATE OF COMPLIANCE
Supply a certificate of compliance to the owner, as required by the Electricity Regulations 1997, and in particular, clauses 16, 34 and 35. Allow the network utility operator to view before the meter installation, listed work inspection, polarity check and livening of supply.

2. PRODUCTS

2.1 MAINS SUPPLY, SINGLE PHASE
Tough plastic sheathed neutral screened cable to NZS 6401 and AS/NZS 3008.1.2, with a minimum rating of 60 amps per phase. Include pilot cable where required by network utility company.

2.2 CABLES
Tough plastic sheathed copper conductors to NZS 6401, stranded above 1.0 mm^2, and to AS/NZS 3008.1.2. Minimum sizes as below. Increase sizes if the method of installation, thermal insulation, cable length or load will reduce the cable rating below that of the connected load, or produce an excessive voltage drop.

Lighting circuits:	Domestic: 1.0 mm^2 on 10 amp MCBs
Lighting circuits:	Commercial: 1.5 mm^2 on 16 amp MCBs
Power circuits:	1.5 mm^2 on 16 amp MCBs for domestic and unenclosed or unfilled cavity construction 2.5 mm^2 on 16 amp MCBs for domestic insulated construction, or filled cavity 2.5 mm^2 on 20 amp MCBs for unenclosed or unfilled cavity construction

2.5 mm^2 on 16 amp MCBs for insulated construction, or filled cavity, or lengths over 30 metres

Range circuits: Single phase: 6 mm^2 on 32 amp MCBs

Heat resistant cable for final connections to all heated appliances, and high temperature cable in ambient conditions may be above 35°C.

2.3 DATA WIRING
To AS/NZS 3086.

2.4 METER BOX
Proprietary manufactured, zinc plated powder coated metal case, or ABS plastic, with glazed panel door, weatherproof if mounted outdoors, and complete with meter mounting, main switch and fuse.

2.5 DISTRIBUTION BOARD
Proprietary manufactured, zinc plated powder coated, or heavy duty plastic, fire resistant enclosed construction, complete with neutral and earth busbars, MCBs, 30 mA RCDs and 60 amp main switch, complete with 20% spare capacity to AS/NZS 3000. Include 2 spare MCBs labelled as “spare”. All protective devices: 6kA MCBs of the appropriate rating.

2.6 MINIATURE CIRCUIT BREAKERS
Miniature moulded case circuit breakers

2.7 WALL BOXES
Standard size in plastic, with 2 or more gang size in metal, all screw fixed.

2.8 SWITCH UNITS
Sixteen amp minimum rated, 230 volt polycarbonate flushplate units. Refer to drawings/schedules for number of switches per unit, dimmer units, neon (indicator or toggle) units, locator units and 2 way units

2.9 HOT WATER SYSTEM SWITCH
One way 20 amp switch complete with cable clamp for flexible PVC conduit to element enclosure.

2.10 SWITCHED SOCKET UNITS
Ten amp, 230 volt polycarbonate flushplate 3 pin flat NZS combination switch units, single or multi gang as detailed.

2.11 SMOKE ALARMS
Battery powered smoke detector .

2.12 CEILING ROSES
White plastic mounting base with screwed cover. Terminal type. Cylindrical section TPS for suspended fittings. Refer to lighting plan for required ceiling roses

2.13 BATTEN HOLDERS
Standard white plastic bayonet cap, with cap angled where wall mounted. Brass liners.

2.14 DOOR BELL SYSTEM
Complete with transformer for mounting on distribution board.

2.15 TV AERIAL
Freeview satellite dish to be installed

2.16 GARAGE DOOR CONTROLLERS
N/A

2.17 LIGHT FITTINGS
Fluorescent and High Intensity Discharge fittings with low loss control gear and power factor corrected to 0.90 minimum. Control gear suitable for dimming if this is required. All fittings complete with lamps; Incandescent GLS lamps pearl, coiled-coil 240v rated,

bayonet cap; Fluorescent triphosphor 2700K; halogen ELV 12v dichroic reflector with cover glass unless detailed otherwise.

3. EXECUTION

3.1 MAIN SUPPLY
Lay underground mains to the network utility operator's requirements. Excavate trench, install cable and marker tape and backfill.

3.2 METER BOX
Fit to meter box manufacturer's and network utility operator's requirements where detailed. Recess into external wall and flash to weatherproof. Arrange for meter installation and connection.

3.3 DISTRIBUTION BOARD
Fit to board manufacturer's requirements where detailed. Recess into wall and ensure fire containment properties of the enclosure is maintained.

3.4 CIRCUIT PROTECTION
Install MCBs to protect each final sub circuit sized for circuit maximum loading.

3.5 EARTH LEAKAGE PROTECTION
RCD protection to AS/NZS 3000

Domestic
Install RCD protection at the switchboard of final sub circuits controlling socket outlets except for:
- Fixed cooking equipment
- Lighting

Residential (other than single and multiple domestic)
Install RCD protection at the switchboard of final sub circuits controlling socket outlets except for:
- Fixed cooking equipment
- Lighting

Do not install RCDs for:
- Socket outlets positioned over 2300 mm above floor level
- Appliances rated at less than 150 watts

Commercial
Install RCD protection at the switchboard or at the outlet for socket outlets up to 20 amps installed in:
- Wet areas: bathrooms, laundries, kitchens
- Near pools and water features
  Where intended for use with cleaning equipment

3.6 SET-OUT
Unless specifically detailed, the position of outlets and equipment shown on drawings is indicative of requirements. Study documents and site conditions to ensure no conflict with other services or features will arise. Resolve conflicts and discrepancies before proceeding with work affected. Confirm on site the exact location, disposition and mounting heights of all outlets, fittings, equipment, penetrations, and use of exposed wiring. Fix outlet items level, plumb and in line.

3.7 CABLING
Install with a maximum of 10 light outlet units or 6 double or single switched socket units on any circuit. Minimum 2 lighting circuits per floor. Separate circuits for all electric heating appliances. Kitchen sockets to be on at least two different circuits. All cabling run concealed. No TPS cable laid directly in concrete.

Locate holes in timber framing for the passage of cables at the centre line of the timber member. Install cable in conduits where required to pass through concrete or underground.

In walls run cabling horizontally and vertically in straight lines.
In ceilings either run cabling along ceiling framing or attached to catenary wires. Clip cabling to ceiling framing/catenary wires.

3.8 WALL BOXES
Flush mounted in cavity construction. Fix vertically mounted wall boxes to studs. Fix horizontally mounted switched socket outlet wall boxes to solid blocking or nogs. Fix switch panel wall boxes to solid blocking.

3.9 SWITCH AND SOCKET UNITS
Fit all single and double switch units and socket at the following heights (to the centre of the unit) unless shown otherwise on the drawings.

Switch Units:	1000 mm
Socket Units:	150 mm above work benches
	400 mm elsewhere

Mount light switches and switch socket outlets vertically and socket units horizontally. Label all switch units that control electrical equipment or special lighting circuits by colour filled engraving on the switch.

3.10 ISOLATING SWITCHES
Locate isolating switches in agreed positions when not specifically shown on the drawings.

3.11 LIGHT FITTINGS
Install light fittings in locations and at heights detailed, and in accordance with the fitting manufacturer's requirements.

3.12 EXTRA LOW VOLTAGE LIGHTING
Where remote transformers are used for ELV lamps, connect from transformer to lamp with minimum 2.5 mm^2 conductor, to ensure voltage drop in transformer and conductor does not exceed 0.8 volts. Connect lamps 50 watt or greater matched to no more than one per transformer, located as close as practicable to the lamp. Ensure transformers and rear of light fittings are adequately ventilated and clear of any thermal insulation.

3.13 EMERGENCY AND EXIT LIGHT FITTINGS
N/A

3.15 EARTH BONDS
Bond together and to earth all plumbing fittings not adequately isolated, to AS/NZS 3000; the Electricity Regulations 1997 and the fitting manufacturer's requirements.

3.16 TELEPHONE WIRING
Install telephone cable to telephone outlet positions shown on the drawings. Install in conduit for outlets on masonry surface. Fix and connect BT jack point outlets to NZ Telecom requirements and terminate wiring at incoming terminal block.

3.17 TELEPHONE DRAW WIRES
Supply draw wires from accessible positions for the telephone outlets shown on the drawings. Install in conduit for outlets on masonry surface.

3.18 DATA WIRING
N/A

3.19 TV AERIAL
Fit new Freeview satellite dish to roof - Sky TV installation practices minimum.

3.20 SPACE HEATERS
N/A

3.21 CONNECT UNDERTILE HEATING
Allow to connect selected under tile heating pad system.

3.22 CENTRAL VACUUM SYSTEM
N/A

3.23 SECURITY SYSTEM
N/A

3.24 MANUAL FIRE ALARM SYSTEM
N/A

3.25 SMOKE ALARMS
Install smoke alarms to NZBC F7/AS1 and to the alarm manufacturer's requirements, fitted neatly and without damage to the surrounding finish.

3.26 ELECTRIC POWERED FITTINGS AND EQUIPMENT
Install and wire fittings and equipment to individual fittings and equipment manufacturer's requirements. Refer to the drawings for required layouts and locations for equipment. Refer to 4 SELECTIONS for schedules of fittings.

3.27 BATHROOM ELECTRICAL FIXTURES
Install electrical fixtures specified in other parts of this specification. Connect the following bathroom and toilet electrical items: -

- Heated towel rails:	Install to manufacturers requirements.
- Extract fans:	Install to manufacturers requirements.
- Under tile heating pad:	Install to manufacturers requirements.
-Mirro demister	Install to manufacturers requirements.

3.29 MAIN EARTH
Provide a plastic toby box or UPVC tube to contain and protect the earth pin. Fix the connecting earth wiring closely and securely against wall surfaces.

3.30 LABELLING
Complete all labelling in clear machine printed permanent manner. Include label under each controller, switch and circuit breaker on distribution boards. Include a warning notice if light dimmers are used in the installation. List the rating of each circuit.

3.31 COMPLETION
Leave work operating correctly, with equipment clean and all lamps operational.

4. SELECTIONS

Materials

4.1 SELECTIONS
Confirm selections of all outlet fittings and hardware with the owner in writing before ordering.

4.3 OUTLETS

Item	Brand/model number	Colour
Switch units:	HPM	Stainless Steel face plate
Switched socket outlets:	HPM	Stainless Steel face plate

4.4 INTERNAL LIGHT FITTINGS

Fitting	Brand and code	Type	Tube or bulb	Number off
Pendant lights:	TBA	TBA	TBA	TBA
Ceiling lights:	TBA	TBA	TBA	TBA
Wall lights:	TBA	TBA	TBA	TBA
Spotlights:	TBA	TBA	TBA	TBA

4.5 EXTERNAL LIGHT FITTINGS

Fitting	Brand and code	Type	Tube or bulb	Number off
Wall lights:	TBA	TBA	TBA	TBA

4.7 HEATED TOWEL RAILS

Location	Brand and code
Bathroom	chrome ladder type to suit space available (TBA)

4.9 BATHROOM FANS

Location	Brand and code
Bathroom and toilet	Ecco Pacific Punto Filo 28w extract fan

4.10 ELECTRIC-POWERED APPLIANCES

Item	Location	Brand and code
Range:	Kitchen	TBA
Wall oven:	Kitchen	TBA
Cooker top:	Kitchen	TBA
Waste disposal unit:	Kitchen	TBA
Range hood:	Kitchen	TBA
Dishwasher	Kitchen	TBA

8231 INTERLOCKING PAVING

1. GENERAL

Related work

1.1 RELATED SECTIONS
For sub base preparation refer to 8221 SUB BASES TO SEALING AND PAVING

Documents

1.2 DOCUMENTS REFERRED TO
Documents referred to in this section are :

AS/NZS 4455	Masonry units and segmental pavers
AS/NZS 4456	Masonry units and segmental pavers - Methods of test
NZS 3108	Concrete production - ordinary grade
NZS 3116	Concrete segmental paving

Documents listed above and cited in the clauses that follow are part of this specification. However, this specification takes precedence in the event of it being at variance with the cited document.

1.3 MANUFACTURER'S DOCUMENTS
Refer to manufacturer's and supplier's documents relating to work in this section.

Requirements

1.4 QUALIFICATIONS
Pavers to be experienced competent workers, familiar with the materials and the techniques specified.

2. PRODUCTS

Materials

2.1 INTERLOCKING CONCRETE PAVING BLOCKS
To NZS 3116 for materials, design shape and dimensions, skid resistance, physical condition.
Compressive strength: 40 MPa
Flexural strength: 6 MPa

2.2 INTERLOCKING CLAY PAVERS
Clay paver bricks dried and fired to AS/NZS 4455 for materials and dimensions and to AS/NZS 4456 for skid resistance and transverse strength, and with a compressive strength of 45 MPa.

Accessories

2.3 BEDDING SAND
Hard, durable, angular particles to NZS 3116 and to the grading limits of table 4.

2.4 STABILISED BEDDING SAND
Hard, durable, angular particles to NZS 3116 and to the grading limits of table 4, with 5% Portland cement added and well mixed.

2.5 JOINTING SAND
Hard, durable, angular particles, with no pumice particles and to NZS 3116 and to the grading limits of table 5.

2.6 STABILISED JOINTING SAND
Proprietary, hard, durable, angular particles, with no pumice particles and to NZS 3116 and to the grading limits of table 3.

2.7 PRECAST CONCRETE EDGE RESTRAINTS
Precast concrete kerbing.

2.8 PVC EDGE RESTRAINTS
Proprietary flexible PVC restraint system.

2.9 CONCRETE
Ordinary grade to NZS 3108 (except where specified otherwise).

Haunching concrete:	17.5 MPa
Infill concrete:	25 MPa.

Finishes

2.10 SEALER
A clear, low viscosity urethane prepolymer liquid.

3. EXECUTION

Conditions

3.1 STORAGE
Take delivery of blocks and pavers in protected pallets, undamaged and dry. Store on level hard standings, protect from damage and keep dry until laid.

3.2 DELIVERY OF SANDS
Do not deliver to site any sands which cannot be immediately placed in final locations.

3.3 INSPECTION
Before starting paving work inspect the area to ensure that kerbing, edge restraints, drainage, cesspits, channels, basecourse and other services are in place to correct falls and to allow work of the required standard.

3.4 SURFACE TOLERANCES

Final surface of paving:	±10 mm of design level
Surface level above drainage:	5 mm minimum above drainage channels or gully entries and continuously graded towards them
Maximum deviation:	8 mm in 3 metres without ponding
Between adjacent blocks:	< 2 mm

Application

3.5 FORM EDGE RESTRAINT
Excavate for and set paver soldier course in concrete haunching to the levels shown. Allow concrete to cure before making good the adjoining basecourse.

3.6 LAY PVC EDGE RESTRAINT
Lay proprietary flexible PVC edge restraint to manufacturers requirements.

3.7 LAY BEDDING SAND
Loose lay sand using screeds over the prepared basecourse to a depth dependent on the sand and its water content to give a nominal compacted thickness of 30 mm. Compact to give a uniform density and thickness. Check the finished level over a small area using paving and then correct the total area before proceeding. Screed the compacted surface to finish completely level.

3.8 LAY PAVERS
Set up string lines in 2 directions at 5 metre centres maximum to ensure joint lines are straight and square. Lay whole pavers first within the string line grid with joint widths in

the range of 2 mm to 4 mm over 90% of the work and a minimum/maximum of 1 mm to 5 mm. Compact to NZS 3116, clause 310.4

Pedestrian areas:	Standard plate compactor
Private driveways:	60 – 120 kg static weight and 10 24 kN centrifugal force

3.9 CUTTING PAVERS
Cut pavers, neat and tidy with a diamond-tipped saw blade. Do not use cut units less than half a paver. Adjust pattern to suit as necessary.

3.10 HAUNCHING
Cut away base course to at least 50 mm below bedding sand and place haunching concrete. Do not allow traffic on adjacent paving while work is being carried out and until concrete has set.

3.11 JOINT FILLING
On completion of the paver compaction, spread joint filling sand dry over the surface and broom in to fill joints completely. Compact again. Inspect after 3 days and re-sand and re-vibrate again as necessary. Repeat at 2 week intervals until 2 such inspections show no loss or settlement of joint sand.

Finishing

3.12 SEALER
When inspections show no loss of jointing sand or settlement of pavers, clean paving, removing marks and stains and apply acrylic sealer to the surface to NZS 3116, clause 313 and the sealer manufacturer's requirements.

3.13 PROTECTION
Protect the completed work from damage and from dropping other materials during the remainder of the construction period. Do not use the completed work as a building platform or for material storage.

Completion

3.14 REPLACE
Replace damaged, cracked or marked elements.

3.15 LEAVE
Leave work to the standard required by following procedures.

3.16 REMOVE
Remove debris, unused materials and elements from the site.

4. SCHEDULES

4.1 INTERLOCKING CONCRETE PAVING BLOCKS

Manufacturer/style:	To be advised
Dimensions:	To be advised
Colour:	To be advised
Laying pattern:	To be advised

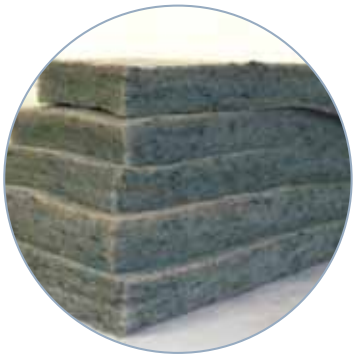
APPENDIX ONE – ECO CEILING AND WALL INSULATION

ecofleece®

The natura

Wool Insulation

BRANZ Appraised
Appraisal No.464 [2005]



Ecofleece® – What is it?

Ecofleece® is available in two product options — natural or recycled. Natural Ecofleece® consists of 100% virgin New Zealand sheep's wool blended with up to 40% polyester fibre. Recycled Ecofleece® consists of coloured sheep's wool sourced from New Zealand wool product manufacturers blended with up to 40% polyester. Recycled is approximately 2/3 the cost of natural. Ecofleece® complies with the insulation standard AS/NZS 4859.1.

