

**BUILDING CONSENT APPLICATION
POOL HOUSE
107 HINEMOA STREET
BIRKENHEAD 0626**

DOC A

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(Building Consent only)

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SPECIFICATION

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

Pool House

(project name)

107 Hinemoa St

(project address)

Justine & Alan

(owners name)

Job Number: 13-027

Date: March 2014

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1232 INTERPRETATION & DEFINITIONS

1. GENERAL

This general section relates to interpretation and definitions that are used in this specification.

1.1 DEFINITIONS

Required:	Required by the documents, the New Zealand Building Code or by a statutory authority.
Proprietary:	Identifiable by naming the manufacturer, supplier, installer, trade name, brand name, catalogue or reference number.
Provide and fix:	"Provide" or "fix" or "supply" or "fix" if used separately mean provide and fix unless explicitly stated otherwise.
Review:	Review by the contract administrator is for general compliance only. Review does not 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.
Working Day:	Working Day means a calendar day other than any Saturday, Sunday, public holiday or any day falling within the period from 24 December to 5 January, both days inclusive, irrespective of the days on which work is actually carried out.

1.2 PERSONNEL

Owner/Principal:	The person defined as "owner" in the New Zealand Building Code.
Contractor:	The person contracted by the principal to carry out the contract.
Contract Administrator:	The person appointed by the principal to administer the contract on the principal's behalf. Where no person has been appointed by the Principal, it means the Principal or the Principal's representative.

1.3 ABBREVIATIONS

The following abbreviations are used throughout the specification:

AS/NZS	Joint Australian/New Zealand Standard
AWCINZ	Association of Wall and Ceiling Industries of New Zealand Inc
BCA	Building Consent Authority
BRANZ	Building Research Association of New Zealand
BS	British Standard
CSIRO	Commonwealth Scientific and Industrial Research Organisation
HERA	Heavy Engineering Research Association
LBP	Licensed Building Practitioner
MBIE	Ministry of Business, Innovation and Employment (includes the old DBH)
MPNZA	Master Painters New Zealand Association Inc
NZBC	New Zealand Building Code
NZS	New Zealand Standard
NZS/AS	Joint New Zealand/Australian Standard
NZTA	New Zealand Transport Agency (previously TNZ)
NUO	Network Utility Operator
PS1	Producer Statement – Design
PS2	Producer Statement – Design Review
PS3	Producer Statement – Construction
PS4	Producer Statement – Construction Review
RBW	Restricted Building Work
SARNZ	Scaffolding and Rigging Association New Zealand Inc
TA	Territorial Authority

1.4 DEFINED WORDS

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

1.5 WORDS IMPORTING PLURAL AND SINGULAR

Where the context requires, words importing singular only, also include plural and vice versa.

1233 REFERENCED DOCUMENTS

1. GENERAL

1.1 REFERENCED DOCUMENTS

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

Reference is also made to various standards produced by Standards New Zealand (NZS, AS/NZS, NZS/AS), overseas standards 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.

Documents cited both directly and within other cited publications are deemed to form part of this specification. However, this specification takes precedence in the event of it being at variance with the cited documents.

1.2 DOCUMENTS

Documents referred to in the GENERAL sections are:

NZBC F4/AS1	Safety from falling
NZBC F5/AS1	Construction and demolition hazards
AS/NZS 1170.2	Structural design actions - Wind loads
AS/NZS 3012	Electrical installations - Construction and demolition sites
NZS 3109	Concrete construction
NZS 3114	Specification for concrete surface finishes
NZS 3404:1997	Steel structures standard
NZS 3602	Timber and wood-based products for use in building
NZS 3604	Timber-framed buildings
NZS 4210	Masonry construction: Materials and workmanship
NZS 6803	Acoustics - Construction Noise
Building Act 2004	
Building Regulations 1992	
Health and Safety in Employment Act 1992	
Health and Safety in Employment Regulations 1995	
New Zealand Building Code	
Historic Places Act 1993	
Resource Management Act 1991	
Smoke-free Environments Act 1990	
OSH	Guidelines for the provision of facilities and general safety in the construction industry
SARNZ	Best practice guideline for scaffolding in New Zealand

1234 DOCUMENTATION

1. GENERAL

This general section relates to documentation required by the Territorial Authority/Building Consent Authority for compliance with the New Zealand Building Code. It also includes documentation relating to:

- Substitutions
- Manufacturers documents

Building Consent Authority documentation

1.1 BUILDING CONSENT

Obtain the original or copies of the building consent forms and documents from the owner and keep them on site. Liaise with the BCA 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.

1.2 BUILDING CONSENT COMPLIANCE

It is an offence under the Building Act 2004

- to carry out any work not in accordance with the building consent.
- to carry out Restricted Building Work by anyone other than a Licensed Building Practitioner licensed for that type of work.

The resolution of matters concerning building code compliance to be referred to the contract administrator for a direction in writing and then to the BCA for consent.

Where any alteration is requested by the territorial authority or any other authority, do not undertake such alteration until the matter has been referred to the Contract administrator for direction.

1.3 PROJECT PERSONNEL

Provide names and contact detail of the contractor's key personnel and tradespersons who are involved with the project. Provide the names in the form required in the general section of the specification. Review the list once a month and reissue it if changes have been made.

Licensed Building Practitioner documentation

1.4 LICENSED BUILDING PRACTITIONERS

On behalf of the Owner, provide details of LBP's to carry out or supervise Restricted Building Work. Provide names, LBP numbers, areas of practice and other required information. Provide this to the BCA and the Contract Administrator before commencing work on the Restricted Building Work. Provide the information in the form required in the general section 1222L PROJECT PERSONNEL LBP'S. Review the list once a month and reissue it if changes have been made.

Include the following which are considered applicable to this project:

- Site LBP
- Carpenter
- Foundations 1 Concrete foundation walls and concrete slab-on-ground constructor
- Foundations 2 Concrete or timber pile foundations constructor
- Roofing 4 Membrane roofer
- Roofing 5 Torch on membrane roofer

Also provide names and contact details of the following

- Registered drainlayer
- Registered plumber
- Registered gasfitter
- Registered electrician

1.5 NOTIFICATION OF BREACHES OF BUILDING CONSENT

Provide to the Contract Administrator and the Contractor a copy of any advice given to the BCA under s.89 of the Building Act. Provide this advice no later than the time the advice is given to the BCA.

1.6 RECORD OF BUILDING WORK

Where Restricted Building Work is carried out by a LBP, on completion of the RBW provide a Record of Building Work for inclusion with the documentation required for Code Compliance. Provide copies to both the BCA and the Contract Administrator.