Ecofleece® can be installed without the need for protective clothing or equipment, but it is recommended.

Ecofleece® – Products

Ecofleece® insulation is supplied as a blanket ready to roll out over ceiling joists or fitted under or between floor joists. Rolls are cut to length when fitting to wall framing cavities.

Ecofleece® insulation is manufactured to fit between standard framing spacings — see Table 1.

Special runs can be manufactured to order — a roll width of up to 2 m is possible.

Ecofleece natural is manufactured to order. Contact Eco Insulation for further information.

Ecofleece® – Identifying it

Natural Ecofleece® insulation is white in colour. Recyled Ecofleece® insulation is grey.

Individual Ecofleece® packs are labelled to identify the specific R-value, coverage per pack in m^2, material width, unit number or length of material, nominal thickness, minimum weight and date of manufacture.

ecoinsulation
The natural choice

Ecofleece® – How much do I need?

Coverage per pack of Ecofleece® insulation depends on the product and its thickness. Typical roll lengths and coverage per pack are summarised in Table 1.

Ecofleece® – Where it can't be used

Ecofleece® insulation must not be installed if the moisture content of timber framing exceeds 20%.

In buildings where there is a high humidity, such as swimming pool halls or saunas, Ecofleece® insulation must be isolated from the moisture by a vapour barrier.

Ecofleece® – Sustainability

Ecofleece® and its associated packaging is fully recyclable. Recycled Ecofleece® also reuses wool as an integral part of product manufacture.

Ecofleece® is Enviromark Gold Certified, ensuring continuous improvements in the field of enviromental sustainability.

Eco Insulation is committed to the development and fostering of sustainable building products and practices and are members of the Sustainable Business Network and the New Zealand Green Building Council.

Ecofleece® – Finding out more about it

To obtain further information on Ecofleece® insulation, Ecofleece® suppliers or other Eco Insulation products call toll free **0800 400 326** or visit **www.ecoinsulation.co.nz**

Ecofleece® – Thermal performance

Ecofleece® insulation is available in the specific R-values given in Table 1.

To obtain the installed R-value of Ecofleece® insulation, refer to Eco Insulation's thermal graphs which takes account of the construction being used to give an R-value for the completed element. Compliance with the requirements of NZBC H1 and E3 can then be determined.

Ecofleece® – Safety

Ecofleece® insulation is non-irritant, non-allergenic, non-toxic and odourless.

Ecofleece® – Durability

Ecofleece® insulation will meet the 50 year minimum durability of NZBC B2.

Ecofleece® – Moisture

Ecofleece® insulation will provide maximum insulation when it is dry in service. The insulation value will be lost when it is wet. Ecofleece® which has become wet must be removed, dried, re-lofted and reinstated to restore the insulation value.

Ecofleece® insulation does not absorb moisture when tested to ASTM C739.

Wool fibres strive to stay in balance with the surrounding moisture conditions – this is why wool is said to breathe as it absorbs and evaporates moisture reducing condensation problems.

ecoinsulation
The natural choice

Table 1: Ecofleece® thermal performance and physical properties

	Insulation R-value	Width (mm)	Thickness (mm)	Actual m^2 per pack
Wall	1.6*	580	95	20
		780	95	20
	1.8*	380	95	20
		430	95	20
		580	95	20
	2.2	380	95	15
		580	95	15
		780	95	15
Ceiling	1.8*	380	95	20
		430	95	20
		580	95	20
		870	95	20
	2.2	380	133	15
		430	133	15
		580	133	15
		870	133	15
	2.6	380	135	15
		430	135	15
		580	135	15
		870	135	15
	3.0	870	150	12
		580	150	12
Floor	1.8	380	95	20
		430	95	20
		580	95	20
	2.2	430	133	15
		580	133	15

Note 1: * Climate zones 1 and 2 only.

Ecofleece® – Fire performance

When tested to AS 1530.3: 1989, Ecofleece® insulation achieves the following Early Fire Hazard Indices:

- ignitability 0
- spread of flame 0
- heat evolved 0
- smoke developed 5

Ecofleece® – Acoustic performance

Ecofleece® insulation will absorb sound in the 500 Hz to 8 KHz range. Specific absorption data as part of an acoustically rated construction element is not currently available. Refer to Eco Insulation for futher infomation 0800 400 ECO

Ecofleece® – Corrosion

Ecofleece® insulation is non-corrosive to carbon steel when tested to NZS 4222, copper and aluminium.

BRANZ Appraised
Appraisal No.464 [2005]

Rotary Cutter and blade

Ecofleece® – Appraisal

Eco Insulation Ltd are the holders of BRANZ Appraisal Certificate No. 464 (2005) Ecofleece®. Ecofleece® insulation is therefore able to meet the relevant requirements of the NZBC namely B2 Durability, H1 Energy Efficiency, E3 Internal Moisture and F2 Hazardous Building Materials.

Ecofleece® – Testing

The following independent testing of Ecofleece® insulation has been undertaken:

- thermal resistance — BRANZ
- fire hazard properties — Applied Physics Laboratory
- corrosivity — Materials Performance Technologies
- insect resistance — Canesis.

Copies of Ecofleece® test reports are available on request.

Ecofleece® – Quality assurance

Eco Insulation's manufacturing systems and materials supply have been audited by BRANZ as part of the Appraisal process.

Eco Insulation's manufacturing systems and materials supply are subjected to regular in-house quality control checks. A quality assurance guarantee is provided when installed by Eco Insulation.

Ecofleece® – Warranties

Eco Insulation will check and certify the installation of their products when their own licensed installer is used.

Ecofleece® – Handling and storage

Ecofleece® insulation must be stored under cover with individual packs stored on end to avoid compression.

Full recovery to design thickness will be achieved after removal from the packaging when the product has been stored for less than six months.

To assist full recovery, 'shaking' the product prior to installation is acceptable.

Ecofleece® – Installation

Installation instructions are inserted into each pack of Ecofleece® insulation. Rotary cutting tools are available from Eco Insulation.

Ecofleece® – Availability

Contact Eco Insulation for your local supplier of Ecofleece®.

Head Office

Eco Insulation Ltd
PO Box 305470
Triton Plaza
Albany, 0757
North Shore
Auckland

Auckland showroom
3/52 Arrenway Drive
Albany Heights
North Shore
Auckland 0630

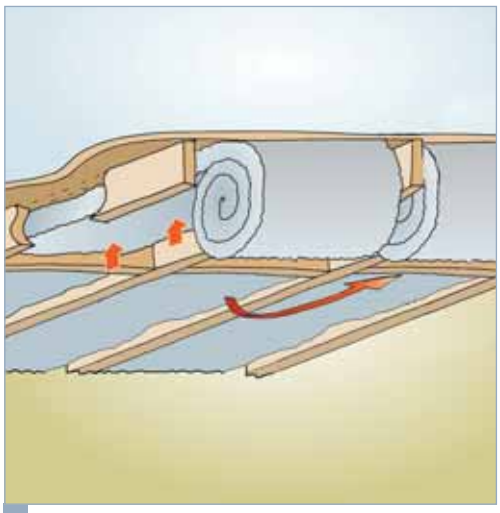
Phone: 09 477 0270
Fax: 09 478 7771
Email: enquiries@ecoinsulation.co.nz

0800 400 ECO
0800 400 326

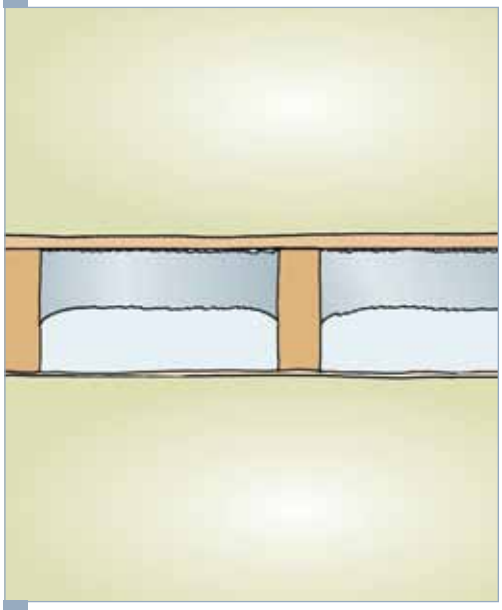
ecoinsulation
The natural choice

Fitting **Ecofleece®** to inter-floor framing

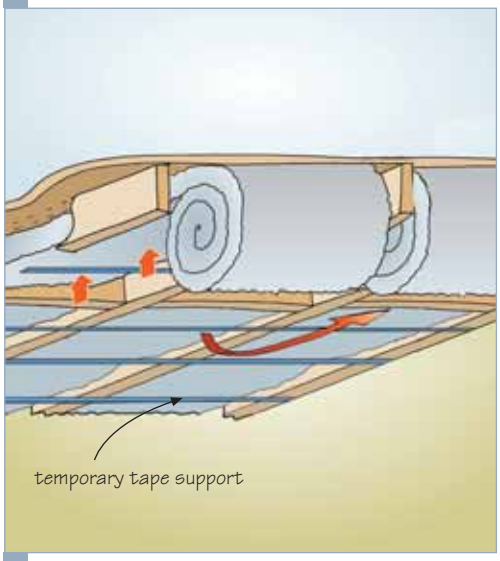
- Ensure Ecofleece® is ordered to the correct width or cut Ecofleece® with an appropriate cutting device to fit between the framing
- fit the segments firmly between the framing to give a friction fit to hold the material in place
- ensure the butt joints are tight at end joints and at the floor perimeter
- avoid creases or folds
- staple around the edge at 300 mm maximum centres, or temporarily support the material with plastic tape at 300 mm centres until the ceiling is installed or if no ceiling battens are in place
- no clearance between the top of the insulation and the underside of the flooring above is required
- leave the required clearance around recessed down-lights. Refer NZS 4246:2006



1 Fitting between framing

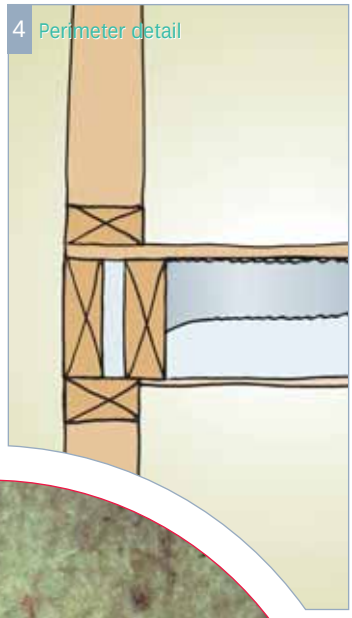


2 No gap between insulation and floor above

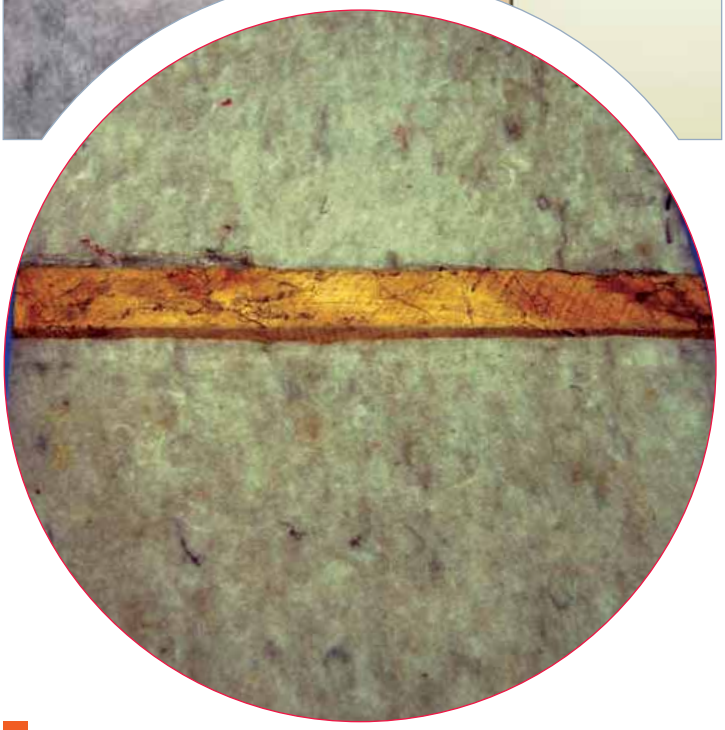


5 Temporary support

3 Clearances to down-lights



4 Perimeter detail



6 Completed job

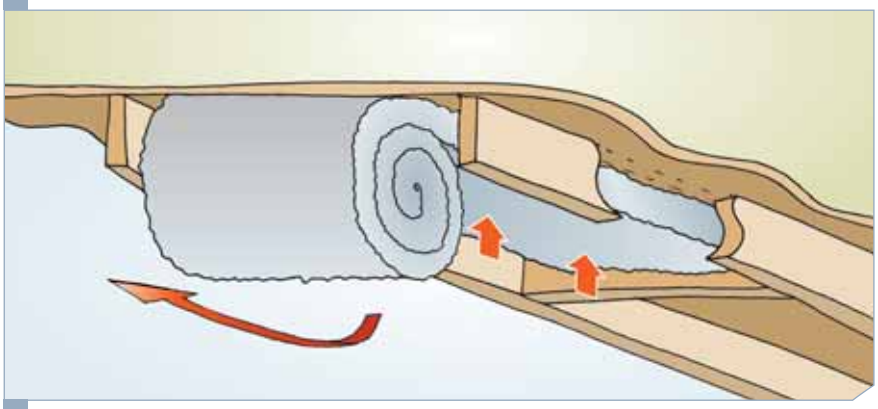
Fitting **Ecofleece®** to sub-floor framing

1 Ground cover

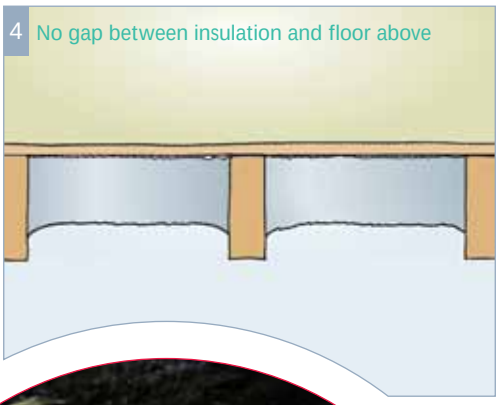
2 Stock piling material

- install the ground vapour barrier
- unroll the required size and cut Ecofleece® to fit between framing
- re-roll material and stockpile rolls under the floor
- fit firmly between the framing to give a friction fit to hold the material in place
- avoid creases or folds
- tight butt the end joints and where the insulation meets the framing at the edges of the floor
- no clearance between the top of the insulation and the underside of the flooring above is required
- staple around the edge at 300 mm maximum centres, or support with plastic tape at 300 mm centres and protect with a suitable lining material such as oil tempered hardboard or specialist foil (Silversark).

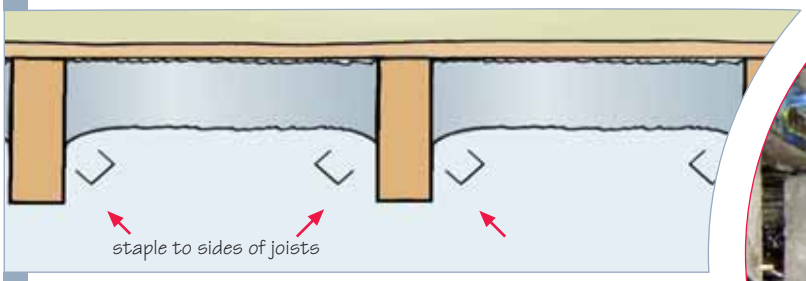
Note: Eco Insulation recommends that a plastic ground cover be installed and that the floor framing and flooring is dry (less than 24%) when the insulation is installed. It is recommended that Silversark or suitable membrane is used inconjunction with Ecofleece® for underfloor applications.



3 Fitting between framing

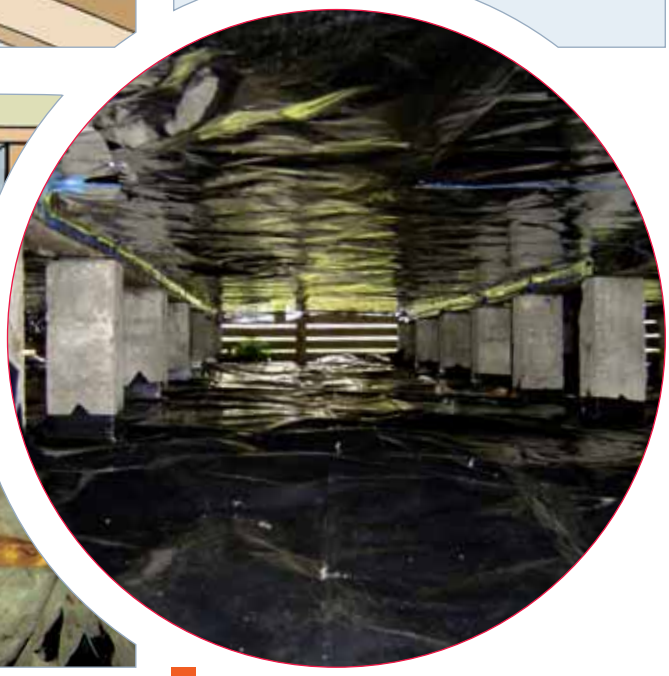


4 No gap between insulation and floor above



5 Additional staple to support insulation

6 Tape support option



7 Completed job – foil and Ecofleece®

On completion

Remove all unused material and off-cuts from the site and leave the work area clean and tidy.

Contact Eco Insulation to arrange for an inspection of the installation to enable the installation certificate to be issued.

ecoinsulation
The natural choice

ecofleece®

The natural choice

Wool Insulation

Installation Guide

BRANZ Appraised
Appraisal No.464 [2005]

ENVIRO MARK NZ

Head Office
Eco Insulation Ltd
PO Box 305470
Triton Plaza
Albany, 0757
North Shore
Auckland

Auckland showroom
3/52 Arrenway Drive
Albany Heights
North Shore
Auckland 0630

Phone: 09 477 0270
Fax: 09 478 7771
Email: enquiries@ecoinsulation.co.nz

0800 400 ECO
0800 400 326

ecoinsulation
The natural choice

Ecofleece® insulation is a quality product. The quality of the installation determines the level of performance that can be achieved with Ecofleece® insulation.

Customer support

For additional information on Ecofleece® insulation installation, call toll free **0800 400 326** or visit **www.ecoinsulation.co.nz**

On delivery

Store Ecofleece® insulation:

- under cover
- on end to avoid compression.

Protect opened Ecofleece® insulation from moisture and dirt/dust.

Ecofleece® safety

When working with Ecofleece® insulation protective clothing and equipment is not essential but is recommended, particularly in retrofit installations.

Before starting Ecofleece® installation

Ensure:

- areas where Ecofleece® insulation is to be fitted are clean and free of dust and wood chips
- framing has a moisture content of 24% or less
- wall wrap, building paper or roof underlay is undamaged
- exterior cladding is weathertight
- thermal breaks are installed for steel framing
- the Ecofleece® insulation is as specified.

Tools

Tools required to install Ecofleece® insulation are a tape measure, sharp scissors or rotary cutter, staple gun, ladder and a light (for ceiling installations).

Opening **Ecofleece®** packs

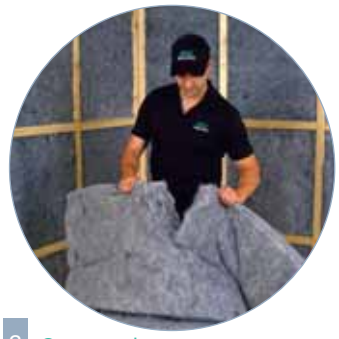
Split the plastic wrapping lengthwise — Ecofleece® insulation is compressed during packing and will expand on being released.

Cutting **Ecofleece®** to size

The best way to cut Ecofleece® insulation lengthways is to use a hand-held rotary cutter. Scissors can be used. Cross-cutting to length can be done by tearing.

When cutting Ecofleece® insulation to fit, over-measure by 5 mm in each direction to allow a snug fit to the framing.

1 Unpacked Ecofleece®



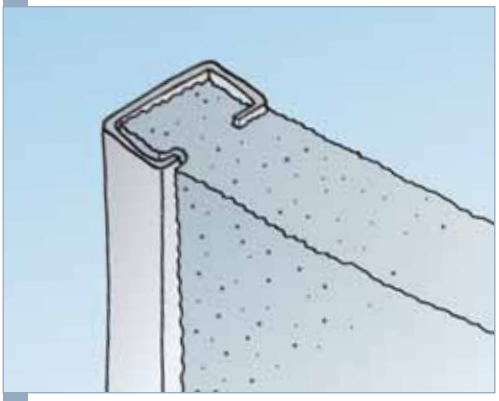
2 Cross-tearing

3 Length cutting

Fitting **Ecofleece®** to wall framing cavities

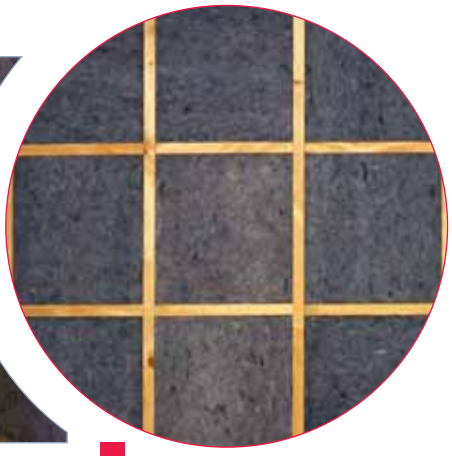
- cut Ecofleece® to fit
- fit insulation firmly between the framing to give a friction fit to hold the material in place
- for steel framing, fit insulation into the steel channel cavity (additional fixing may be required)
- leave no gaps between the insulation and the framing
- secure Ecofleece® insulation in place with three staples to the top and bottom of each dwang
- avoid creases or folds.

1 Fitting to wall cavity



2 Special requirements for fitting to steel framing

3 Stapling



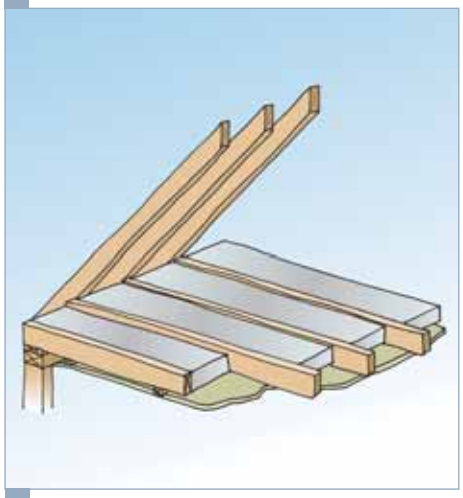
4 Completed wall

ecoinsulation
The natural choice

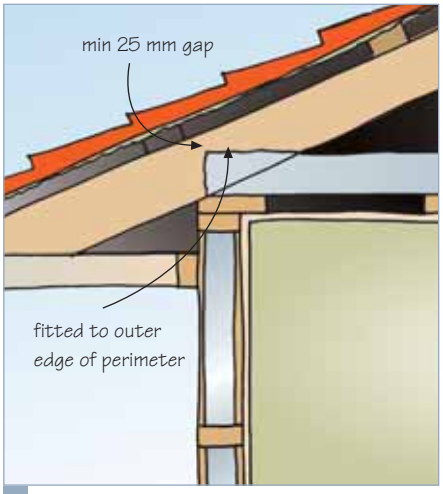
Fitting **Ecofleece®** between ceiling/roof framing

- cut Ecofleece® to fit
- fit insulation firmly between the framing
- avoid creases or folds
- maintain a 25 mm minimum clearance between the top of the insulation and the underside of the roofing underlay at all times
- trim for required clearance around recessed down-lights
- for skillion roofs –
  - with exposed rafters, insulation must be installed immediately before the roof cladding – no insulation must be left unprotected by roofing at the completion of the day's work
  - where fitted between framing, support insulation by stapling at 300 mm centres around edges or by installing plastic tape
- cut a piece of insulation to size and fit to the top of the access hatch.

1 Passing up materials



2 Fitting between framing



3 Clearances at eaves

4 Clearances around down-lights

5 Completed attic ceiling

6 Completed exposed rafter job

7 Additional support to rafter installation

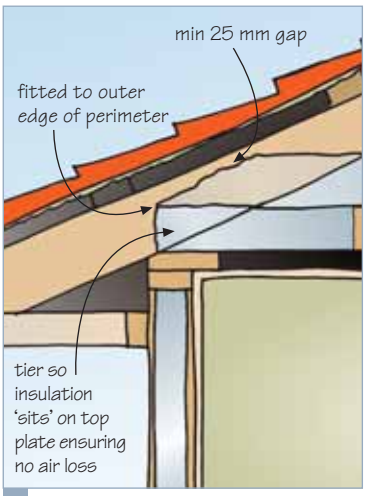
8 Access hatch detail

Fitting **Ecofleece®** over ceiling framing

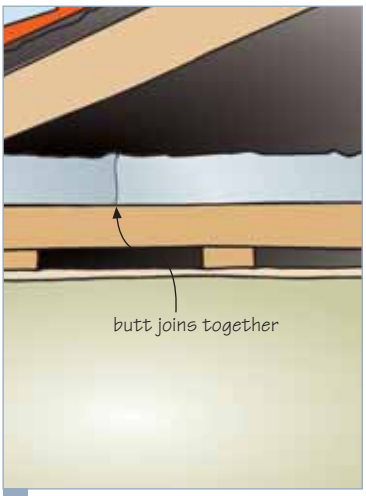
- work from the furtherest point from the access panel
- cut to the required length
- fold in half
- pass up into the roof space
- roll out across the ceiling framing
- maintain 25 mm minimum clearance between the top of the insulation and the underside of the roofing underlay at all times
- cut or tear accurately to give a tight fit around rafters/struts
- install to the outer edge of the top plate (edge of insulation may have to be trimmed to an angle to maintain the 25 mm clearance to roof underlay)
- leave the required clearance around recessed down-lights
- close butt blanket edges
- cut a piece of insulation to size and fit to the top of the access hatch.

1 Passing up materials

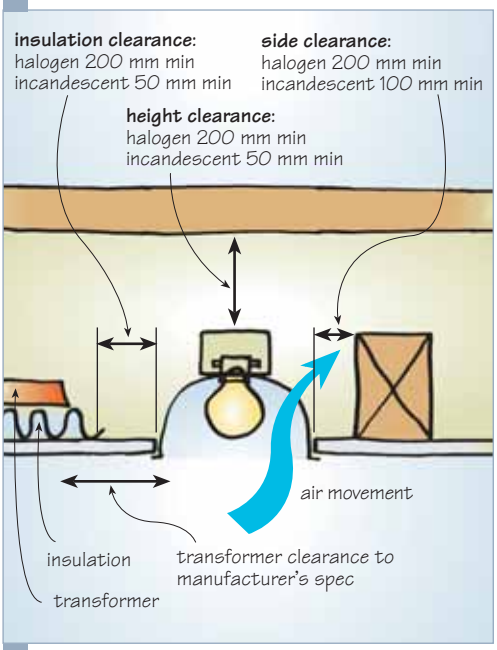
2 Rolling out over framing



3 Clearances at eaves



4 Butting edge jointing



5 Clearances around down-lights

6 Completed job

APPENDIX TWO – DIMOND DOWNPIPE INSTALLATION INSTRUCTIONS

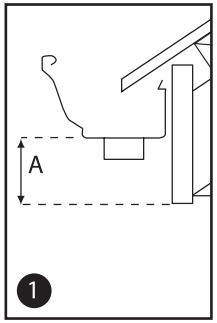
INSTALLATION DETAILS

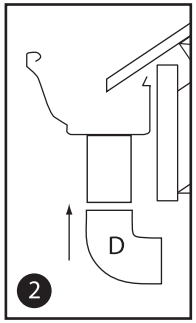
Dimond Rainwater Systems and Downpipes can cope with a maximum rainfall intensity of 200mm per hour. For the correct size of downpipe check with the Dimond website www.dimond.co.nz or call 0800 DIMOND for further information.

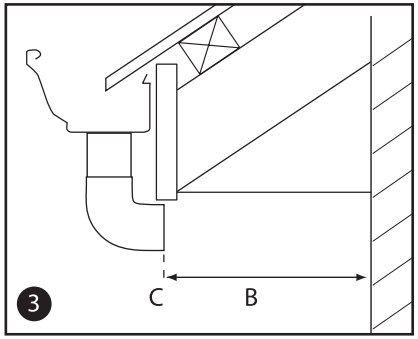
Determine the offset length

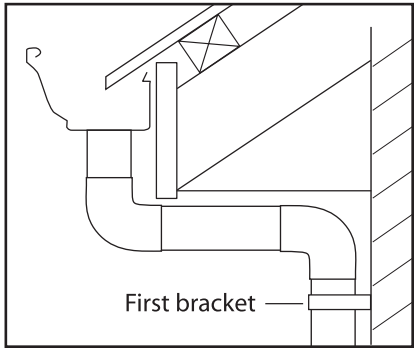
- Measure from the bottom of the gutter to the bottom of the fascia board. This is measurement A see fig 1.
- Cut a piece of downpipe to measurement A and place it onto the dropper with an elbow, see fig 2.
- Measure from point C on the elbow to the wall of the building see fig 3. This becomes measurement B. Then deduct 120mm from measurement B to allow for the elbow and standoff from the wall. For example if measurement B is 600mm, the length of the downpipe required for the offset is 480mm long.
- When assembling the offset use a neutral silicone sealant making sure that there is a continual ring of sealant up against the stop inside the elbow and another ring 10mm from the outside edge of the elbow.
- Place the first downpipe bracket under the elbow to retain in place then continue to attach the downpipe to the wall of the building using three downpipe brackets per downpipe.

Note: **1** Dimond does not recommend the use of downpipse in wall or ceiling cavities.
2 Colorflo Downpipes are specifically designed for use with the Colorflo Fascia and Guttering Rainwater System.
3 To ensure a water tight fit we recommend using only Colorflo accessories when installing metal downpipes.









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APPENDIX THREE – WEATHERBOARD PROFILE

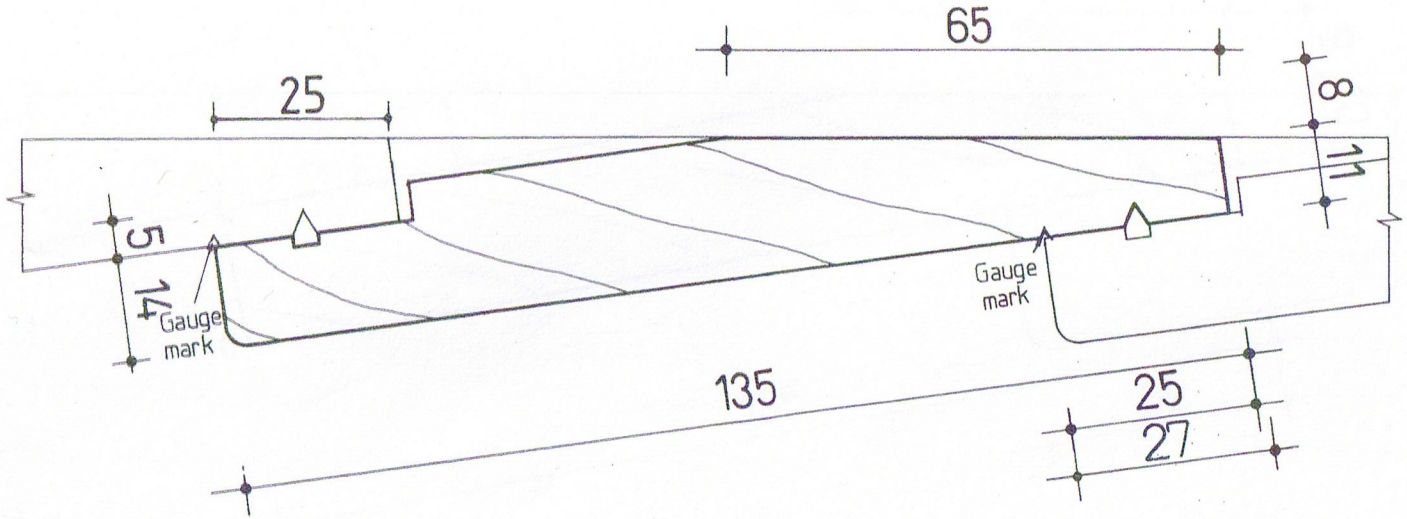


Fig. 1 150 mm x 25 mm REBATED BEVEL-BACK WEATHERBOARD
(full size)

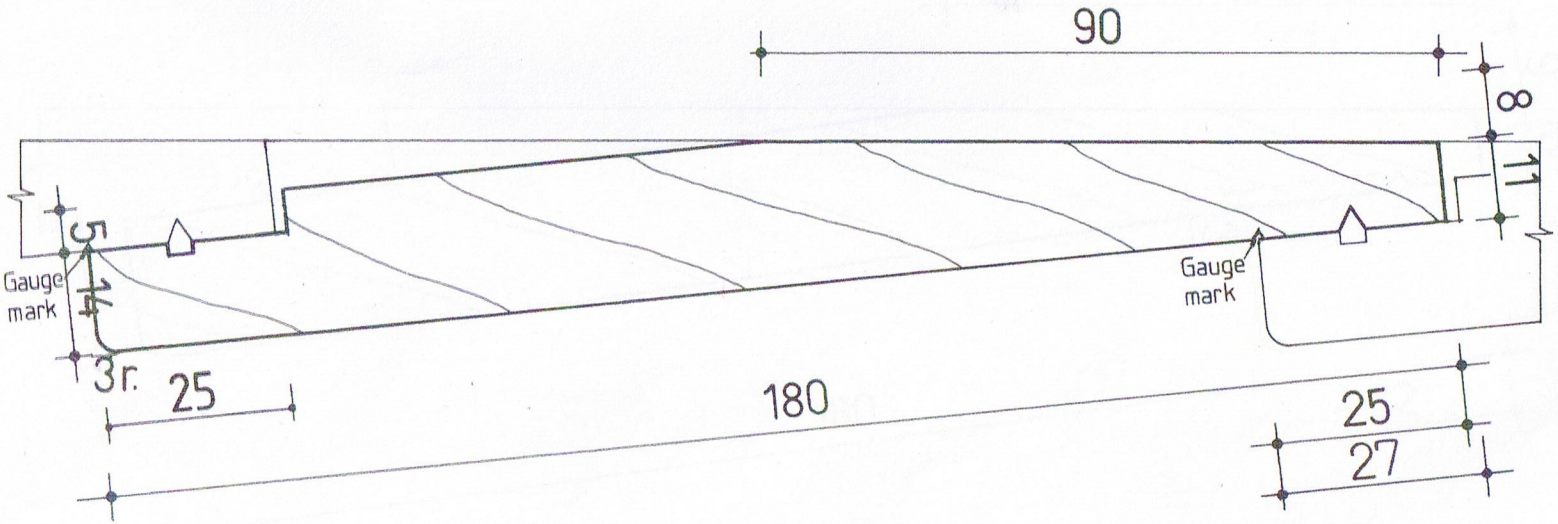


Fig. 2 200 mm x 25 mm REBATED BEVEL-BACK WEATHERBOARD
(full size)

APPENDIX FOUR – NATURAL OILS CLADDING STAIN

tbc

APPENDIX FIVE – STONE CLADDING SUBSTRATE SHEET

Product Description

BGC Stonesheet™ is a purpose designed fibre cement sheet for external applications. It is recommended as a stone slip substrate and background for true masonry on timber framed buildings.

Stonesheet™ is a smooth flat square-edged sheet and is manufactured in nominal thickness of 6.0 mm, 7.5 mm and 9.0 mm.

Mass

The approximate weight of Stonesheet™ at equilibrium moisture content (7% moisture) is as tabulated.