- 1.7 Compliance information**
DOCUMENTATION REQUIRED FOR CODE COMPLIANCE
 Information may be required either as a condition of the contract documents or as a condition of the building consent may include the following: -
 - Applicators approval certificate from the manufacturer / importer / distributor
 - Manufacturer's, importer's or distributors warranty
 - Installer / applicator's warranty
 - LBP Record of Work
 - Producer Statement - Construction from the applicator / installer
 Producer Statement - Construction review from an acceptable suitably qualified person
 Refer to the general sections for the requirements for compliance information to be provided by the contractor.
 Refer to the building consent for the requirements for compliance information to be provided by the contractor.
 Obtain required documents from the relevant parties for delivery to the contract administrator after the final inspection has been carried out by the Building Consent Authority.
- 1.8 Substitutions**
ACCEPTABLE PRODUCT/MATERIAL SUPPLIERS
 Where a product or material supplier is named in SELECTIONS, the product/material must be provided by the named supplier. Where more than one named supplier, any one of the named suppliers will be acceptable.
- 1.9 NO SUBSTITUTIONS**
 Where specifically stated in a section, substitutions are not permitted to any of the specified systems, components and associated products listed in that section.
- 1.10 PROPOSED SUBSTITUTIONS**
 A substitution may be proposed where specified products are not reasonably available. A substitution may also be proposed by the Contractor where the Contractor considers a proposed substitution to be an alternative to the specified product. Except where a specified product is not available, the Contract administrator is not bound to accept any substitutions. Where branded work sections are included in this specification, substitution of those products or systems will not be allowed.
- 1.11 ACCEPTANCE OF SUBSTITUTIONS**
 The Contract administrator must advise of acceptance of substitutions in writing.
- 1.12 Amendment to issued Building Consent**
CONTRACTOR AMENDMENTS TO BUILDING CONSENT
 Where the contractor has sought acceptance of a substitution or a variation which is for the contractor's own convenience and the substitution or variation requires an amendment to the Building Consent, the contractor must apply for and obtain the required amendment.
 The contractor must:
 - Obtain approval for substitutions from the Contract administrator.
 - Prepare and provide to the BCA all documentation required for the amendment.
 - Pay all fees and other costs associated with this amendment.
 - Where the amendment affects other approved plans, also amend those plans.
- 1.13 PRINCIPALS AMENDMENTS TO BUILDING CONSENT**
 Where the principal is proposing a substitution or a variation which requires an amendment to the Building Consent, the contractor must provide to the principal information that the contractor has that is required for the amendment.
 The principal will:
 - Prepare and provide to the BCA all documentation required for the amendment.
 - Pay all fees and other costs associated with this amendment.
 - Where the amendment affects other approved plans, also amend those plans.
- 1.14 Manufacturer's documents**
BRANDED WORK SECTIONS
 Branded sections may be included in this specification relating to specific products and systems to be installed as part of the contract works. Where branded sections are included, substitutions to the branded products and systems will not be allowed.

- 1.15 **CROSS REFERENCED WORK SECTIONS**
If any related work is cross referenced to a generic work section, but only the equivalent branded section is included in the specification, use that branded section. Confirm with the Contract administrator if there is any doubt.
- 1.16 **MANUFACTURER'S AND SUPPLIER'S REQUIREMENTS**
Manufacturers and supplier's requirements, instructions, specifications or details mean those issued by them for their particular material, product or component and are the latest edition.
- 1.17 **MANUFACTURER'S AND SUPPLIER'S DOCUMENTS**
Refer to individual sections for a detailed list of manufacturer's and supplier's documents relating to work on this project. Retain current copies of the documents listed, and all other relevant manufacturer's 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 all products before commencing work. Provide a copy of all listed manufacturer's literature to the Contract administrator.
- 1.18 **ONGOING MAINTENANCE REQUIREMENTS**
Refer to individual sections for details of manufacturer's and supplier's requirements for ongoing maintenance necessary to ensure continuing compliance with the durability requirements of the NZBC. Provide a copy of literature detailing ongoing maintenance and inspection requirements to the Contract administrator.

2361 STRIP FOOTINGS

1. GENERAL

This section relates to the supply and installation of concrete strip footings of non-specific design to NZS 3604 and NZS 4229, including; formwork, reinforcement, concrete mixes and the placing of concrete

Documents

1.1 DOCUMENTS

Refer to the general section 1233 REFERENCED DOCUMENTS. The following documents are specifically referred to in this section:

NZS 3104	Specification for concrete production
NZS 3109	Concrete construction
NZS 3121	Specification for water and aggregate for concrete
NZS 3604	Timber-framed buildings
NZS 4229	Concrete masonry buildings not requiring specific engineering design
NZS 4431	Code of practice for earth fill for residential development
AS/NZS 4671	Steel reinforcing materials

Requirements

1.2 QUALIFICATIONS

Concrete workers to be experienced, competent and familiar in the fabrication and erection of formwork and with the materials and the techniques specified.

All work to be installed or supervised by a Registered Mason or licensed building practitioner (LBP): Licensed for Bricklaying and Blocklaying 2: Structural Masonry. RBW must be supervised by an LBP.

1.3 QUALITY RECORDS

Do not place concrete/grout until all excavations, formwork/blockwork and reinforcing have been inspected and passed by the Building Consent Authority.

2. PRODUCTS

2.1 NORMAL CONCRETE

Normal concrete 17.5, 20 or 25 MPa grade (refer to SELECTIONS), maximum aggregate size 19mm ready-mixed to NZS 3104. Retain delivery dockets listing mix and despatch details.

Mass concrete 10 MPa grade.

2.2 REINFORCEMENT

To AS/NZS 4671 Grade 300E deformed mild steel except for ties in plain round mild steel and as detailed.

2.3 TYING WIRE

Mild drawn steel wire not less than 1.2mm diameter.

2.4 WATER

To NZS 3121. Water from a territorial authority/NUO water supply is acceptable.

2.5 SPACERS AND CHAIRS

Precast concrete or purpose made moulded PVC.

3. EXECUTION

3.1 STORAGE

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 SOIL BEARING

To NZS 3604 or NZS 4229, Section 3, **Site Requirements**.

All soil bearing surfaces of footings shall be horizontal and may be stepped to accommodate variations in cleared ground level. Bearing shall be upon solid bottom in undisturbed good ground to NZS 3604 or NZS 4229, or firm fill with a "Statement Of Suitability...." to NZS 4431.