Nominal Thickness	Approx. Weight (kg/m^2)
6.0	9.5
7.5	11.8
9.0	14.27

Sheet Sizes

Durasheet™ is available in the following sizes:

Thickness (mm)	Length (mm)	Width (mm)
6.0	3000	1200
7.5	3000	1200
9.0	3000	1200

Framing

Refer to page 4.

Fixing Guide

Slip Weight	Wall Height	Stonesheet Type	Extra Requirements
20 - 40 kg m2	Up to 2.7m 2.7 to 4m Above 4m	6.0mm 6.0mm 7.5mm	None - as per E2/AS1 See Note 1 See Note 1
40 - 50 kg m2	Up to 2.7m 2.7 to 4m Above 4m	6.0mm 7.5mm 7.5mm	See Note 1 See Note 1 Sheet Screw Fixed - see note 2
50 - 60 kg m2	Up to 2.7m 2.7 to 4m Above 4m	7.5mm 7.5mm 9.0mm	Sheet Screw Fixed - see note 2

Note 1. Fixing as per Acceptable Solution E2/AS1 plus replace nails on second nog line with screws and washers as per type below at 150mm centres

Note 2. Replace nails with screws and washers as per type below.

Screw Type - MSL Fortress Fasteners 10g x 65mm Surefast Stainless Steel Screws
Washer Type - MSL Fortress Fasteners - m6 x 19mm x 1.6mm Stainless Steel Washer

Acceptable Solution E2/AS1 fixing requirements - table 24 - 60 x 3.15 Fibre Cement nail - 150mm centres to sides and 300mm Centres in middle.

Sheet Layout

Refer to page 5 and jointing to Acceptable Solution E2/AS1, vertical sealant joints for fibre cement sheets figure 106

Horizontal fixing of sheets is permissible when height does not exceed 1200mm.

Refer to Acceptable Solution E2/AS1 horizontal joints for fibre cement sheets on cavity figure 108.

Do not butt sheets tightly together.

For further details regarding Stonesheet™, please contact BGC.

Note: Stonesheet™ is a non-structural substrate. BGC does not accept any responsibility for the selection and design of mechanical fixings and adhesives used. Installation instructions and recommended kg/m^2 are supplied as a guide only (BGC Stonesheet™ Fixing Guide 1 June 2007).

Refer to your Stone veneer supplier for details of mechanical and adhesive fixing requirements.

Contents

Durasheet™

Fibre cement sheet for external applications 6

Duratex™

Fibre cement sheet for applied finish systems 8

Durabacker™

Fibre cement sheet for high build plaster coatings 10

Stonesheet™

Fibre cement stone slip substrate 12

Duraplank™

Woodgrain and smooth fibre cement plank for external applications 13

NuLine™

Weatherboard fibre cement for external cladding 19

Cover photographs:

1. BGC Durabacker coated with Mineral Plaster Technology Limited - Liteclad Plaster System
2. Nuline 175mm Square
3. Nuline 175 Square and Eldorado Stone (fixed on BGC Stonesheet)

Product Information

BGC fibre cement sheets are manufactured to conform to the requirements of NZS/AS2908.2 Cellulose-Cement Products and are classified as Type A Category 2 sheet for external use.

Quality Systems

BGC Fibre Cement manufactures all products under the rigorous Quality Management System of the International Standard ISO 9002:1994 and is the holder of Licence Agreement number QEC2955/13.

Fire Resistance

The early fire indices of BGC fibre cement sheets as tested by the CSIRO - Building, Construction and Engineering Division, (report number FNE7528) in accordance to Australian Standard AS1530.3 - 1989, are:-

- Ignitablility Index 0
- Spread of Flame Index 0
- Heat Evolved Index 0
- Smoke Developed Index 0-1

Handling and Storage

BGC fibre cement sheets must be stacked flat, up off the ground and supported on level bearers.

The sheets must be kept dry, preferably by being stored inside a building. When stored outdoors they must be protected from the weather.

Care should be taken to avoid damage to the ends, edges and surfaces.

Sheets must be dry prior to being fixed, jointed or coated. Sheets must be carried on edge.

Health and Safety

BGC fibre cement is manufactured from New Zealand cellulose fibre, finely ground sand, Portland cement and additives. As manufactured the product will not release airborne dust, but during drilling, cutting and sanding operations, cellulose fibres, silica and calcium silicate dust may be released.

Breathing in fine silica dust is hazardous, prolonged exposure (usually over several years) may cause bronchitis, silicosis or cancer.

When cutting sheets, work in a well ventilated area and use the methods recommended in this literature to minimise dust generation. If using power tools wear an approved (P1 or P2) dust mask and safety glasses.

These precautions are not necessary when stacking, unloading or handling fibre cement products.

For further information or a Material Safety Data Sheet contact BGC Fibre Cement.

New Zealand Building Code Compliance (NZBC)

BGC fibre cement sheets must be used, installed and maintained in accordance with this Technical Literature to meet the following provisions of the New Zealand Building Code (NZBC).

Clause B1 Structure

BGC fibre cement sheets will meet performance B1.3.1, B1.3.2 and B1.3.4. Relevant information on the physical conditions pertaining to B1.3.3 is included in this literature.

Bracing

BGC fibre cement sheets can be used to provide racking resistance to timber framed walls against wind and earthquake loads in accordance with NZBC, when applied directly to studs. Cavity battens and an additional fibre cement outer cladding is required.

Clause B2 Durabilty

When used as an external substrate for an applied coating system BGC fibre cement will meet the following provisions of the NZBC.

- B2.3.1(a) - 50 years for structural (bracing) applications. Stainless steel fixings must be used for all bracing sheets.
- B2.3.2(b) - 15 years for general applications. Stainless steel fixings must be used in corrosive conditions such as geothermal hot spots or coastal zones (within 500m of the sea).

Coating systems, seals and flashings must be maintained to ensure moisture does not penetrate the cladding system and sheets and that fixings remain dry at all times.

The homeowner should follow the BRANZ Homeowner's Manual to maintain their dwelling. this manual provides a recommended maintenance check list.

BGC fibre cement is expected to have the service life of at least 50 years.

Clause E2 External Moisture

BGC fibre cement when used in conjunction with an external applied finishing system (jointing and coating) that meets NZBC B2, E2 and F2, will meet performance E2.3.2.

Head flashings and sill trays must be used at all joinery penetrations, and jambs must be sealed as per the relevant instructions in Acceptable Solution E2/AS1 third edition.

Clause F2 Hazardous Building Materials

BGC fibre cement is not considered a health hazard to people and therefore meet the performance F2.3.1.

Sheet Cutting and Preperation

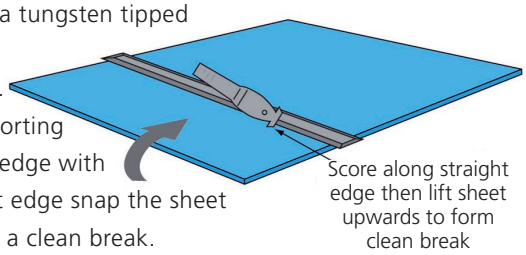
BGC fibre cement sheets may be cut to size on site. If using power tools for cutting, drilling or sanding they must be fitted with appropriate dust collection devices or alternatively an approved (P1 or P2) dust mask shall be worn.

It is recommended that work always be carried out in a well-ventilated location. If a cut edge is to be flush-joined it must be prepared with a recessed edge.

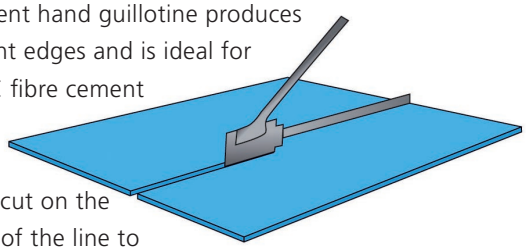
Cutting

The most suitable cutting methods are:

- **Score and snap**
  Using a straight edge, score the sheet face 4 or 5 times with a tungsten tipped 'score and snap' knife. While supporting the scored edge with the straight edge snap the sheet upward for a clean break.



- **Hand Guillotine**
  A fibre cement hand guillotine produces clean straight edges and is ideal for cutting BGC fibre cement sheets. Make the guillotining cut on the off-cut side of the line to allow for the blade thickness.

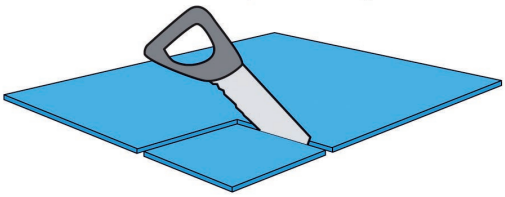


- **Notching**
  Notches can be made by cutting two sides of the notch with a hand saw or guillotine. Score along the third side with a 'score and snap' knife, then snap upwards while supporting the scored edge to remove the notch.

- **Hand Sawing**

  Hand sawing is suitable for general cutting operations, small cuts, notches and small penetrations.

  For accuracy and neatness, mark out the cut lines on the face side of the sheet prior to sawing.

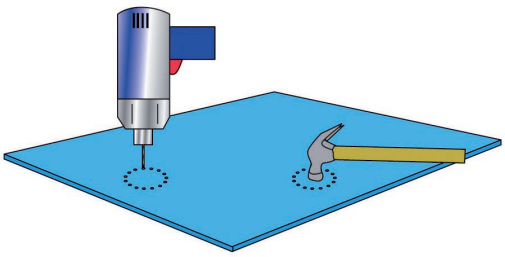


  When sawing, the back of the sheet should be supported close to the cut. A fine toothed saw can be used. A quick jabbing action gives best results.

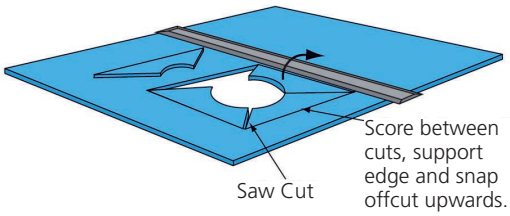
Holes and Penetrations

- **Drilling**

  BGC fibre cement sheets can be drilled using normal high-speed drill bits, do not use the drill's hammer function.



  Small rectangular or circular penetrations can be made by drilling a series of small holes around the perimeter of the cut out, then tapping out the waste piece from the sheet face. Tap carefully with a hammer while supporting the underside of the opening to avoid damage. Clean up any rough edges with a rasp if necessary.



  Large rectangular openings such as for air conditioners, are formed by deeply scoring the perimeter of the opening with a 'score and snap' knife. Next form a hole in the centre of the opening (see method above) then saw cut from the hole to the corners of the opening.

  Finally snap out the four triangular segments to form the opening. Clean rough edges with a rasp if necessary.

Fixing Instructions

BGC fibre cement sheets must be dry before fixing to the framing structure. Sheet edges must be joined over a stud or continuous line of nogging. Sheet cuts, which are to be flush jointed, must be recessed on site. The Hitachi 'Easy Bevel' (Model EBCOMBO) is specifically designed for this purpose.

Framing

- Framing must be constructed to comply with the New Zealand Building Code (NZBC). Compliance with the NZBC can be met by timber framing designed and constructed in accordance with NZS 3604 for non-specific design, or in accordance with NZS 3603 and NZS 4203/4251 for specific design.
- The framing must be set to a true plane to ensure a straight finish to the wall.
- The moisture content of timber framing must be less than 16% when the cladding sheets are fixed. If sheets are fixed to 'wet' framing problems may occur at a later date due to excessive timber shrinkage. It is strongly recommended that kiln dried framing is used.
- Timber framing, for sheet joints, must have a minimum face width of 45 mm (nominal 50 mm).
- Intermediate studs with a minimum face width of 35 mm (nominal 40 mm) may be used.
- Studs must be spaced at maximum 600 mm centres. Noggings need to align with sheet joints when used for horizontal fixing. BGC fibre cement sheets must not be joined off the framing.

Control Joints

Refer to Acceptable Solution E2/AS1 Third edition, Clause 9.7.4.2. Figures 103-113 and Table 19.

Fixings

Refer to Acceptable Solution E2/AS1 Third edition, Table 24

Impact Resistance

BGC Fibre Cement has good resistance to hard and soft body impacts likely to occur in residential and light commercial use. When used in commercial or industrial situations, or other high impact situations, the designer should consider protection measures such as the installation of barriers or bollards to vulnerable areas.

Wind Face Loads

BGC Fibre Cement sheets may be used in all Building Wind Zones of NZS 3604, including Very High.

Sheet Layout

BGC fibre cement sheets must be joined over a stud or continuous line of noggings. Leave a 2-3 mm gap for vertical joints and 1-2 mm gap for horizontal joints.

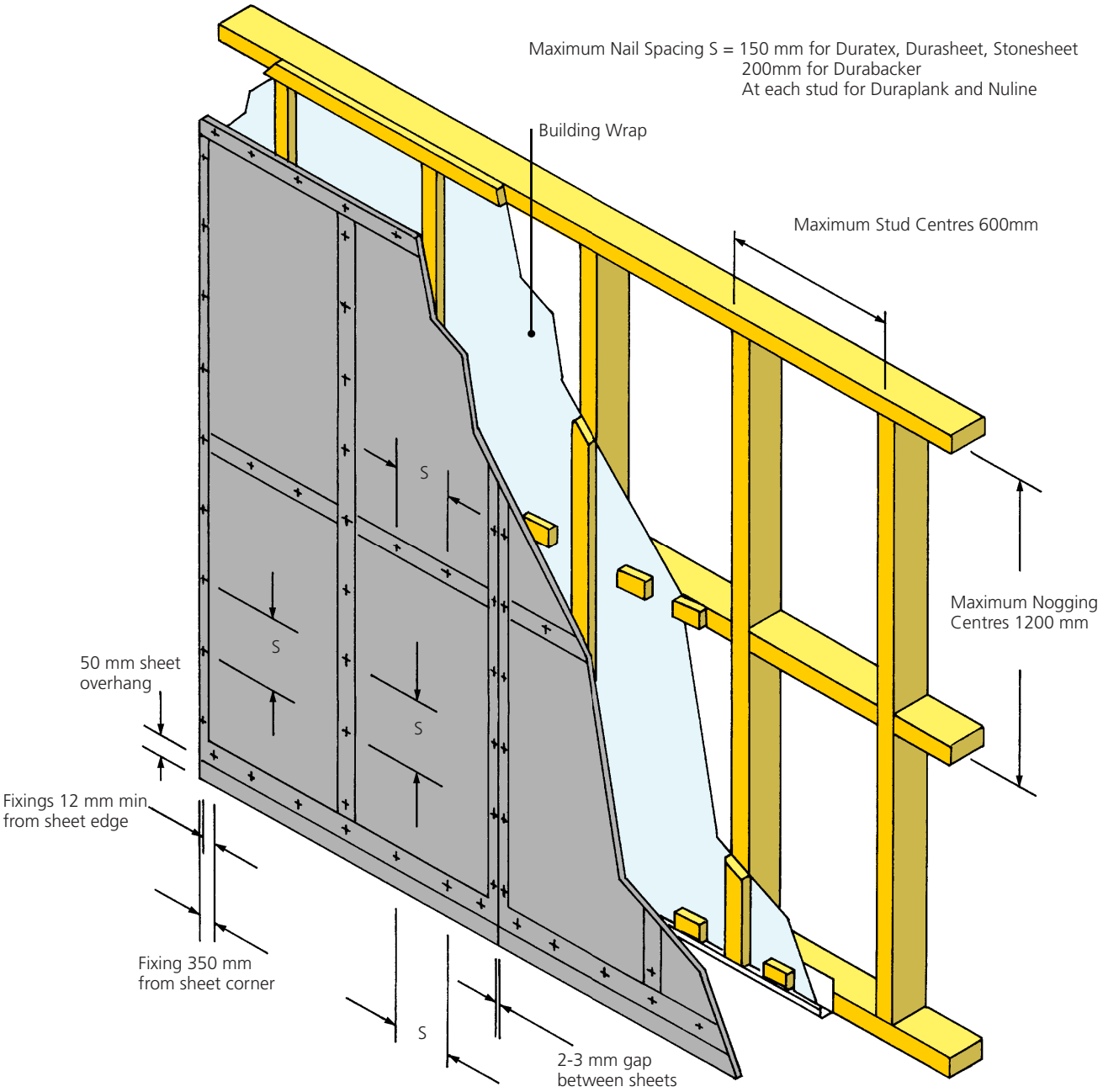
Do not butt sheets tightly together.

Horizontal fixing of sheets is permissible. When fixing more than one sheet high vertical joints must be offset (staggered).

General

The selected joint and coating system complying with NZS 4251 must be applied to dry, clean sheets only. Application must be completed within 3 months of the sheets being fixed on site.

It is strongly recommended that dark colours be avoided "and colour with a minimum Light Reflective Value (LRV) of 40% be used" as "dark colours" may cause high temperature variations within the substrate leading to excessive thermal movement.



BGC Stonesheet Fixing Guide

1 June 2007

Slip Weight	Wall Height	Stonesheet Type	Extra Requirements
20 to 40 kg m2	Up to 2.7m	6.0mm Stonesheet	None – as per E2/AS1
	2.7 to 4 m	6.0mm Stonesheet	See Note 1
	Above 4 m	7.5mm Stonesheet	See Note 1
40 to 50 kg m	Up to 2.7m	6.0mm Stonesheet	See Note 1
	2.7 to 4 m	7.5mm Stonesheet	See Note 1
	Above 4m	7.5mm Stonesheet	Sheet Screw Fixed – see note 2
50 to 60 kg m2	Up to 2.7m	7.5mm Stonesheet	Sheet Screw Fixed – see note 2
	2.7 to 4 m	7.5mm Stonesheet	Sheet Screw Fixed – see note 2
	Above 4 m	9.0mm Stonesheet	Sheet Screw Fixed – see note 2

Note 1. Fixing as per E2/AS1 plus replace nails on second nog line with screws and washers as per type below at 150mm centres

Note 2. Replace nails with screws and washers as per type below

Screw Type – MSL Fortress Fasteners 10g x 65mm Surefast Stainless Steel Screws
Washer Type – MSL Fortress Fasteners – m6 x 19mm x 1.6mm Stainless Steel Washer

E2/AS1 fixing requirements- table 24 – 60 x 3.15 Fibre Cement nail – 150mm centres to sides and 300mm Centres in middle

NOTE: Stonesheet™ is a non-structural substrate. BGC does not accept any responsibility for the selection and design of mechanical fixings and adhesives used.
Refer to your stone veneer supplier for details of mechanical and adhesive fixing requirements.
The Installation instructions and recommended kg/m² contained in the BGC Stonesheet™ Fixing Guide 1 June 2007 are supplied as a guide only.

BGC Stonesheet Fixing Guide

1 June 2007

Slip Weight	Wall Height	Stonesheet Type	Extra Requirements
20 to 40 kg m2	Up to 2.7m	6.0mm Stonesheet	None – as per E2/AS1
	2.7 to 4 m	6.0mm Stonesheet	See Note 1
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	2.7 to 4 m	7.5mm Stonesheet	See Note 1
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	2.7 to 4 m	7.5mm Stonesheet	Sheet Screw Fixed – see note 2
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E2/AS1 fixing requirements- table 24 – 60 x 3.15 Fibre Cement nail – 150mm centres to sides and 300mm Centres in middle

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Refer to your stone veneer supplier for details of mechanical and adhesive fixing requirements.
The Installation instructions and recommended kg/m² contained in the BGC Stonesheet™ Fixing Guide 1 June 2007 are supplied as a guide only.

APPENDIX SIX – ECCO PACIFIC EXTRACT FAN SPECIFICATION

Ecco Pacific Product Range

As a supplier of trade products to the electrical wholesale industry we pride ourselves on combing the world to hand pick elite brands that have grown to be leaders in their field through innovation, quality and durability. We understand the importance of design and performance in creating solutions for the trade.

Punto Filo Range

230 - 240vac

Made in Italy

36 month warranty

Eco Friendly, virtually silent, long life Axial Fans

A series of super quiet axial fans with ultra flat grills designed to expel the air outside or into short ducts, perfect for walls, panels, false walls, ceilings and false ceilings. The front grill of just 17mm and the roundness of the four sides make the appliance 'virtually' invisible.

• Extremely easy installation & maintenance, fitted with just 1 supplied screw!

• 'Virtually silent'; The fans were designed in parallel with an advanced aeraulic design that was accomplished by making a new impeller that permits very limited noise level with high performance.

• Integral backdraught shutter is already installed and prevents unwanted air from getting back in when the appliance is switched off.

• The Punto Filo series has IPX4 slash proof protection on all models.

• Eco Friendly: These fans guarantee a low environmental impact. Recyclable materials have been used and the 'design for disassembly' technique has been followed.

Ecco Pacific NZ
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New Zealand

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Punto Filo Range

Specifications

Ecco Code	D011131 and D011135
Dimensions	Grill: 159w x 159h x 17d mm; Fan: 98w x 98h x 77d mm
Voltage	230 - 240v / 50Hz
Power	15w
RPM	2400
Delivery	85m³/h; 24l/s
Current	0.09a
Weight	0.52kg
Protection	IPX4
Volume @3m	31dB(A)
Temperature	50°c max
Timer	D011131 No; D011135 Yes

230 - 240vac

Ecco Code	D011132 and D011136
Dimensions	Grill: 179w x 179h x 17d mm; Fan: 119w x 119h x 89d mm
Voltage	230 - 240v / 50Hz
Power	20w
RPM	2150
Delivery	175m³/h; 49l/s
Current	0.12a
Weight	0.62kg
Protection	IPX4
Volume @3m	34.4dB(A)
Temperature	50°c max
Timer	D011132 No; D011136 Yes

Made in Italy

Ecco Code	D011133 and D011137
Dimensions	Grill: 214w x 214h x 17d mm; Fan: 156w x 156h x 96d mm
Voltage	230 - 240v / 50Hz
Power	28w
RPM	2100
Delivery	335m³/h; 93l/s
Current	0.15a
Weight	0.98kg
Protection	IPX4
Volume @3m	40.1dB(A)
Temperature	50°c max
Timer	D011133 No; D011137 Yes

36 month warranty

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APPENDIX SEVEN – WATERPROOF MEMBRANE FOR TILING

tbc

APPENDIX EIGHT – UNDER TILE HEATING PAD

UNDER TILE INSTALLATION
INSTRUCTIONS

THE HEATING COMPANY

• Ceramics • Wooden Laminate • Terracotta • Stone • Marble • Slate • Cork • Vinyl

www.HotWire.co.nz

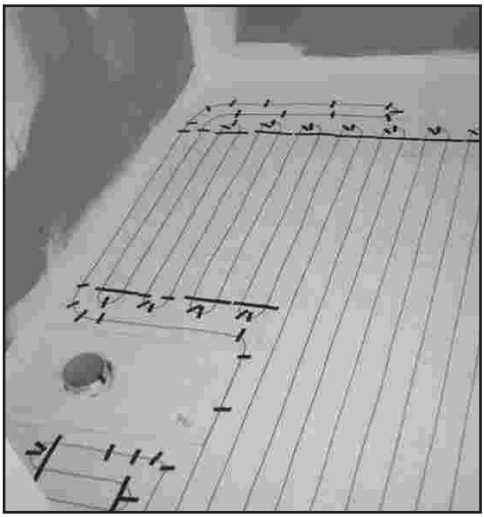
On Demand Electric Heating

PO Box 420
Whitianga, New Zealand
Ph: 0064 7 866 4434 Fax: 0064 7 866 4423
www.hotwire.co.nz

Under Tile Spooled Elements : Under Tile Set Mats : Under Carpet Heating
In-concrete Storage Heating : Radiant Ceiling Heating : Air-conditioning
Panel Heaters : Mirror Demisters

Elements Approximate m² & Spacing Guide

Element Watts	Colour	Lm Length	Ohms/m	-5%	Total Ohms	5%	Amps	Approx m² Coverage	Approx Element Spacing
150	White/Red	**13**	27.13	335.03	352.67	370.30	0.65	**1.00**	**77**
200	White/Black	**17**	15.56	251.28	264.50	277.73	0.87	**1.33**	**78**
250	White/Green	**21**	10.10	201.02	211.60	222.18	1.09	**1.67**	**80**
300	White/Blue	**25**	7.05	167.52	176.33	185.15	1.30	**2.00**	**80**
350	White/Yellow	**30**	5.04	143.59	151.14	158.70	1.52	**2.33**	**78**
400	White/Orange	**35**	3.78	125.84	132.25	138.86	1.74	**2.67**	**76**
500	White/Brown	**43**	2.46	100.51	105.80	111.09	2.17	**3.33**	**77**
600	Blue	**53**	1.66	83.76	88.17	92.58	2.61	**4.00**	**75**
700	Green	**63**	1.20	71.79	75.57	79.35	3.04	**4.67**	**74**
800	Yellow	**72**	0.92	62.82	66.13	69.43	3.48	**5.33**	**74**
900	Orange	**82**	0.72	55.84	58.78	61.72	3.91	**6.00**	**73**
1000	Red	**91**	0.58	50.26	52.90	55.55	4.35	**6.67**	**73**
1250	Pink	**118**	0.36	40.20	42.32	44.44	5.43	**8.33**	**71**
1500	Brown	**141**	0.25	33.50	35.27	37.03	6.52	**10.00**	**71**
1750	Grey	**168**	0.18	28.72	30.23	31.74	7.61	**11.66**	**69**
2000	Black	**189**	0.14	25.13	26.45	27.77	8.70	**13.33**	**71**
2500	Violet	**235**	0.09	20.10	21.16	22.22	10.87	**16.66**	**71**
3000	White	**294**	0.06	16.75	17.63	18.52	13.04	**20.00**	**68**



Introduction

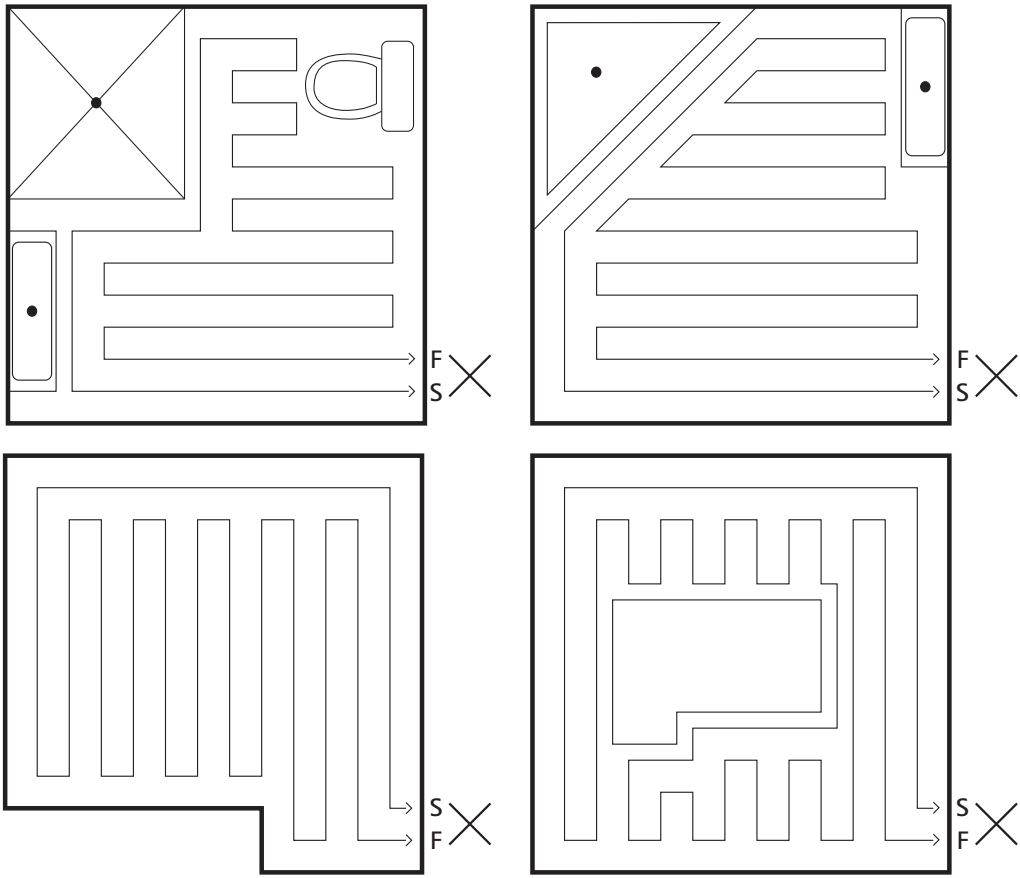
Prior to starting please read the following installation instructions carefully.

The Hotwire elements are set length continuous resistance wire with conducting cables (white) connected to each end. **The heating element must NOT be cut, shortened or lengthened.**

Typical Element Design Layout

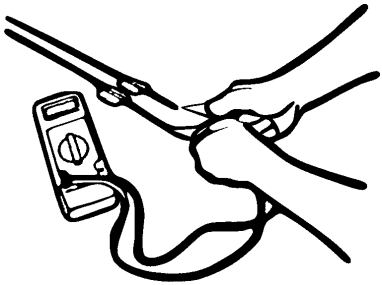
Step 3 - Installation of Element

Note: Every area and layout differs. Work out your required layout and coverage.



= Thermostat Position and Start/Finish Point

Electrical Requirements & Element Test

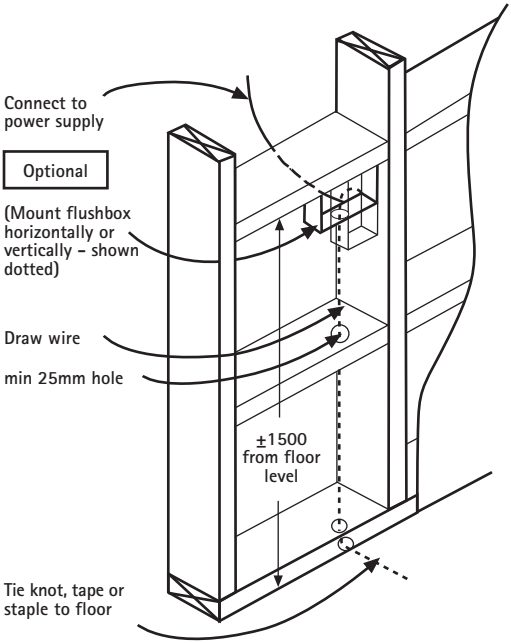


- The installation of elements is to be in accordance with the national wiring rules.
- Please see the cross section pre-wire requirements below before starting your installation.

The Hotwire™ elements have completed comprehensive testing. However, immediately prior to tiling, check the continuity of the element. It should match the Ohm rating listed above, with a tolerance of -5%/+ 5%. Also check the insulation resistance between the conductor and the earth screen = infinity.

Pre-wire Flush Box Requirements

- Pre-wire preparation should be carried out prior to the element installation.
- Please pass to your Electrician



Note:

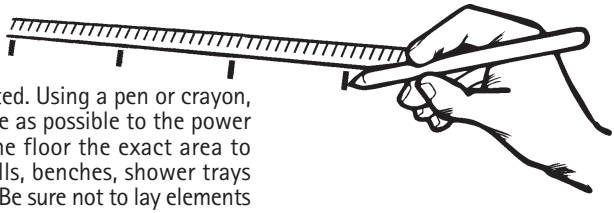
- All Hotwire™ thermostats are designed to fit a vertical flush box.
- Use strong TPS, or similar for your draw wire, and ensure the cavity is clear from floor to flush box to allow the draw wire to move freely.

Step One – Floor Preparation

- Floors must be entirely clean, dry and level. If necessary, sand or grind the floor first. Clean working surfaces will mean good adhesion for a long life installation. Where there is no waterproofing, you **must Prime** the floor with primer, and allow drying for 30 – 40 minutes. Concrete floors must be cured properly.

- The heating element must not be installed on irregular surfaces.

Step Two – Marking the floor for element installation



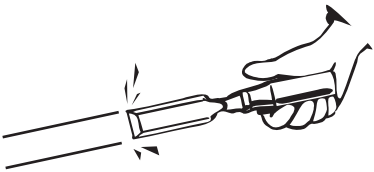
- Calculate the area to be heated. Using a pen or crayon, mark your start point as close as possible to the power supply, and then draw on the floor the exact area to be heated. Come off the walls, benches, shower trays etc the distances you require. Be sure not to lay elements in areas that may have floor fixtures installed after tiling, such as doorstops and toilet etc.

- Once the heated m^2 area is defined. E.G **4 m^2**. You can then choose the required size element using the chart guide on page 1. **4 m^2 = 600 watt element.**

- Mark the spacing intervals using the chart guide on page 1.

Element spacing formula E.G **4 m^2** X 1000 = 4000 ÷ 53 (element length) = 75 mm spacing. The minimum spacing = 50 mm and maximum = 100 mm.

Step Three – Installation of Element (refer to page 2)



- It is essential at the start point, that you chisel, or chase 2 short channels in the sub-floor at 50 mm spacings, to accommodate the "black joins" of both the first, and second power supply cords. This is needed to rebate the joins into the sub-floor, minimising their height and to create a flat surface, and to protect the joins from damage during tiling.

- Unroll 3 metres of the white power supply cable, until you have reached the 'black join' of the heating element, marked by individual colour.

- Tape the black join into the first channel of the sub-floor at your start point. Leave the power cord to one side whilst laying the element.

- Following the 'perimeter' floor markings, lay the heating element, to the further most corner of the room, securing with adhesive tape at the corners.

- You now work your way back towards the start position, laying the element back and forth in parallel even lines, being guided by the space markings.

- Secure the element with adhesive tape at even spacing. **Note:** If you are having trouble sticking

the tape to the sub-floor, you may need to apply spray adhesive to assist adhesion, where you are taping.

- You will note a ½ way marker on the element, that allows a gauge to your heating cover, relative to remaining element.

- When you have laid approximately 70% of the designated area, roll out the remaining element and second white power supply cord. Then before continuing laying the remaining heating element, secure the second black join back at the start point, and tape into the second channel.

- Now lay the remaining element in reverse back to the point where you last stopped.

- So to maintain even heat distribution, you may need to adjust previously laid and taped element, by increasing or decreasing the element spacing. The key is to try and maintain an even spacing across the floor, and if necessary, you may need to redesign your layout.

Note: You can hide extra element down the side of toilets etc provided –

1. The element spacing is **never** less than 50 mm.

2. The element is **never** crossed over or is cut.

3. The heating element is **never** placed in the wall cavity.

4. Should never across two or more rooms.

5. Avoid placing elements where doorstops may be screwed into the floor.

- Once you are happy with the layout and position of your heating element, you need to secure both white power leads to the draw wire, and carefully pull them up the wall cavity to the thermostat flush box position.

- **Thermostat/Floor Temperature Sensing Probe:** If this type of controller is being used, you now need to position and tape fix the probe on the floor, directly below the thermostat position and "exactly between" 2 runs of heating elements. Ensuring the probe lead can reach the thermostat position.

Note: The sensing probe should be placed in conduit, with no more than one angled bend, to ensure that it can be removed, if servicing is required.

Note:

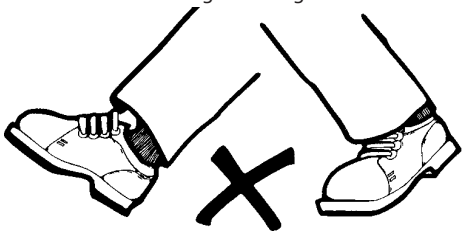
- Look over the total installation to ensure that the element is flat to the floor, and where necessary, use further tape to secure down lifting element.

- **Self-Leveling screed:** This can be used to protect the element during tiling. If you apply a self-leveling screed, you will need to wait 24 hours for the screed to cure, before tiling. Consult your tiler of their requirements.

Finishing:

- Repeat the continuity test to ensure the element has not been damaged during the installation.

- Once the element is installed, **avoid all traffic over the area until the tiling is laid.** If there is a delay in the tiling, cardboard, or similar, should be placed over the elements for interim protection.