- 3.3 DEPTH OF FOOTINGS
As shown on drawings with minimum depth of footings below cleared ground level, to NZS 3604 or NZS 4229, clause 3.4.2.
- 200mm.
- 3.4 MASS CONCRETE SUB FOOTING
Where good ground is greater than 600mm deep, 10 MPa mass unreinforced concrete can be used to fill up from the good ground to the required depth of the footing, to NZS 3604 or NZS 4229, clause 3.4.1. Refer to SELECTIONS for minimum dimensions.
- 3.5 WIDTH OF FOOTINGS
Footing to be centred on foundation wall above. Refer to drawings or SELECTIONS for minimum dimensions.
- 3.6 FORMWORK
Use 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. Water blast to clean formwork. Keep formwork wet before concrete is placed.
- 3.7 REINFORCEMENT
Cut and bend bars using proper bending tools to avoid notching and to the requirements of NZS 3109. Do not rebend bars. Where rebending is approved, use a purpose built tool, proper preparation and preheating. Longitudinal reinforcing and ties, refer to SELECTIONS for size and quantity.
Stepped footings to NZS 4229, at least 50% of the lower footing reinforcement shall be turned up the step to a minimum of 450mm beyond the rebar intersection, and at least 50% of the upper footing reinforcement shall be carry on into the lower foundation wall to a minimum of 450mm (350 with hook) beyond the rebar intersection.
- 3.8 REINFORCING LAPS
To NZS 3604, 6.11.7, **Foundation wall reinforcement**. Horizontal reinforcing bars lapped 500mm minimum.
To NZS 4229, 6.6.3, 40 diameter laps for deformed bars.
Tie all lapping bars to each other.
- 3.9 STARTER BARS
Vertical starter reinforcement to NZS 4229, to match vertical wall reinforcement in size, type, location and spacing. Starters to penetrate foundation wall by 600mm minimum, and in the footing to be bent through 90° and tied to longitudinal reinforcing.
- 3.10 COVER
Minimum cover 75mm.
- 3.11 OPENINGS
Footings to be continuous under openings unless shown otherwise.
- 3.12 PUMPING CONCRETE
Set up and supervise pump operation, placing and compaction of the mix to, NZS 3109: **7.4 Handling and placing** and **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.
- 3.13 STRIKE FORMWORK
Strike formwork without damaging or overloading structure to NZS 3109. Do not remove formwork before the following minimum periods under average temperature conditions:
12 hours: Sides of beams, walls and columns
- 3.14 **Completion**
PROGRESSIVE CLEANING
Clean off concrete spills as they occur, making good any damage at the same time.
- 3.15 FINAL CLEANING
Clean down exposed walls and remove waste material from adjoining surfaces at completion.

3102 CONCRETE WORK - STANDARD

1. GENERAL

This section relates to formwork, reinforcement, concrete mixes and the placing of concrete.

1.1 ABBREVIATIONS AND DEFINITIONS

Refer to the general section 1232 INTERPRETATION & DEFINITIONS for abbreviations and definitions used throughout the specification.

The following abbreviations apply specifically to this section:

DPM	Damp proof membrane
MPa	Megapascal
CCANZ	Cement and Concrete Association of New Zealand

Documents

1.2 DOCUMENTS

Refer to the general section 1233 REFERENCED DOCUMENTS. The following documents are specifically referred to in this section:

NZBC B1/AS1	Structure
NZBC E2/AS3	External moisture
AS 1366.3	Rigid cellular plastics for thermal insulation - Rigid cellular polystyrene - Moulded (RC/PS - M)
AS 1478	Chemical admixtures for concrete, mortar and grout - Admixtures for concrete.
AS/NZS 2269.0	Plywood - Structural - Specifications
NZS 3101.1	Concrete structures standard
NZS 3104	Specification for concrete production
NZS 3109	Concrete construction
NZS 3112.1	Methods of test for concrete - Tests relating to fresh concrete
NZS 3114	Specification for concrete surface finishes
NZS 3121	Specification for water and aggregate for concrete
NZS 3122	Specification for Portland and blended cements (General and special purpose)
NZS 3125	Specification for Portland-limestone filler cement
NZS 3604	Timber-framed buildings
NZS 3631	New Zealand timber grading rules
NZS 4229	Concrete masonry buildings not requiring specific engineering design
AS/NZS 4671	Steel reinforcing materials
AS/NZS 4858	Wet area membranes
CCANZ CP 01	Code of practice for weathertight concrete and concrete masonry construction

Requirements

1.3 QUALIFICATIONS

Workers to be experienced, competent trades people familiar with the materials and techniques specified.

Performance

1.4 TESTING

Carry out sampling and concrete acceptance tests during construction to NZS 3109.9. **Concrete acceptance tests during construction.** Conduct 7 day strength tests. After a 7 day test result of less than 60% of the specified strength, stop concrete placement until it is shown that the suspect concrete complies with the specification.

Carry out slump tests, yield tests and air content tests to NZS 3112.1, sections 4, 5 and 9, and evaluate to NZS 3104.2.15. **Control tests and their evaluation.** Make available all test records to the contract administrator on request.

1.5 QUALITY ASSURANCE

Carry out the whole of this work to the requirements of NZS 3109.

Quality assurance procedures to include all aspects of concrete construction including;

- Formwork quality
- Reinforcing steel placing
- Cast in items
- Concrete quality
- Concrete finishes
- Construction tolerances

Advise the name of the suitably qualified and experienced representative who is responsible for quality control of the concrete work. The representative is to sign a written quality control checklist for each on-site concrete pour. Provide a copy to the construction reviewer in sufficient time for a pre-pour inspection on request.

2. PRODUCTS

Materials

2.1 CEMENT

Portland cement to NZS 3122.

2.2 CEMENT, FILLER

Portland limestone filler cement to NZS 3125.

2.3 SAND

To NZS 3121.

2.4 COARSE AGGREGATE, NORMAL AND SPECIAL CONCRETE

To NZS 3121, except as modified by NZS 3104: clause 2.4.3, Coarse aggregate. The total mass of reactive alkali in the concrete mix to not exceed the requirements of section 2 of the Cement and Concrete Association, Alkali Aggregate Reaction publication.

2.5 WATER

To NZS 3121.

Concrete

2.6 MIXING CONCRETE

Produce with stationery mixer and transport by truck agitator or revolving drum type with all batches recorded and all to NZS 3104.2.8. **Concrete mixing.**

2.7 NORMAL CONCRETE

Normal concrete 17.5, 20 or 25 MPa grade, (refer to SELECTIONS), maximum aggregate size 19mm ready-mixed to NZS 3104. Provide delivery dockets listing mix and despatch details.