Tiler Information – Please ensure your tiler reads the following

Only use tile adhesive and grout compatible with under floor heating. For further information see BRANZ – Good Tiling Practice.

The heating element incorporates PTFE Teflon double insulation, with a multi-stranded conductor and will withstand normal tiling practices. However, we ask you to note and take care of the following:

- **With care**, you can tile directly over the elements.
- We recommend applying a thin bed of "flexible" tile adhesive with a standard double "round ended" notch trowel (10 -12 inch)
- A latex modified (acrylic, PVA, SBR) cement based grout must be used, with at least a 10 - 15% "by weight of solid based" latex content.
- Where possible move the tile adhesive in the same direction of the elements runs.
- Where waterproofing is required, and has not been applied prior to the heating installation, please seek advice from your waterproofing supplier, on a suitable product to be applied over the elements.
- **Take extra care when cleaning between tiles prior to grouting.**
- Ensure that **enough adhesive is used** to eliminate hollows or voids under the tiles.
- **Wear soft soled type shoes** while tiling.
- Do not carry out other work on top of the elements, such as tile cutting.
- Avoid dropping tools on the elements.
- Do not place ladders on the elements.
- **Be extremely careful if the lifting of tiles is required.**
- **Endeavour to limit the twisting of feet** as this may cause irreversible damage to the heating.
- Avoid excessive foot traffic.
- Keep the heating area free of dust and foreign matter.
- Close off the area to other trades before the tiling has taken place.

Important Notes

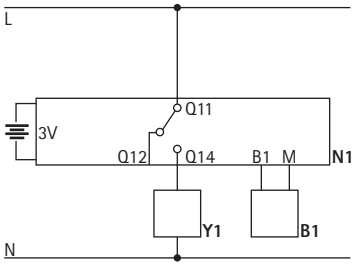
Note: Continuity alarm monitors are available from your supplier on request. The monitor can be attached to the power lead ends, and will set an alarm, if the element is damaged during tiling.

If at any time you damage, or cut the heating element, STOP and call The Heating Company Helpline 0800HEATING (432 846)

Electrical Connection – Please ensure your electrician reads the following

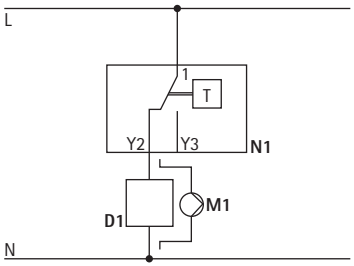
- You are not required to be an electrician to lay the heating element, as the Hotwire heating element has been classified as an electrical appliance, but all electrical connections including the thermostat, must be carried out by a registered electrician.
- All circuit wiring supply and thermostat connection must be undertaken in accordance with the current electrical standards and national wiring regulations.
- The heating units must be separated from other heat sources.
- The maximum thermal resistance between the heating element and the room = 0.4 m sq. K/w
- Using the label provided, note the heated zones installed, and fix the label adjacent to the distribution board.
- **All electrical supply circuits must be RCD (Residual Current Device) protected with a rated residual operating current not exceeding 30 mA.**

Hotwire Thermostat Connection Cross-Section

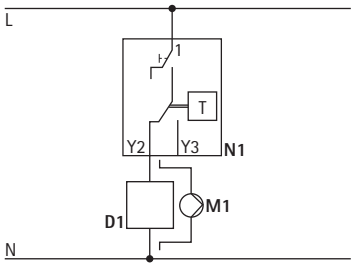


B1	QAH11 external temperatures sensor
N1	RDE20.1 room temperature controller
Y1	Regulating unit
L, N	Live, Neutral AC 24...250V
B1	Signal input "External temperature sensor"
M	Measuring neutral "External temperature sensor"
Q11, Q12	N.C. contact (for N.O. valves)
Q11, Q14	N.O. contact (for N.C. valves)

RDE20.1 Digital 7-Day Timing Thermostat



RAAO2/RAAO2.1N



RAAO3

RAAO2 & RAAO3 Manual Thermostat

- White power supply cable at one end = Brown **(phase)**/Green (earth)
- White power supply cable at one end = Blue **(neutral)**/Green (earth)

Hotwire™ heating elements comply with Electrical Standard AS/NZS 603335.2.96.2004 and IEC800

Operation

Wait 7 days for the tile adhesive to dry before you turn your heating on. Once the heating is commissioned the initial heat up time will vary depending on the sub-floor type (concrete or timber), insulation, thermal characteristics and ambient temperature. Performance will improve with use.

Do's and Don'ts

Do's

- Carefully read the installation instructions prior to commencing your installation.
- Check the element is working before you start.
- Ensure the surface is clean and clear of obstructions.
- Pre plan your element layout and stay with the recommended element spacing.
- Maintain even element spacing.
- Protect the heating element from damage at all times.
- Plan required pre-work and drilling before laying the heating element.
- Protect the element with cardboard or similar after the installation and before tiling.
- Take care when tiling not to damage or move the element.
- Ensure that enough tile adhesive is used so not to leave gaps or voids under the tiles.

Dont's

- **Don't** cut or shorten the heating element.
- **Don't** commence installation on concrete floors that have not fully cured.
- **Don't** allow the heating elements to touch or cross.
- **Don't** allow traffic over the heating elements until tiled.
- **Don't** remove the heating element off the spool other than during the installation.
- **Don't** store tiles, sharp or heavy objects on the elements while tiling.
- **Don't** switch on the heating until the tile adhesive has fully cured.

Footnotes

- The lowest ambient temperature that the heating element can be installed equals – 200°C
- The minimum radius for bending the heating element equals 20mm.
- The thickness of covering materials should be at least 5mm.
- Contact the manufacturer for advice if materials other than those recommended are used.
- The appliance is not intended for use by young children, or infirm persons, without supervision.
- Young children should be supervised to ensure they do not play with the appliance.

HotWire™ Warrranty Certificate

The Warranty Certificate must be properly completed after installation.

HotWire™ heating element/s carry a ten year product manufacturer's guarantee (thermostats carry a two year warranty) on the condition that –

1. The installation instructions have been read and the installation is carried out strictly to those instructions.
2. That the Warranty Certificate is completed correctly in ledgeable English. It must be given to the HotWire agent at the time of any defect inspection.

The HotWire™ warranty does not cover installations by unauthorised trades people, faults caused by incorrect installations, incorrect designs supplied by other parties, damage caused by persons other than the installer, or subsequent damage that may occur.

If the HotWire™ agent is required to inspect or repair any faults caused by any of the above, then all work will be fully chargeable.

If the HotWire™ Heating Cable is deemed to be faulty, it is the manufacturer's obligation to repair or supply an equivalent heating element/s (free of charge to the customer), without incurring any secondary charges linked to repairing of the heating cable.

HotWire™ Warranty applies to:

Name _____ Phone _____

Address _____ Fax _____

Email _____

Contractor/Installer _____ Installed Date _____

Phone _____

Electrical Contractor _____ Installed Date _____

Phone _____

Mat Size _____ Wattage _____

Floor Type

Concrete Floor ☐

Wooden Floor ☐

Floor Covering

Tiles ☐

Vinyl ☐

Parquet ☐

Supplier Details and Stamp

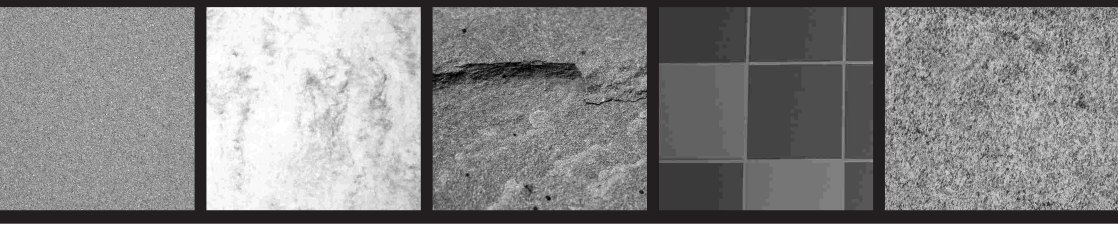
Note: This Section is required to be completed at the time of purchase to validate the warranty.

Company Name _____ Date of Sale _____

Sales Person _____

Note: To register and then validate your warranty, the above needs to be filled in, and posted or faxed to – The Heating Company NZ.

PO Box 420
Whitianga
New Zealand
Fax: +64 7 866 4423



PO Box 420
Whitianga, New Zealand
Ph: 0064 7 866 4434 Fax: 0064 7 866 4423
www.hotwire.co.nz

APPENDIX NINE – MIRROR DEMISTER

THE HEATING COMPANY Ltd

www.HotWire.co.nz

On Demand Electric Heating

MIRROR

DEMISTER

- Saves cleaning mirrors
- Negligible running costs
- Simple to install
- Sizes to suit all mirrors
- 5years manufacturers guarantee
- Made in NZ

Product Advantages

NEW HOMES OR RENOVATIONS

- Total peel back self-adhesive cover for ease of installation.
- Custom made ultra thin cold tail for ease of installation.
- Self-regulating heating film.
- The heating film will NOT overheat, as the resistance increases with the temperature.
- Operational savings are achieved. When the temperature increases by 10 degrees, the resistance increases by 4%, so therefore achieving a power decrease.
- Superior mechanical strength and durability from the aluminium heating elements.
- No risk of corrosion, leakage or product failure, due to all in one unit, with NO lamination properties, or conductors.
- Safer use and durability due to one termination connection.

Complies to Electrical Standards IEC60335-1 : AS/NZS3000 : AS/NZS3350.1-2000

SIZE		
	350mm x 380mm	(30 Watt)
	430mm x 500mm	(36 Watt)
	550mm x 600mm	(70 Watt)
	550mm x 800mm	(80 Watt)

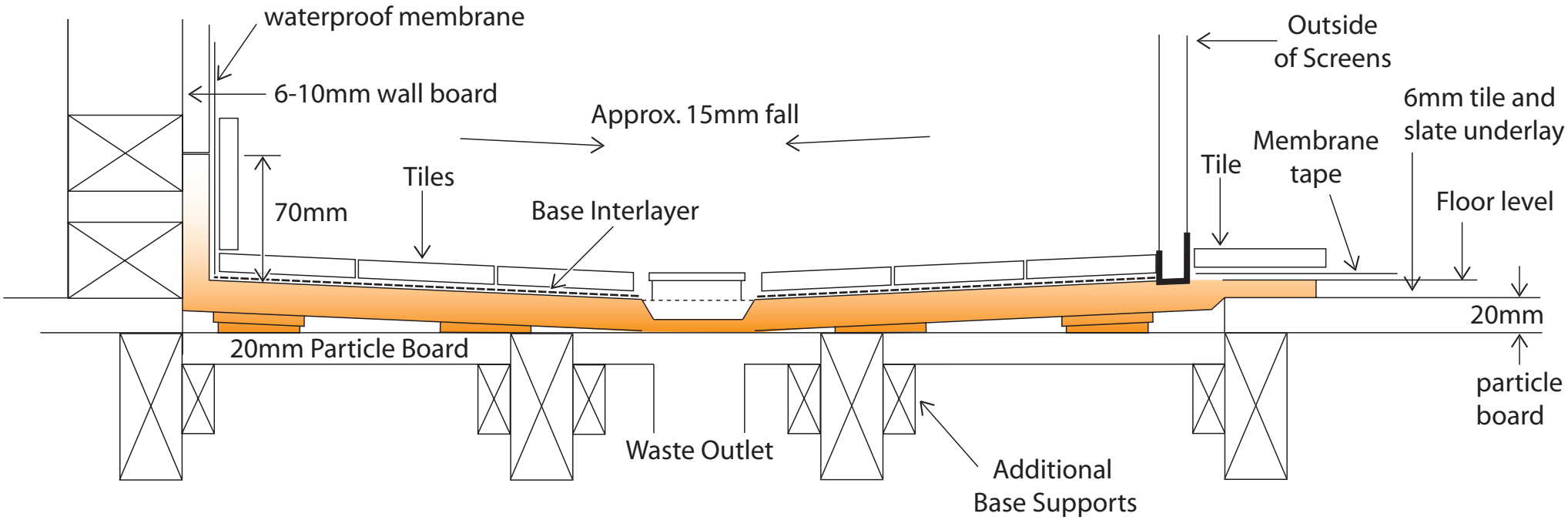
For all nationwide enquiries and
no obligation free quotations
Call our Toll Free Hotline

0800 Heating 0800 432 846

www.hotwire.co.nz

APPENDIX TEN – LEVEL TILED SHOWER ENTRY DETAIL

Level entry set into timber floor



= Base Channel - satin finish

PATENT AND DESIGN REGISTRATIONS APPLY

APPENDIX ELEVEN – LASERLITE POLYCARBONATE ROOFING

LASERLITE
AUSTRALIA

A Bayer Company

Laserlite Polycarbonate Roofing.
Only Laserlite.

ALSYNITE
creating natural light

To many people across Australia and New Zealand, the word Laserlite actually means polycarbonate roofing.

It's a reputation forged by being the best.

When people think about translucent roofing materials they think of Laserlite first.

And the reasons are very simple.

Laserlite is backed by a lifetime product warranty.

Only Laserlite offers an extensive range of colours, profiles, light transmission levels, accessories and offers a 99.9% UV protection rating.

Only Laserlite is a certified product under the stringent Australian Standard Guidelines, earning it the coveted Australian StandardsMark emblem.

Laserlite is made in Australia

Laserlite uses high quality Bayer Makrolon® polycarbonate resin designed for high impact resistance and excellent transparency.

Laserlite can be used in high wind including cyclone areas.

Laserlite is suitable for use in bushfire prone areas, designed for fire resistance and to self extinguish.

Make your installation complete

To make your installation complete there are a number of fixings and accessories required to ensure you achieve the most professional finish.

Laserlite Fixings

LASERLITE ONE SHOT

Laserlite one-shot pre-drills a 11mm oversized hole to allow for sheet expansion with its unique blade cutter in one step saving you up to 50% installation time. No more pre-drilling required.

Help your Laserlite perform better

Prevent your Laserlite Polycarbonate buckling due to changes in temperature by cutting an oversized hole in one action.

Save 50% Installation time*

Unique blade cuts an oversized hole in the Laserlite Polycarbonate, and its strengthened tip drills through the steel or timber batten all in one action. No more pre-drilling required.

Easy Installation

No more pre-drilling means installation is faster and easier. No extra expense of specialist tools. No extra effort changing tools.

Professional Finish

Automatically centres the oversized holes to allow the sheet to expand and contract in both directions equally, for the most professional finish.

*50% claim based on number of steps.

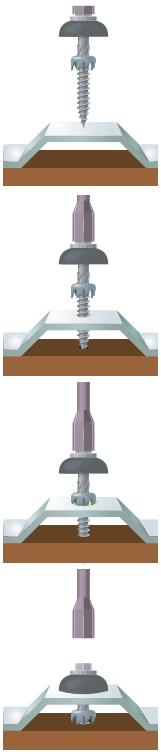
Easy Installation

Stage 1
Firmly place the sharp point of the ONE SHOT® fixing onto the crest of the corrugation to be fixed, to eliminate "skidding" or "wandering".

Stage 2
Commence drilling at 1000rpm (timber one-shot), 2000rpm (steel one-shot) to pierce the sheet. Screw engages in timber or steel batten.

Stage 3
Cutter engages polycarbonate sheet, cuts the expansion hole and centres the screw.

Stage 4
Wait until the rubber weather seal engages and compresses against the roof sheet and under the fixing head, to stop.



Available for both timber and steel battens

TIMBER

One Shot **Standard**

- Roma/Greca 50mm, Trimdek 65mm
- 12 gauge, 11 threads per inch
- Suitable for use with treated timber
- Type 17 (shape of tip)

STEEL

One Shot **Standard**

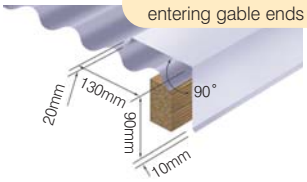
- One Shot Roma/Greca/Trimdek 55mm
- Standard Roma/Greca 45mm, Trimdek 55mm
- 12 gauge, 14 threads per inch
- Suitable for use with battens gauges 0.75mm to 4.5mm

All Laserlite Fixings are mechanically plated to comply with AS 3566 Class 3.

Laserlite Accessories

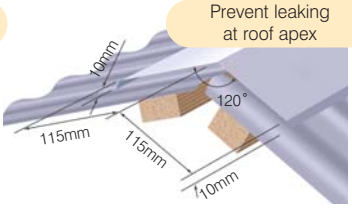
Flashings

Prevent wind and rain entering gable ends



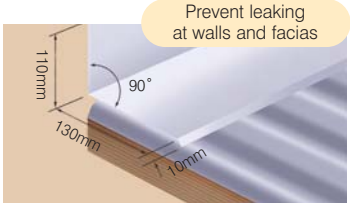
Polycarbonate Barge Capping
Colour: Clear. Length: 3.0m

Prevent leaking at roof apex



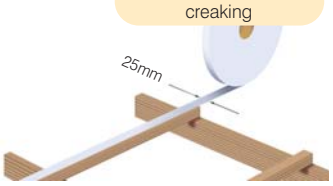
Polycarbonate Ridge Capping
Colour: Clear. Length: 3.0m

Prevent leaking at walls and facias



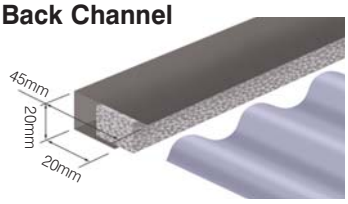
Polycarbonate Apron Flashing
Colour: Clear. Length: 3.0m

Reduce creaking

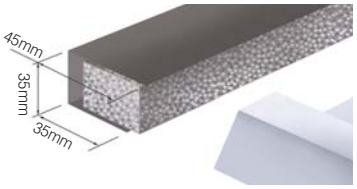


Noise Stop Tape (Purlin Tape)
Colour: White
Length: 25.0m

Back Channel

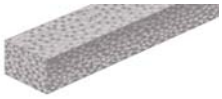


Back Channel Flashing (Metal)*
***Use with Back Channel Infill Strips.**
Colours: White and Grey
Profile: Roma, Greca Length: 3.6m

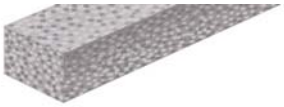


Back Channel Flashing (Metal)*
***Use with Back Channel Infill Strips.**
Colours: White and Grey
Profile: Trimdek Length: 3.6m

Prevent leaking at walls and facias

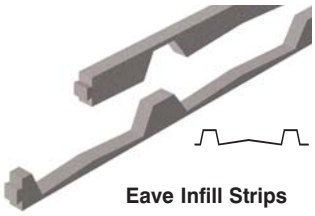


Back Channel Infill Strips
Profile: Roma, Greca
Colour: Grey Length: 3.6m



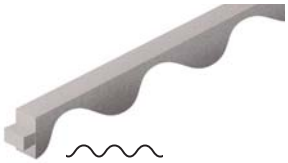
Back Channel Infill Strips
Profile: Trimdek
Length: 3.6m

Eave Infill Strips

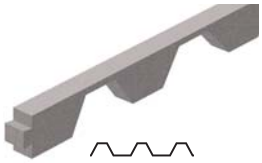


Eave Infill Strips
Profile: Trimdek
Length: 760mm
Qty: Pack of 4

Prevent rain, dust and wind entering eaves



Eave Infill Strips
Profile: Roma. Length: 975mm
Colour: White
Qty: Pack of 4



Eave Infill Strips
Profile: Greca. Length: 760mm
Colour: White
Qty: Pack of 4

Laserlite 2000. New Zealand's most popular choice.

Laserlite 2000 offers the most extensive range of designer colours to enjoy your outdoor living all year round.

Only Laserlite gives you the peace of mind that comes from being able to spend more time outside, knowing that you and your family are protected from the elements. Your pergola, carport and even your greenhouse can benefit from the durability, high impact resistance and 99.9% UV protection of Laserlite 2000.

Available in an extensive range of colours and in three profiles to suit your lifestyle. Backed by a lifetime warranty for peace of mind.

	Clear	Opal	Classic Cream	NEW Stone*	Bronze Tint	Grey Tint	Gumleaf	Ocean Blue
Colours~								
Transparent	✓				✓	✓		
Translucent		✓	✓	✓			✓	✓
Profiles (all colours)	Roma			Greca		Trimdek		
Benefits	• High impact resistance • Durable							
Product Certification	Certified Product Australian Standard AS/NZS 4256.5 Licence 1811; Made in Australia from Imported Resin; Laserlite Lifetime Warranty; 99.9% UV Protection; High Wind Areas; Bush Fire Resistant							

~ Some colours may not be available ex-stock.

Laserlite Apollo. Advanced performance, contemporary design.

Only Laserlite Apollo combines advanced heat reflecting performance and light transmission. Available in the largest range of contemporary metallic colours to suit any lifestyle.

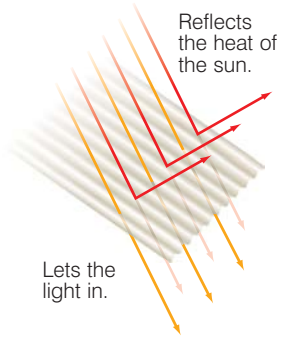
Laserlite Apollo's secret for advanced performance is the millions of heat reflective metallic particles that are encapsulated in each polycarbonate sheet. They provide a lustrous metallic or pearl appearance, as well as extremely efficient heat reflecting properties. So it not only looks cool, it keeps you cool as well.

In fact, it also provides protection from 99.9% of harmful UV radiation, has around 250 times the impact resistance of glass and is backed by a lifetime warranty. Laserlite Apollo is available in a range of contemporary colours to suit any lifestyle.

	Arctic Ice	Platinum	Olive Mica	Gun Metal	NEW Metallic Bronze*	Steel
Colours~						
Transparent		✓	✓	✓	✓	✓
Translucent	✓					
Profiles (all colours)	Roma		Greca			
Benefits	• Heat reflective metallic particles • High impact resistance • Durable					
Product Certification	Certified Product Australian Standard AS/NZS 4266.5 Licence 1811; Made in Australia from Imported Resin; Laserlite Lifetime Warranty; 99.9% UV Protection; High Wind Areas; Bush Fire Resistant					

~ Some colours may not be available ex-stock.

Laserlite XPT. Unrivalled heat reflective technology.



Laserlite XPT offers unrivalled heat reflective technology which lets the light in and keeps the heat out, providing comfort and shade to enjoy your outdoor living.

Laserlite XPT is one of the most technologically advanced polycarbonate roofing products in the world. Its specially co-extruded cap layer cleverly singles out heat carrying infra red light and reflects it away from the sheet, whilst allowing visible light to pass through. It also protects you from 99.9% of harmful UV radiation.

Laserlite XPT is available in a range of soft and subtle colours and is backed by a lifetime warranty.

Only Laserlite can give you such peace of mind.

	Satin Cream	Ivory* (NEW)	Satin Sage* (NEW)	Eucalypt	Alpine Blue
Colours~					
Translucent	✓	✓	✓	✓	✓
Profiles (all colours)	Roma		Greca		
Benefits	• Heat reflective co-extruded layer • High impact resistance • Durable				
Product Certification	Certified Product Australian Standard AS/NZS 4256.5 Licence 1811; Made in Australia from Imported Resin; Laserlite Lifetime Warranty; 99.9% UV Protection; High Wind Areas; Bush Fire Resistant				

~ Some colours may not be available ex-stock.

Installation Instructions

Carefully read all installation instructions before you start.

- *For installation of roofs over 3 metres in height or for cyclonic regions, contact your nearest Alsynite New Zealand office for special instructions.*
- *Always exercise extreme care when working on a roof. Use walking boards along purlins. Never walk directly on the sheeting.*
- *Always wear eye protection when using cutting tools.*
- *Laserlite does not recommend the collection of drinking water from any roof without appropriate precautions and filtration. Check with your local water authority for further advice.*
- *For safety precautions Laserlite recommends the use of safety mesh for installations above 3m.*

1. Ensure that your roof pitch is at least 5˚, i.e. 88mm rise per lineal metre. This will ensure adequate water run off.

2. Allow for ventilation, particularly at the highest point, to minimise heat build-up and provide air circulation. Good ventilation will also minimise condensation in cold weather.

3. For roofing, purlin/batten spacings should be no more than those shown in Table X – Maximum Purlin Spacings. For curved structures, the maximum purlin spacing should be 750mm and a minimum radius of 6000mm for Roma and Greca profile and 14000mm for Trimdek profile. For walls, nogging spacings should be no more than 1200mm. Use Laserlite Noise Stop Tape on all battens, purlins or noggings to minimise the noises associated with expansion and contraction.

4. Ensure the UV surface protected side faces the sun. This is the side of the label and the inkjet marking. When installed as a wall or fence it is recommended that the UV protected side is facing the most sun. The life of the sheet may be shortened and discolouration may occur due to the unprotected side being exposed to UV radiation.

5. The sheet can be easily cut with a pair of shears, a fine-toothed handsaw or a circular saw with a cut-off blade suitable for plastic.

6. In normal conditions, use the fixing spacings shown in Table Y – Fixing Spacings. As a guide, you will need approximately 7 fixings per lineal metre. This depends on your purlin spacings and wind conditions. In high wind areas fix Roma and Greca on every second corrugation on each purlin/batten. It is suggested that barge capping be used. Fix the sheet through the crests for roofing and through the valleys for walls.

7. For roof laying, start with the lower sheets first, keeping side laps away from prevailing wind. Allow an overhang of 50mm. Temperature changes will cause expansion and contraction, so make allowances for thermal movement. Resistance to movement can cause buckling.

8. Temperature changes will cause the sheet to expand and contract. To ensure maximum performance of the sheet, and to avoid buckling, it is necessary to oversize the holes and centre the fixings.
It is recommended that Laserlite One-Shot fixings are used. They come complete with their own hole saw that cuts an expansion hole as you drill. The screw is centred every time. The cutter holds the plug of material removed and grips the purlin when the fixing is tight enough.
If using standard fixings, pre-drill your fixing holes. Use a 10mm drill for sheets up to 4.2m long and a 12mm drill for sheets longer than 4.2m. Fix the sheet through the centre of the pre-drilled holes, perpendicular to the purlins/battens. A (5/16") Drill hex driver bit should be used.
Only tighten the fixings enough to prevent rattling. Over-tightening may cause distortion and undue stress with possible failure resulting. Use only Laserlite branded fixings as these are designed to be compatible with Laserlite Polycarbonate Roofing. Any failure of the sheet due to fixings other than Laserlite branded will void the Laserlite warranty.

9. Side laps will differ by profile. Install as shown in Table Z.

10. End overlaps should be 150mm for steep pitch or 200mm for shallow pitch.

Important. Sealants - *These instructions are designed to prevent leaking and alleviate the requirement for sealants. Sealants, especially silicone, are incompatible with polycarbonate. They will damage the sheet, restrict expansion and contraction, and void the warranty. Use the appropriate Laserlite flashings and infill strips to complete your project and help protect your outdoor entertaining areas from the weather, without the need for sealants.*

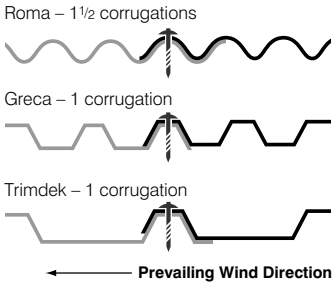
Table X – Maximum Purlin Spacings

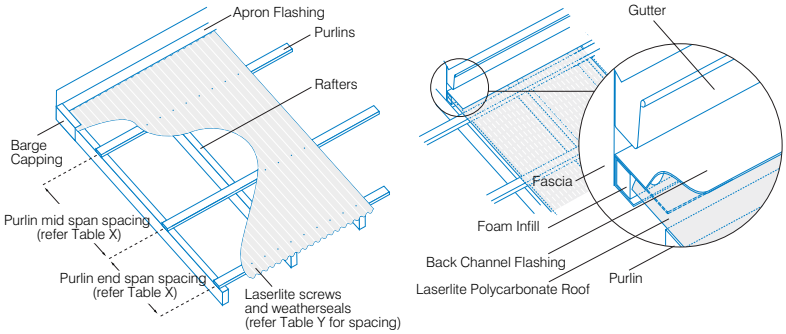
Profile	End Span	Mid Span
Roma	800mm	1000mm
Greca	900mm	1200mm
Trimdek	900mm	1200mm

Table Y – Fixing Spacings

Profile	End Purlins	Mid Purlins
Roma	Every 2nd crest	Every 3rd crest
Greca	Every 2nd crest	Every 3rd crest
Trimdek	Every crest	Every crest

Table Z – Side Laps





Light and Heat Transmission

Shading Co-efficient Ratio (x:1)[1] 2000 Apollo XPT

Warmest — Coolest

Clear	Bronze Tint	Grey Tint	Opal	Ocean Blue	Gumleaf	Arctic Ice	Alpine Blue	Stone	Gun Metal	Ivory	Satin Sage	Metallic Bronze	Eucalypt	Satin Cream	Steel	Olive Mica	Platinum	Classic Cream
1.01	0.68	0.55	0.53	0.50	0.43	0.39	0.37	0.36	0.35	0.35	0.34	0.34	0.34	0.33	0.32	0.31	0.31	0.30

Light Transmission

More Light — Less Light

Clear	Opal	Satin Cream	Arctic Ice	Bronze Tint	Ivory	Classic Cream	Stone	Satin Sage	Grey Tint	Gumleaf	Eucalypt	Ocean Blue	Platinum	Alpine Blue	Olive Mica	Metallic Bronze	Steel	Gun Metal
93%	56%	51%	44%	35%	35%	33%	29%	28%	19%	19%	19%	18%	17%	16%	15%	15%	15%	13%

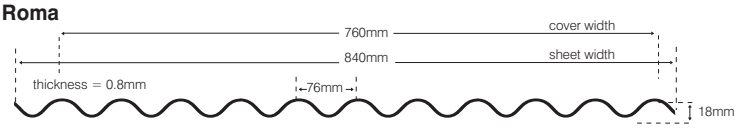
[1]Shading co-efficient: A ratio of the warming effect of the sun's rays through a sheet divided by the sun's warming effect through 3mm float glass. **The lower the figure the cooler it is under the sheet.**

*New colours (Stone, Ivory, Satin Sage and Metallic Bronze) still awaiting certification to AS/NZS 4256.5

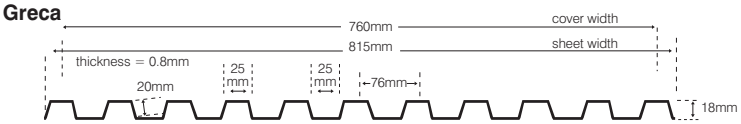
Product Range

Dimensions - Laserlite Polycarbonate roofing is available in 3 designer profiles.

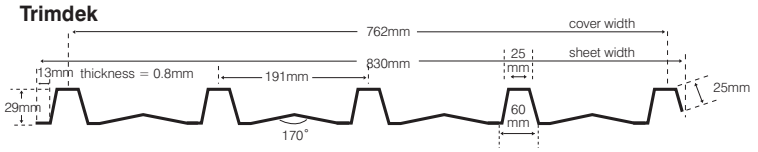
Roma



Greca



Trimdek



Weight	Roma	Greca	Trimdek
Kg per Lineal Metre	0.92	0.93	0.92
Kg per m²	1.10	1.13	1.11

Available Sizes

Standard lengths in metres 1.8, 2.4, 3.0, 3.6, 4.2, 4.8, 5.4, 6.0, 7.2

Long lengths - Lengths up to 10 metres can be ordered (conditions apply)

Technical Data

Thermal Expansion[1]	2.1mm per 3m per 10˚C
Thermal Conductivity	0.17W/m˚C
Vicat Softening Point	135˚C (AS1462)
Tensile Strength	65Mpa (AS1145-1989)
Impact Strength	Exceeds 12 joules (AS4257.6-1994) approx 250 times more than glass[2]
Corrugation Retention	No change for up to 2 hours at 100˚C

[1]Thermal Expansion – calculate from ambient temperature at time of installation.
[2]Impact resistance can decline with age.

UV Protection

Laserlite Polycarbonate Roofing prevents the transmission of more than 99.9% of harmful UV radiation, measured to standard ISO 9050:2003. Its co-extruded UV barrier protects the sheet from UV degradation and discolouration. It remains stable under extreme climatic conditions (-20° to +120°C).

Wind Load

Laserlite Polycarbonate Roofing is suitable for use in high wind areas. Roma and Greca profiles meet the requirements of AS 1170.2- 1989 SAA Loading code Part 2 – Wind Loads. Roma and Greca profiles also meet the requirements of TR440 (Guidelines for the testing and evaluation of products for cyclone prone areas) for fatigue loading, for the permissible stress design pressure of 3.0kPa, for a multiple span of 600mm end span and 900mm internal spans using 14 gauge hex head screws with cyclone assemblies. Deemed to comply to the Darwin Cyclone Area certification numbers M/133/1 and M/133/2 apply. Please visit our website at www.laserlite.co.nz for further details and specific installation instructions.

Fire Performance

Laserlite Polycarbonate Roofing is self extinguishing, stops the spread of flame and also has excellent fire resistant properties. Therefore, this product complies with many fire related tests, including Heat and Smoke Release Rates (AS/NZS 3837:1998), Radiant Heat Test (FES025 c Version 2), Heat Radiation (NF P92-501), test for meltable materials (NF P 92-505), Spread of flame propagation (NF P 92-504), Early Fire Hazard Test (AS 1530.3-1999) and with CSIRO Appraisal for Bush Fire prone areas.

Compliances

Impact Resistance	AS/NZS 4257.6:1994
99.9% UV Resistant	ISO 9050:2003
Cyclone Testing	TR440
Heat & Smoke release rates	AS/NZS 3837:1998
Radiant Heat Test (Bush fire attacks)	FES025 C Version 2
Multi Layered materials	NF P 92-507
Heat Radiation	NF P 92-501
Test for meltable materials	NF P 92-505
Spread of flame propagation	NF P 92-504
Durability Test	NF P 92-512
Sandbag Impact Test	AS/NZS 4040.4:1996
Resistance to wind pressures for non cyclone regions	AS 4040.2:1992
SAA Loading code Part 2 – Wind Loads	AS 1170.2:1989
Early Fire Hazard Test	AS 1530.3:1999
Plastic roof and wall cladding material – Polycarbonate[1]	AS/NZS 4256.5
Design and Installation[2]	AS/NZS 1562.3:1996
Diffuse Light Transmission	AS/NZS 4257.4:1994
Colourfastness & Impact Resistance following UV exposure	AS/NZS 4257.7:1994
Outdoor Durability	AS 1745.1:1989
Dimensional Properties	AS/NZS 4257.1:1994

[1]StandardsMark Product Certification Licence number 1811 in relation to AS/NZS 4256.5 ongoing compliance. Independent third party monitoring of compliance is conducted by SAI Global Limited, a JAS-ANZ accredited certification body.

[2]Installation and design shall be carried out in accordance with AS/NZS 1562.3:1996 using good trade practice and in meeting the requirements of E2 and B2 of the New Zealand Building Code. Laserlite standard installation instructions apply as indicated in this brochure.

Handling, Storage and Cleaning

1. Store sheets on a flat surface in a well protected and shaded area, out of direct sunlight. Stacked sheets stored in the sun will cause heat build-up and possibly distortion, even if covered. If damage occurs in this situation, warranty is void.
2. Prevent moisture getting between stored sheets as this may cause whitening.
3. Clean sheets regularly with warm soapy water (mild detergent) and a soft sponge. Take care not to scratch the sheet. Hose down thoroughly.