2.8 SITE CONCRETE

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

Reinforcement

2.9 GRADE 300E STEEL

To AS/NZS 4671. Round bars are shown by symbol "R" and deformed bars by symbol "D", followed by the diameter in millimetres.

2.10 GRADE 500E STEEL

To AS/NZS 4671. Round bars shown by symbol "HR" and deformed bars by symbol "HD" followed by diameter in millimetres.

2.11 WELDED WIRE FABRIC

Hard drawn steel wire spot welded with correct gauge to AS/NZS 4671, smooth or deformed and to the spacings and dimensions either specified or shown on the drawings.

All wire fabric/mesh for residential slabs on ground shall be to AS/NZS 4671 Class E.

2.12 TYING WIRE

Mild drawn steel wire not less than 1.2mm diameter.

2.13 SPACERS AND CHAIRS

Precast concrete or purpose made moulded PVC to approval. Where concrete spacer blocks are used in exposed concrete work use blocks similar to 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.

Install reinforcing

3.2 CUT AND BEND

Cut and bend bars using proper bending tools to avoid notching and to the requirements of NZS 3101.1, 8 and NZS 3109: 3.3 **Hooks and bends**. Minimum radii of reinforcement bends to NZS 3101.1, 8 and NZS 3109: table 3.1, **Minimum radii of reinforcement bends**. Do not rebend grade 500E bars. Where rebending is necessary for grade 300E bars, use a purpose built tool, proper preparation and preheating.

3.3 ADJUSTMENTS

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

3.4 TOLERANCES, BENDING

To NZS 3109, 3.9, Tolerances for reinforcement.

3.5 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 in NZS 3109, 3.6, **Spacing of reinforcement**.

3.6 LAPPED SPLICES

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

Welded wire mesh laps to NZS 3101, lap one mesh square plus 50mm minimum (do not count bar extension beyond the outermost wire).

3.7 REINFORCEMENT COVER

Minimum cover to all reinforcing bars, stirrups, ties and spirals, as shown on drawings. Where cover is not shown on drawings provide minimum cover to NZS 3101.1, table 3.6, **Minimum required cover for a specified intended life of 50 years**. Fix chairs for top reinforcement in slabs at 1.0 metre centres or to ensure adequate support. Cover tolerances to NZS 3109, 3.9, Tolerances for reinforcement.

3.8 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 100mm in length. Location and form of conduits to be approved in writing by the Contract Administrator. Minimum cover 40mm. Do not encase aluminium items in concrete. Do not paint steel embedded items more than 25mm 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.

3.9 CONSTRUCTION JOINTS

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

Place concrete

3.10 PRE-PLACEMENT INSPECTION

Do not place concrete until all excavations, boxing and reinforcing have been inspected and passed by the Building Consent Authority.

3.11 UNFAVOURABLE CONDITIONS

Do not place concrete in high winds or other unfavourable conditions. Refer to NZS 3109: 7.2 Unfavourable conditions, for when concrete may not be placed. Remove and make good concrete damaged by frost, dry and wet conditions.

- 3.12 **PROTECT CONCRETE WORK**
Protect formwork, reinforcement, "build in" items and fresh concrete from damage, as the pour is placed, making good any damage if it occurs.
- 3.13 **TRANSPORT CONCRETE**
Transport concrete from agitator to final placement as quickly as possible using means that avoid segregation.
- 3.14 **PUMPING CONCRETE**
Set up and supervise pump operation, placing and compaction of the mix to NZS 3109, 7.4, Handling and placing and NZS 3109, 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.
- 3.15 **PLACE CONCRETE**
Place concrete in layers not more than 500mm deep, compacted and vibrated. Do not place fresh concrete against the preceding layer after more than 45 minutes, or such lesser time as required by the circumstances, to NZS 3109: clause 7.4, Handling and placing.
- 3.16 **COMPACT CONCRETE**
To NZS 3109: clause 7.6, Compaction. Compact by vibration of the concrete to expel entrapped air and until settlement of the concrete is visibly evident over all areas of the surface. Maintain vibration until settlement ceases and coarse aggregate at the surface is embedded. Do not continue vibration beyond reaching this condition.
- 3.17 **VIBRATORS**
Use sufficient immersion vibrators, with one spare for emergency, to ensure that vibration is achieved throughout the entire volume of each layer of concrete, and until complete compaction is reached, to NZS 3109: clause 7.6, Compaction.
- Finishing**
- 3.18 **SCREED THE SURFACE**
Screed the concrete surface by straight edge or vibrating screed immediately after compaction and to tolerances in NZS 3109: table 5.2, Tolerances for in situ construction.
- 3.19 **SURFACE FINISHES**
To NZS 3114, 105, **Specification of finishes**. Refer SELECTIONS.
- 3.20 **SAW CUTS**
Cut slabs where indicated on the drawings and 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 100mm of every second wire of the mesh for a length of 50mm each side of the saw cut position. Saw cuts: 1/3rd slab depth or 30mm minimum.
- 3.21 **SPACING OF SAW CUTS**

Floor situation	Maximum spacing of sawcuts both ways
Industrial floor	5m
Architectural, exposed floor, thin finishes, rigid finishes	4m
Carpet on underlay flooring	6m
Supermarket floor	5m

- Curing**
- 3.22 **CURING PERIOD**
Cure all concrete of normal cement type and mixing proportions for a minimum of 7 days. Keep time between placing of concrete and the start of curing to an absolute minimum. Ensure curing is continuous.
- 3.23 **CURING METHOD**
Notify the curing method to be used for this work. Select from the following methods;
- Sprinkling
 - Wet coverings
 - Plastic sheet

- 3.24 **KEEP ABSORBENT FORMWORK MOIST**
Keep formwork left in place continuously moist by sprinkling with water over the curing period. Continue sprinkling the exposed surface if the formwork is removed before the end of the curing period.
- 3.25 **SECURE COVERINGS**
When covering with sheet materials, ensure that edges are well secured throughout the specified curing period, to prevent draughts passing over the surfaces of the concrete.
- 3.26 **COLD WEATHER**
Do not use coverings employing water at times of freezing weather.
- Protect**
- 3.27 **PROTECT PLASTIC CONCRETE**
Protect plastic concrete from indentation and surface marking.
- 3.28 **PROTECT HARDENED CONCRETE**
Protect surfaces of stripped concrete from damage especially at arrises.
- 3.29 **PROTECT EXPOSED SURFACES**
Protect from rust marks and other surface disfigurements.
- Defects**
- 3.30 **DEFECTS**
Reject concrete with structural defects. Immediately after stripping formwork, identify all defects and obtain direction. Do not carry out any repair work until directed and then only in accordance with the direction. Repair defects by cutting out, making good and replacing, or otherwise as directed.
- 3.31 **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.
- Residential - Slab & Wall openings**
- 3.32 **RESIDENTIAL FLOOR SLABS**
Generally to NZS 3604 as modified by NZBC B1/AS1 and NZBC E2/AS3
Construct to NZS 3604, 4.5 **Concrete and concrete masonry** and NZS 3604, 7.5, **Concrete slab-on-ground floors in timber buildings** as modified by NZBC B1/AS1, 3.0 **Timber**. Lay to true and straight surfaces, screeded, floated and steel (manual or power) trowelled finish. Tolerance on flatness: maximum 3mm gradual deviation over a 3 metre straight-edge, to NZS 3109, 104, Surface tolerances.
Allow for free Joints to NZBC B1/AS1, 3.1.13 NZS 3604 **New clause**
- 3.33 **WATERPROOFING EXTERIOR OPENINGS**
Apply waterproofing to the exposed face of openings for windows, doors, meters etc, also if necessary the top of parapets/balustrades and ends of masonry walls abutting other claddings. To CCANZ CP 01, waterproofing manufacturer's requirements and as detailed.
Provide temporary protection from direct sunlight.
- Completion**
- 3.34 **CLEAN OUT**
Clean out saw cuts. Fill with cement grout where the floor will be covered with carpet or vinyl.
- 3.35 **REMOVE**
Remove all unused materials and all concrete and reinforcing debris from the site.

3411 STRUCTURAL STEELWORK

1. GENERAL

This section relates to the fabrication and erection of structural steel framing and steel framed buildings of a general nature.

Documents

1.1 DOCUMENTS

Refer to the general section 1233 REFERENCED DOCUMENTS. The following documents are specifically referred to in this section:

NZBC F5/AS1	Construction and demolition hazards
AS/NZS 1252	High strength steel bolts with associated nuts and washers for structural engineering
AS/NZS 1554.1	Structural steel welding - Welding of steel structures
AS 1627.4	Metal finishing - Preparation and pre-treatment of surfaces - Abrasive blast cleaning
AS 1627.9	Metal finishing - Preparation and pre-treatment of surfaces - Pictorial surface preparation standards for painting steel surfaces
AS/NZS 2980	Qualification of welders for fusion welding of steel
NZS 3404.1:1997	Steel Structures Standard
NZS 4781	Code of practice for safety in welding and cutting
AS/NZS ISO 9001	Quality systems - Requirements
AS 1111.1	ISO metric hexagon bolts and screws - Product grade C - Bolts
AS 1111.2	ISO metric hexagon bolts and screws - Product grade C - Screws
AS 1112.1	ISO metric hexagon nuts - Style 1 - Product grades A and B
AS 1897	Electroplated coatings on threaded components (metric coarse series)
AS 3828	Guidelines for the erection of building steelwork
HERA R4-99	Specification for the fabrication, erection and surface treatment of structural steelwork
OSH	Guidelines for the provision of facilities and general safety in the construction industry

1.2 CO-ORDINATION

Refer to architectural, electrical and services drawings to ensure details and fixings required are provided for in the structural steel work.

1.3 VERIFY DIMENSIONS

Verify dimensions against site measurements prior to fabrication. For existing structures, verify grade of steel and dimensions against site measurement.

Requirements

1.4 QUALIFICATIONS

Welding operators to be experienced, competent workers, qualified to AS/NZS 2980, familiar with the materials and techniques specified. Comply with NZS 3404.1 and AS/NZS 1554.1. Welding operators to have passed the qualifications tests covering those welding positions required to complete the work as set out in NZS 4781. Provide evidence of qualifications on request.

Riggers to be experienced and competent workers, familiar with the materials and techniques required.

Performance

1.5 QUALITY ASSURANCE

Maintain quality assurance programmes to AS/NZS ISO 9001 for both fabrication and erection as necessary to assure that work is performed in accordance with this specification and the qualifying requirements of the contract documents.

1.6 INSPECTION

Inspect fabrication and construction of the structure to NZS 3404.1.

1.7 MATERIAL CERTIFICATES

Supply mill test certificates relating to mill sections, bolts and nuts or welding consumables. High strength steel to be marked accordingly by the supplier before delivery.

1.8 TEST WELDING

Non-destructive weld examination with method, extent and standards of acceptance to AS/NZS 1554.1, Section 7 and NZS 3404.1, Appendix D.

2. PRODUCTS

Materials

2.1 STRUCTURAL STEEL

Comply with Australian, British and Japanese Standards for steel as required by NZS 3404.1, part 1. Test and stress relieve for brittle fracture as required by NZS 3404.1, section 17.

Grade 300, except RHS sections Grade 350, unless noted otherwise on the drawings.

Components

2.2 BOLTS, NUTS AND WASHERS

Grade 4.6, screws AS 1111.2 and bolts to AS 1111.1. Grade 4.6 nuts to comply with AS 1112.1. Grade 8.8 bolts, nuts and washers (high strength structural quality only) to comply with AS/NZS 1252. 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.

Accessories

2.3 ELECTRODES

To comply with and be selected for grade of steel being welded as required by AS/NZS 1554.1.

2.4 WELDING WIRE

Welding wire as required by the manufacturer for materials to be joined and the welding position.

2.5 FLUX

Welding flux to be dry and from sealed containers.

2.6 STEEL STUDS

Material for arc stud welding to comply with AS/NZS 1554.1.

3. EXECUTION

Conditions

3.1 GENERALLY

Construct to NZS 3404.1, section 14 (fabrication) and section 15 (erection). Identify steel to NZS 3404.1.

3.2 DEFECTS

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

3.3 SURFACE FINISH

Grind off burrs and sharp arrises.

3.4 TOLERANCES

Comply with the tolerances laid down for holding down bolts, columns, beams and other members in HERA R4-99 and NZS 3404.1. Comply with NZS 3404.1 for level and alignment of beams and alignment and plumbing of struts.

Structural elements to comply for straightness, length, full contact splices and struts not prepared for full contact with NZS 3404.1.

3.5 CARRY OUT ERECTION

Carry out the erection of structural steel to the requirements of NZS 3404.1, section 15 Erection. Comply with NZBC F5/AS1: Construction and demolition hazards, and the OSH publication: Guidelines for the provision of facilities and general safety in the construction industry.

3.6 START ERECTION

Start erection only when the holding down bolts and anchorages have been cast-in-place long enough to achieve sufficient strength.

3.7 SAFETY DURING ERECTION

Erection practices to comply with AS 3828. During erection make structure safe against erection loading including loading due to erection equipment or its operation, and wind.