Laserlite Polycarbonate Roofing is generally unaffected by acids, alcohols, glycols, mineral oils, animal and vegetable fats, kerosene, and non-abrasive cleaners. However, it is affected by methylated spirits, benzene, petrol, ketones, acetone, phenols, chlorinated and aromatic hydrocarbons, petroleum-based paints, abrasive cleaners and solvents.

Warranty

Loss of Light Transmission – Lifetime Warranty

The product will not lose more than 8% of light transmission for the first 10 years and thereafter, no more than 1% per year for lifetime from the purchase date (when tested in accordance with ASTM D 1003-1995). This warranty applies from the date of original purchase and is valid only to the original purchaser of the product (claims must be accompanied by an original purchase receipt). The product must be for domestic use only and must have been stored, installed and cleaned in accordance with Laserlite's recommendations.

Weather Breakage – 5 Year Warranty

From the date of purchase the product will not break as a result of hailstones measuring up to 25mm in diameter. Damage caused by objects other than hail is excluded from this warranty. It is the responsibility of the consumer to obtain a copy of the full warranty conditions. These are available from any Alsynite New Zealand office or website. Any claim should be made in writing to: Alsynite NZ Limited, PO Box 10-409 Te Rapa, Hamilton NZ.

Distributed by

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creating natural light

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Colours depicted in this brochure are representations offered only as a guide and should not form the basis of a colour selection. Slight colour variation may occur between production runs. Transmitted light and colour may vary in intensity depending on weather conditions.

The information contained in this brochure is to the best of our knowledge accurate, but all recommendations are made without any warranty whatsoever, since the conditions of use are beyond our control. This brochure cancels and supersedes all previous publicised information.

The company reserves the right to alter and revise, without notice, the information contained herein.

® Registered trademark of Bayer, Germany.

BAYER makrolon®

All Laserlite Polycarbonate Roofing products are manufactured from high-tech, high quality Bayer **Makrolon**® polycarbonate resin for high impact resistance, light weight, excellent transparency, UV stability and excellent fire resistance.

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2.3.1 HANDLING AND STORAGE

Correct handling of profiled metal roofing and cladding products is critical to ensure damage does not occur during transportation and storage of the material. The following comments are made as guidelines to be used when inspecting Dimond Roofing and Wall Cladding Systems during the installation process.

Visual inspection of materials when they are delivered to the site should be carried out to ensure they are dry and free from damage. All components stored on site must be kept dry.

Site storage of sheet material requires dunnage evenly spaced to provide a surface for the materials to be placed on that is in plane.

Covers must be placed over the material to ensure it does not become wet during any storage period, and must remain clear of the material surface so air can circulate freely around the bundle. Product with strippable film applied must not be exposed to direct sunlight during storage.

The need to keep the sheets dry applies to all metal types. If aluminium is stored wet it will suffer black staining that detracts from appearance. If pre-painted Zincalume® products are stored wet, the paint finish will blister due to moisture absorption and eventual under-film corrosion. If unpainted Zincalume® products are stored wet, the surface will stain and can suffer loss of protection that will show up in time as premature corrosion. If the sheets have remained in this wet condition for more than 3 days, they should not be used.

If sheets do become wet and remained wet for less than 3 days, they must first be removed from the stack, immediately dried thoroughly and re-stacked with timber fillets being placed evenly between the sheets to ensure air can circulate freely over the sheet surfaces.

Sheets must always be lifted clear of the stack, never dragged.

Adequate support must be given along the length of sheets when lifting, whether it be single sheets by hand or bundles of sheets by crane or other lifting device. When lifting by mechanical means, spreader bars must be used to ensure the fabric strops do not damage the edge of the sheets as they are lifted.

2.3.2 LAYOUT AND FASTENING

The following comments are made as guidelines to be used when inspecting Dimond Roofing and Wall Cladding Systems during and after installation.

a. Netting

Netting should be run across purlins and tensioned to remove unnecessary sag. Fastening to timber should be with either galvanised staples or 25mm clouts, and to steel with flat head Climaseal® Tek® screws.

Fixings should be at 150mm centres on end purlins in such a way that the netting cannot pull past the fixing. Edges of the netting should be tied together or twitched at 300mm centres and fixed to each purlin.

b. Roofing Underlay

Horizontal Application: underlay is unrolled across the roof parallel with purlins and secured as necessary. Joins should be lapped by a minimum of 100mm.

Vertical Application: underlay is unrolled vertically up the slope of the roof from guttering to ridge and secured to the purlins as necessary before laying the roof sheet and fixing down. Joins should be lapped by a minimum of 150mm.

When used under roofing, all underlays must be supported on wire netting or strapping at 300mm maximum spacings (except Greenwrap which may be used over purlin spacings up to 1200mm without support).

Underlay should overlay into the gutter at least 20mm and not more than 50mm, and avoid lapping into the water flow.

In general it is recommended that prolonged exposure of the underlay to the weather is avoided by fixing the roofing the same day.

c. Roofing and Cladding Sheets

Supporting Structure

- Roofing and wall cladding sheets should not be installed until the roofing contractor is satisfied that the support structure is complete, sound, and correctly aligned. This includes support around penetrations and openings.
- Purlin and girt spans both end and internal spacings must be in accordance with Dimond recommendations for profile, metal type and thickness, as well as the expected level of foot traffic. If in doubt, check.
- Curved roofs (whether draped/rolled or crimped) require purlin alignment within ±5mm to minimise the risk of unacceptable finished appearance.
- Timber packers must be fixed to steel purlins when installing to allow insulation to fit between. Avoid compressing the insulation when the full 'R' value from the insulation is required.

Where the building is under the scope of E2/ASI there is a requirement to install horizontal wall cladding onto a cavity batten system to achieve a 20mm air space between the back of the cladding and wall framing on all walls in accordance with NZBC E2/ASI. Dimond profiles that come within the scope of E2/ASI are: Corrugate, Styleline, Trimdek, DD300, DD400 and V-Rib.

Vertical run cladding does not require a cavity batten system on any risk matrix wall provided the details and installation is carried out in accordance with recommendations in this manual, which are based on past history where Dimond profiles have successfully been fixed.

Installation in this way will not be in acccordance with E2/ASI: June 05 and is an alternative solution.

2.3.2 Continued

Sheet Layout

- Firstly, the sheet should show no signs or evidence of transport damage or storage damage including wet storage effects. If the sheets are damaged they must not be fixed down, and the Dimond supplying branch should be informed as soon as possible.
- Care should be taken to ensure sheets are laid parallel to the lines of building ends, and perpendicular to ridges and gutters. If possible, the direction of laying should be such that the sheet side laps face away from the prevailing wind direction, or, in the case of wall cladding, away from the most common line of sight.
- Side laps must be properly engaged such that the overlap rib fits correctly over the underlay without obvious gaps or insufficient cover.
- Roofing sheets should run continuously from ridge to gutter, avoiding end laps. Long lengths separated for thermal expansion or handling reasons should join at a step in the roof. Where end lapping of straight and curved sheets cannot be avoided, a correctly formed and sealed lap is required, with a bead of neutral curing silicone sealant each end of the lapped sheets.
- Sheet ends should form an even line (within a workable tolerance) and roof sheeting should overhang into gutters by at least 50mm and must allow clearance to enable ease of gutter cleaning.

Sheet Ends

- All roofing and wall cladding sheet ends that terminate under flashings (regardless of pitch) should be formed with a vertical stop end to the full height of the profile rib.
- For roofs below 8 degrees pitch the drip edge sheet end should be formed with a down turned lip.

Sheet Fastening

- Sheet must be fastened to every purlin (or girt) to transfer outward loads evenly to every structural member.
- The screw and washer system used should meet specification requirements and have a durability to at least match that of the sheeting, and be in accordance with Dimond literature for that profile.
- Screw fasteners must be perpendicular to the sheeting and tightened sufficiently to effect a durable seal without over tightening that results in seal washer distortion or profile crest dishing and depressing. Fixings must be to a line.
- Concealed clips used to fasten Dimondek 400 and Dimondek 630 products must not exhibit screw or nail head protrusion such that damage to the roof sheet and coating may result.
- Whenever oversize holes are required to accommodate expansion, profiled washers and seals must be used.
- Profiled washers and seals should be used whenever specified to provide extra wind uplift capacity.
- Note should be made to ensure there are sufficient fasteners, evenly distributed. In particular the perimeter zones of roofs, where maximum wind uplift occurs, must have sufficient fasteners.
- No areas on the roof should hold water that will cause ponding long term. The structure may require realignment and if the profile is damaged, this should be replaced.

Continued on next page...

2.3.2. Continued

Side Lap Fastening
All metal profiles must have side laps fastened (either by primary fasteners through to the purlins, or by stitching the top sheet to the underlay sheet) to comply with the following maximum spacings.

Material	Thickness (mm)	Maximum Side Lap Fastener Spacing (mm)
Steel	0.40 0.55 0.75	1500 2000 2400
Aluminium	0.70 0.90	1500 2000
Duraclad (GRP) Rib height 30mm or less	1.7	750
Duraclad (GRP) Rib height greater than 30mm	1.7	1000

Wall Cladding Side Lap
Side lap stitching on pan fixed wall cladding is recommended to improve the lap weather tightness, when the distance between fixings is greater than 1.5m. Side lap fixings should not exceed 750mm centre to centre.

The recommended side-lap fasteners for stitching sheets together are:

Metal Sheeting

10 – 16 x 16mm	Hex head	Tek® screws
10 – 12 x 20mm	Hex head	Type 17 screws

Duraclad
Bulb - Tite Rivet
or Bolt and compressible rubber sleeve

d. Duraclad
The above comments for roofing and cladding sheets generally apply. Additional attention should be given to:
- Stop ends should be correctly formed by attaching a metal (usually aluminium) folded angle to the sheet end, and sealing it in place.
- The supporting structure must be free of abrasive surfaces or irregularities. If used over netting or safety mesh, a barrier strip must be installed to prevent abrasive damage to the sheet surface.
- Fastening of Duraclad requires pre-drilling of the sheet with a hole size that is at least 2mm greater than the fastener diameter. Additional hole size may be required to accommodate thermal expansion of the sheeting.
- 32mm Weatherlok washers must be used as specified.
- Provision should be made during installation to enable foot traffic movement across the roof without applying point loads to the Duraclad sheeting. Planks or temporary walkways are recommended.
- Safety Mesh must be installed underneath Duraclad if the sheet thickness is less than 1.7mm. (If general foot traffic is expected, consult Dimond for the use of products specifically designed for the purpose.)

e. Natural Lighting Products
Refer to Section 2.4.1.3 for installation of these products.

2.3.3 FLASHINGS / PENETRATIONS

The following comments are made as guidelines to be used when inspecting Dimond Roofing and Wall Cladding Systems during and after installation.

Material
Must be the same material and coating as the roof or wall cladding to give a similar durability and compatibility as the roof/wall system.

Fabrication
Flashings should be fabricated to achieve sufficient cover width and to maintain falls to avoid water ponding. They must be without noticeable micro-cracking and be fixed without damage such as dings or crushing, and should be free of scratches and swarf the same as for roofing.
Flashing joins must be sealed at both ends of the lap, and the fasteners must pass through the sealant at the leading edge. Spacing of fasteners should be no greater than 50mm apart. Laps to be 150mm min.

Fastening
Wherever possible, flashings should be screw fixed through to the supporting structure, with sufficient slope or fall to ensure ponding does not occur. Stitch screws should be the preferred means of attaching flashings to sheeting ribs. If aluminium rivets are used, the minimum size should be 4.8mm diameter.

All fasteners should be of sufficient size and frequency to withstand the loads that may be applied through wind uplift or thermal expansion, throughout the life of the roofing material. As a guide, where flashings cover the roof, use the same fastener that has been used to fasten the roof.

As a guide, the fastener frequency for fixing flashings should be:

Wind Zone*	Fasteners Per Metre
Low (32 m/s)	1
Medium (37 m/s)	2
High (44 m/s)	3
Severe (50 m/s)	4

*in accordance with NZS 3604

Sensible allowance should be made to allow relative thermal expansion between flashings and sheeting if sheet lengths exceed 12m.
Expansion joints in the flashings should be considered for steel flashings greater than 18m and aluminium flashings greater than 12m in length.
Flashing lapping over roofing should be in accordance with Table 2.1.O of Section 2.1.3.6 in this manual. Where barges meet the gutter, this must be closed off to ensure wind driven moisture and birds cannot enter the building.

2.3.3 Continued

Profiled Foam

Profiled foam sealing strips should be installed when specified at the top end of the sheet, adjacent to the stop end. To help keep the strips in place it is good practice to position them on a bead of silicone sealant.

Notching

Best practice to notch flashing downturns around sheet profiles is to mark in-situ and use a rib-shaped template. Clearance gaps around the rib should be just sufficient to prevent cut edge contact with the sheet surface. Gaps between 1mm and 3mm are generally considered satisfactory.
Soft edging can be used on corrugate and low rib profiles with rib heights up to 30mm and should be neatly pushed down and formed in to the profile pans to achieve a neat-tight fit.

Dektites®

Dektite® pipe flashings must not be positioned in such a way that a dam is formed across a water channel. It is preferred that Dektites® are positioned on the 'bias' rather than square across the sheet.
Excess silicone sealant should be avoided, as it will add to the risk of water ponding.

Penetrations

Penetration holes with their major dimension or diameter greater than 150mm must have support framing placed around the perimeter of the penetration holes.
Water diversion around the penetration must not cause an overload of the receiving channel such as the pans that the water has been diverted into, which may cause flooding. Penetration flashing shall not rely solely on the silicone sealant to achieve weather tightness of the flashing.

2.3.4 GENERAL WORKMANSHIP

The following comments are made as guidelines to be used when inspecting Dimond Roofing and Wall Cladding Systems during and after installation.

Roof Access
The means of access must be safe and secure, and should provide protection to the sheeting at the access point. Provision for cleaning or changing footwear to prevent the transfer of dirt onto the roof surface is recommended to minimise the risk of surface scratching damage.

Walking on Roofs
Soft, clean (free from dirt and clay) light coloured sole footwear must be worn. Foot placement should be close to purlin lines, and point loads should not be applied to profile ribs through careless weight distribution while walking. Avoid foot placement on the underlay edge of roof sheets.
Translucent or Natural Lighting sheet must not be walked on.

Subsequent Trades
The work habits of trades accessing the roof must be controlled to avoid unnecessary damage from foot traffic, swarf, and storage of materials. Installed roofing that will be subject to further use (or abuse) during building construction should be protected by covers or temporary walkways. Care must be taken to protect and avoid scratching of the paint finish. The placement of scaffolding legs onto a roof should be avoided unless there is adequate support and protection to the roof finish to avoid damage.

Dissimilar Materials
Care should be taken to ensure that incompatible materials have not been used, particularly through the installation of walkways and air conditioning equipment. Copper pipe must not discharge or allow water run-off onto the metal roof. Where necessary, water run-off from dissimilar metals should be contained and discharged separately from the roofing material.

Wall cladding lapping onto concrete tilt slab or block walls must not contact the concrete. A small gap, such as 5mm, between or isolation strip is recommended.

Drilling and Cutting
When metal sheets require cutting, only shears, powered nibblers or hand snips should be used to leave a cleanly cut sheared edge. Any form of disc cut will nullify the material warranty.

Cutting of Duraclad sheets can be with an abrasive disc or a fine tooth saw. Breathing protection should be worn to prevent inhalation of dust.

Cutting and drilling should be carried out clear of other sheeting material, and the drilling swarf immediately removed from the surrounding sheet surface.

Swarf
The particles of metal that result from cutting, drilling or self-drilling screw placement can adhere to the sheet surface and rapidly corrode, causing staining problems. The sheet durability is not affected provided the swarf particles have not penetrated the coating. Loose swarf must be removed without damage to the metal surface at least at the end of each day's work including swarf driven by wind up under barge or apron flashings.

Remaining adhered swarf may be best left alone, provided no particles have broken the coating surface and the visual effect is acceptable. Roofs with heavy deposits of swarf or where the coating has been broken may require the affected sheets to be replaced.

It is best trade practice to clean up after each day's work to avoid swarf damage.

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2.3.4 Continued

General Appearance
Screw fasteners should be installed to a straight line (staggered for lapped purlins). Extra care on wall cladding is required to achieve this. Flashings should run parallel with profile ribs or the building line.

Sheet side laps should not exhibit excessive gaps, which can be controlled by careful sheet layout and side lap stitching if necessary.

Water Ponding
The installed roof and flashings must not exhibit water ponding. Buckling of profile pans caused by poorly formed lip downturns at gutter lines is a particular area of potential ponding that should be checked.

Sealants
Only neutral cure silicone sealants should be used. All sealed joints must be mechanically fastened, and excess sealant removed to prevent unnecessary dirt buildup.

Joints in flashings or roof plane intersections should not be constructed in a way that relies entirely on sealant to remain weather secure. Sealant should only be used to seal between two metal surfaces, not fill holes or gaps.

Cleaning on Completion
All forms of debris must be removed daily from the roof surface to prevent scratching damage and moisture or dirt retention. On completion the roof should be thoroughly washed down and then inspected for any damage and any necessary remedial work carried out.

Strippable Film
Protective films must be removed within 1 day of product installation. Prolonged UV exposure will make removal difficult. The film must be removed from laps and under flashings during installation.

Scratches and Touch-up
Scratches that have not penetrated to the base metal (on coated materials) and minor surface abrasions should be left alone, as touch up painting will become obvious in time.

Sheets with heavy scratch damage (e.g.: scratches readily visible from a 3-metre distance that expose the base metal) should be replaced.

Buckled Ribs
Minor buckles that have occurred in profile ribs and will not retain water can be left alone. More severe buckles that will retain water or weaken the sheet should be pushed out from underneath, or be capped over with a rib section extending a minimum 50mm beyond the damaged section, fully sealed with silicone sealant and held onto the roofing rib with 5 – 3.2mm diameter blind aluminium rivets each side.

Major buckles that affect more than 1/4 of the ribs in line across any sheet will cause a severe loss of strength, and in such cases the sheet must be replaced, ie if more than 2 adjacent ribs are buckled on the same purlin line, the sheet's ability to hold load is reduced and it must be replaced.