3.8 TEMPORARY BRACING

Provide temporary bracing and restraint as required to make structure safe. Leave temporary bracing and restraint in place until the erection is sufficiently advanced to allow safe removal of temporary bracing.

- Assembly**
- 3.9 CUTTING
Hand cut only where machine cutting is not possible. Cutting to comply with NZS 3404.1. Site cutting and welding are forbidden.
- Application**
- 3.10 WELD FAILURE
Comply with AS/NZS 1554.1 for detailed guidance on welding inspection and quality control.
- 3.11 WELDING
Carry out welding in accordance with AS/NZS 1554.1 and the additional requirements of NZS 3404.1. Equipment to comply with AS/NZS 1554.1, clause 1.8.2.
- 3.12 WELDING SYMBOLS
Welding symbols have not been used on the drawings. Unless denoted otherwise on the drawings, shop weld touching or near-touching steelwork together all round with 6mm continuous fillet welds.
- 3.13 HOLING
Comply with NZS 3404.1 for sizes, alignment, finishing, punching and flame cutting of holes.
- 3.14 BOLTING
Bolting, including high strength bolting to comply with NZS 3404.1, section 14.3.6. Ensure that at least one clear thread shows above the nut and at least one thread run out is clear beneath the thread after tightening
- 3.15 BOLTING NOTATION
Notation of bolting categories:
- | Bolting category | Bolt standard | Bolt grade | Tension method | Tensioned joint type |
|------------------|---------------|------------|----------------|----------------------|
| 4.6/S | AS 1111.1 | 4.6 | Snug tight | |
| 8.8/S | AS/NZS 1252 | 8.8 | Snug tight | |
| 8.8/TB | AS/NZS 1252 | 8.8 | Full tension | Bearing |
| 8.8/TF | AS/NZS 1252 | 8.8 | Full tension | Friction |
- In bearing type connections where the thread position relative to the shear plane is to be controlled.
 N - threads included in shear plane
 X - threads excluded from shear plane
 F - friction type joints - prepare faying surfaces
- 3.16 THREADS EXCLUDED FROM SHEAR PLANE
Select length of bolts such that the threaded portion does not occur within the shear plane between joined parts.
- 3.17 BASE PLATES
Enlargement or site cutting of holes is not permitted. Bending or displacement of holding down bolts is not permitted.
- 3.18 INSTALLATION OF COLUMNS
Plumb columns using sawn steel packs and wedges not larger than necessary for the purpose. Obtain written instructions when any column base needs to be raised by more than 25mm. Fill the space beneath the base plate with cement-sand grout, containing an approved non-shrink additive, having a minimum compressive strength of 30MPa at 28 days, or by the use of a dry pack of 1:2 cement:sand mortar hammered in tight to ensure complete filling of space.
- Finishing**
- 3.19 BRUSHING AND POWER TOOL CLEANING
Remove oil and grease by the use of solvents. Scrape and power wire brush to a minimum St2 finish to AS 1627.9. 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.
- 3.20 UNPAINTED SURFACES
Do not paint:
 - Faying face of high strength friction grip (HSFG) bolted joints
 - Areas for site welding keeping 75mm clear all round
 - Surfaces for embedding in concrete.

3821 TIMBER FRAMING

1. GENERAL

This section relates to the supply and erection of timber framing, as a framed structure, or as part of a partitioning system.

1.1 ABBREVIATIONS AND DEFINITIONS

Refer to the general section 1232 INTERPRETATION & DEFINITIONS for abbreviations and definitions used throughout the specification.

The following abbreviations apply specifically to this section:

SG Structural grade to NZS 3604, 1.3 **Definitions**

Documents

1.2 DOCUMENTS

Refer to the general section 1233 REFERENCED DOCUMENTS. The following documents are specifically referred to in this section:

NZBC B2/AS1	Durability
AS/NZS 2904	Damp-proof courses and flashings
NZS 3602	Timber and wood-based products for use in building
NZS 3603	Timber structures standard
NZS 3604	Timber-framed buildings
NZS 3622	Verification of timber properties
NZS 3631	New Zealand timber grading rules
NZS 3640	Chemical preservation of round and sawn timber
OSH	Guidelines for the provision of facilities and general safety in the construction industry.
BRANZ BU 475	Structurally fixed cavity battens

***A copy of NZS 3604 Timber-framed building, must be held on site.**

2. PRODUCTS

Materials

2.1 TIMBER FRAMING, TREATED

Species, grade and in service moisture content to NZS 3602, NZBC B2/AS1 and treatment to NZS 3640, NZBC B2/AS1. Structural grade (SG) to NZS 3604, NZS 3622 with properties to NZS 3603.

2.2 APPEARANCE TIMBERS

Graded to NZS 3631, treated where required by NZBC B2/AS1, NZS 3602, table 1, and treatment to NZS 3640.

2.3 STRAPPING

Treated to NZBC B2/AS1, NZS 3602, table 1 and to NZS 3640, clause 6.3.1.

Species: Radiata pine

Grade: SG6

Size: 70mm x 45mm, 45mm x 45mm or 45mm x 19mm

2.4 DPC

Refer to 4161 UNDERLAYS, FOIL AND DPC section

Components

2.5 NAILS

Type to NZS 3604, section 4, **Durability**, and of the size and number for each particular types of joint as laid down in the nailing schedules of NZS 3604, sections 6-10.

2.6 BOLTS AND SCREWS

Bolts and screws of engineering and/or coach type complete with washers, to the requirements of NZS 3604, section 4, **Durability**, and of the number and form required for each particular junction to NZS 3604, sections 6-10.

2.7 THREADED RODS

Use stainless steel threaded rods of the required length, with washers and nuts at both ends, when stainless steel bolts of the required length are not available.

- 2.8 **TIMBER CONNECTORS AND FIXINGS**
Supply for each particular joint the connectors and fixings as noted on the drawings. Comply with the requirements of the manufacturer, NZS 3604, section 4, **Durability**, and of the number and form required for each particular junction to NZS 3604, sections 6-10.
- 2.9 **BRACING STRAPS**
Nail-on type to the requirements of NZS 3604, section 4, **Durability**, and of the number and form required for each particular application to NZS 3604, sections 6-10.
- 2.10 **POWDER ACTUATED FASTENERS**
To type, size and charge required by the powder actuated tool manufacturer for each particular member and the substrate.
- 2.11 **CORROSION RISKS**
For exterior timber, timber in damp areas and timber subject to occasional wetting, use only stainless steel (or equivalent) fixings and connectors, when the timber is treated with; Copper Azole (CuAz, Preservative code 58), Alkaline Copper Quaternary (ACQ, Preservative code 90), Micronise Copper Azole (code 88) or Micronised Copper Quaternary (code 89).
3. **EXECUTION**
- Conditions**
- 3.1 **PROTECT TIMBER**
Protect all timber against damage and from inclement weather. Ensure that any variation in moisture content is kept to a minimum, before and after erection and before enclosure.
- 3.2 **EXECUTION**
Execution to comply with 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).
- 3.3 **SEPARATION**
Separate all timber framing timbers from concrete, masonry and brick by: -
- a full length polyethylene damp-proof membrane overlapping timber by at least 6mm; or
- a 12mm minimum free draining air space
- 3.4 **FRAMING MOISTURE CONTENT**
Maximum allowable equilibrium moisture content (EMC) for non air-conditioned or centrally heated buildings, for framing to which linings are attached.
- At erection: 24% EMC maximum
- At enclosure: 20% EMC maximum
- At lining: 16% EMC maximum
- 3.5 **TOLERANCES**
Permissible deviations from established lines, grades and dimensions equal to or less than the following. Multiples of given limits are not cumulative.
- Deviation in plan, up to 10 metres, 5mm
- Deviation in plan, over 10 metres, 10mm total
- Deviation from horizontal, up to 10 metres, 5mm
- Deviation from horizontal, over 10 metres, 10mm total
- Deviation from vertical position per 3 metres, 3mm
- Deviation from horizontal and vertical, within openings, 3mm.
- Application**
- 3.6 **SET-OUT**
Set-out framing generally in accordance with the requirements of NZS 3604, to carry superimposed loads and as required to support sheet linings and claddings. Set back nogs 12.5mm from face of studs where required for back-blocking of plasterboard non-tapered ends or edges.
- 3.7 **SET TIMBERS**
Set timbers true to required lines and levels with mitres, butt joints, laps and housings cut accurately to provide full and even contact over the whole of the bearing surface.

- 3.8 **TIMBER CUTTING**
Select and cut spanning members to minimise allowable defects and avoiding knots and short grain on edges in the middle third, and shakes, splits and checks at mid-span and close to ends.
- 3.9 **TIMBER PLATES AND FURRING**
Fix to steelwork with bolts and washers or approved proprietary fastenings at 1 metre maximum spacing and not less than 2 fixings to each member, or to engineering specific design.
- 3.10 **HOLES AND NOTCHES**
Limit holes and notches, checks and half-housing for the structure to those allowable in NZS 3604. Neatly form holes and notches for services without lessening the structural integrity of the member.
- 3.11 **CUTTING**
Cutting for straightening to comply with NZS 3604, 8.5.3, **Straightening studs.**
- 3.12 **EXPOSED TIMBER CONNECTORS AND FIXINGS**
Do not use steel timber connectors and fixings on any structural framing exposed to view unless detailed on the drawings.
- 3.13 **POWDER ACTUATED AND MECHANICALLY POWERED FIXING**
Comply with the OSH: Guidelines for the provision of facilities and general safety in the construction industry, part 5, section 5.7. To be operated by a licensed applicator.
- 3.14 **ADDITIONAL FRAMING**
Position and fix all necessary members for the fixing of all services, fittings, fixtures, edges of linings or claddings, and to provide lateral support to load carrying framing.
- 3.15 **FORM NAILED JOINTS**
Fully drive nails in all structural joints with the number and location for each particular joint, to the requirements of the nailing schedules of NZS 3604. Where splitting could occur, pre-drill to 80% of nail diameter.
- 3.16 **FORM BOLTED JOINTS**
Drill for and set bolts to ensure full bearing and development of the joint strength, with tension to just set the washers into timber or to engineering specific design.
- 3.17 **FIT CONNECTORS AND FIXINGS**
Fit connectors and fixings to obtain full bearing over all contact surfaces and full development of the required loading capacity for that particular joint and in accordance with the manufacturer's requirements or to engineering specific design.
- 3.18 **FIT JAMB BATTENS**
For walls with direct fix cladding, fit 20mm (nominal) jamb battens over the wall underlay, to the jambs of window and door rough openings, to NZBC E2/AS1, fig 72A. Cut around sill flashings. Fix with 60 x 2.8 flat head galvanized nails at 300mm centres.
- 3.19 **FIT BRACING**
Fit and fix subfloor, wall and roof bracing elements to the requirements of the manufacturer or to NZS 3604, to develop the full number of bracing units required.
- 3.20 **Completion**
CLEAN UP
Clean up timber framing as the work proceeds so no offcuts, chips, sawdust or any other matter or items remain behind the claddings or linings.
- 3.21 **LEAVE**
Leave work to the standard required by following procedures.
- 3.22 **REMOVE**
Remove debris, unused materials and elements from the site.

4221HH HERMAN PACIFIC HORIZONTAL CEDAR CLADDING SYSTEM

1. GENERAL

This section relates to the supply and fixing of **Herman Pacific** (Hermipac) cedar cladding:

- Bevel back weatherboards
- Fascia
- Mouldings
- Proprietary flashing systems

Documents

1.1 DOCUMENTS

Refer to the general section 1233 REFERENCED DOCUMENTS. The following documents are specifically referred to in this section:

NZBC B2/AS1	Durability
NZBC E2/AS1	External moisture
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 BU 475	Structurally fix cavity battens

1.2 MANUFACTURER/SUPPLIER DOCUMENTS

Herman Pacific Ltd (Hermipac) documents relating to this part of the work:

Construction details via website

Standard profiles - via website

Custom profiles - via website

Set out tools - via website

Board to board lap and set out details - via website

Profiles catalogue - Current Volume

Grade descriptions - via website

Hermipac architectural resource box

Hermipac Table 1: Nail fixings

Machinecoat - Flood Coat Inundation versus Spray Application

Custom profile drawing template and request form

Legal and / or Sustainable Certification - via website

Maintenance of selected oil stain finishes

BRANZ Appraisal 524 - Cavity Batten System

BRANZ Appraisal 658 - Rusticated and Splaycut Weatherboard Cavity System

BRANZ Appraisal 663 - Bevelback Weatherboard Cavity System

Manufacturer/supplier contact details

Company: **Herman Pacific Ltd**

Contacts:

North Island: Kyle Deans - 021 771 857, kyle.deans@hermpac.co.nz
Jonathan Rugg - 021 770 320, jonathan.rugg@hermpac.co.nz

Web: www.hermpac.co.nz

Email: technical@hermpac.co.nz
information@hermpac.co.nz

Telephone: 09 377 1426 Auckland
04 586 9674 Wellington
03 341 2163 Christchurch
09 426 5475 Hibiscus Coast

Facsimile: 0800 329 423

Performance

1.3 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.

1.4 PERFORMANCE

Accept responsibility for the weather-tight performance of the completed cladding system, including all penetrations. To NZBC B2/AS1 Durability and NZBC E2/AS1 External moisture.

- 1.5 SAMPLES AND PROFILE DRAWINGS
Hard Profiles, Technical Profile Drawings, Species samples and/or Colour Chips for Machinecoat (NZ) applied finish options are available by request at www.hermipac.co.nz, or via fax, e-mail or telephone.
2. PRODUCTS
- Materials**
- 2.1 TIMBER SPECIES
Western Red Cedar:
Herman Pacific Canadian Western Red Cedar (*Thuja plicata*) harvested from the sustainable managed forests of British Columbia, Canada. Herman Pacific Western Red Cedar is supplied from forest sources, certified legal and sustainable under one or more independent third party verified certification systems (PEFC, CSA, SFI or FSC).
Refer to website for Herman Pacific's policy on sustainability and for links to suppliers websites and forest management goals and policies.
- 2.2 WEATHERBOARDS
Western Red Cedar weatherboards to **Herman Pacific** (Hermipac) profiles, Lap and Rebate details to BRANZ BU 411 and general design to NZS 3617, species and grading to NZS 3602, table 2, reference 2A.1, Requirements for wood-based building components to achieve a 15-year durability performance.
Weatherboards in lengths relevant to profile selection and application, with all unsound and open split knots excluded by cross cut removal prior to fixing into position.
Acceptable Solution is limited to the following types of weatherboards and their derivatives:
- Horizontal Standard Bevel Back and Hermipac Custom Profiles
A selection of the above profiles are also available in Western Red Cedar Finger-Joint/Edge Glued (CEDARONE) Pre-Primed and Undercoated, Sanded and/or de-nibbed between coats.
- 2.3 COVER BOARDS, MOULDINGS AND SCRIBERS
To **Herman Pacific** (Hermipac) profiles as detailed, with species and grading to NZS 3602, but with all unsound and open split knots excluded by cross cut removal prior to fixing into position. To NZS 3602, table 2, reference 2A.3, Requirements for wood-based building components to achieve a 15-year durability performance.
- 2.4 FASCIA BOARDS
To Herman Pacific (Hermipac) profiles, with species and grading to NZS 3602, but with all unsound and open split knots excluded by cross cut removal prior to fixing into position. To NZS 3602, table 2, reference 2A.3, Requirements for wood-based building components to achieve a 15-year durability performance.
- 2.5 BUILDING UNDERLAYS
Breather type, waterproof, to NZBC E2/AS1, table 23: **Properties of roof underlays and wall underlays**.
Refer to section 4161 UNDERLAYS, FOIL AND DPC for type and fixing details.
- Components**
- 2.6 CLINCH NAILS, STAINLESS STEEL
Hermipac Proprietary 40 x 2.0mm and 50 x 2.0mm Clinch Nail, Annular Grooved Shank Grade 316 Stainless steel.
- 2.7 FLASHINGS
To NZBC E2/AS1, 4.0 **Flashings**. Material, grade and colour as detailed and scheduled and to NZBC E2/AS1; Table 21: **Compatibility of materials in contact** and Table 22: **Compatibility of materials subject to run-off**. Ensure that materials used for flashings are compatible with the window frame materials and fixings and cladding materials and fixings.
- 2.8 SOAKERS, STAINLESS STEEL / COLORSTEEL ZINCALUME / ALUMINIUM
To NZBC E2/AS1, 4.0 **Flashings**. Machine folded stainless steel/zinc coated steel sheet to profile of weatherboard and mitred corner joints. To NZBC E2/AS1; Table 21: **Compatibility of materials in contact** and Table 22: **Compatibility of materials subject to run-off**. Ensure that materials used for soakers are compatible with adjacent materials and fixings, cladding materials and fixings.
- 2.9 SOAKERS, COPPER
To NZBC E2/AS1, 4.0 **Flashings**. Machine folded half-hard copper sheet to profile of weatherboard and mitred corner joints. To NZBC E2/AS1; Table 21: **Compatibility of materials in contact** and table 22:

Compatibility of materials subject to run-off. Ensure that materials used for Soakers are compatible with adjacent materials and fixings and cladding materials and fixings.

Finishes

2.10 FACTORY PRE-FINISHING - MACHINECOAT (NZ) - SURFACE SPRAY APPLICATION

Oil Stain:

Factory spray application of selected solvent based oil stain finishes on to timber surface. Surface penetration of finish variable by product.

Refer to: Machinecoat (NZ) - Flood Coats versus Spray Application, and Maintenance Of Selected Oil Stain Finishes.

Wood X: Penetrating wood oil - exclusive Machinecoat (NZ) factory formulation, standard and custom colour range.

Site applications to manufacturers specifications.

Premium Alkyd Primer and Undercoat, Premium Acrylic base Top coat:

Factory spray application of selected solvent based oil primer and undercoat starter coats and / or acrylic base finish coat on to timber surface.

Refer to: Hermpac Coating instructions

Primer Colour: Hermpac Off White or as specified by special contract.

Undercoat Colour: Hermpac Green or as specified by special contract.

Factory applied Starter coats: Primary coat - Primer.
Secondary coat - Undercoat.

Site applications to coating manufacturer's specifications.

3. EXECUTION

Conditions

3.1 GENERALLY

Execution to NZBC E2/AS1: 3.0 **Weathertightness risk factors**, and 9.0 **Wall claddings**, 9.1.8 **Drained cavities** and 9.4 **Timber weatherboards**.

3.2 STORAGE

Take delivery of **Herman Pacific** timber products, dry, unmarked and undamaged from freight and handling (Grade characteristics excluded). Store on site, laid flat and true under cover.

3.3 SUBSTRATE

Before starting fixing ensure that the substrate conforms with NZS 3604, section 2, table 2.1, **Timber framing tolerances** and the requirements of NZS 3604, section 6, **Foundation and subfloor framing** and NZBC E2/AS1, governing support for timber board cladding.

Application - preparation

3.4 FIX UNDERLAYS

Refer to section 4161 UNDERLAYS, FOIL AND DPC for type and fixing details.

Application - fixing

3.5 FIXING - PAINT FINISH

Install level, true to line and face, to NZBC E2/AS1: 9.4 **Timber weatherboards**. Oil Prime all cut ends before fixing. Pilot drill all fixings slightly smaller than gauge of fixing to ensure a snug fit and to minimise risk of moisture entry. Punch all fixings and prime all raw, exposed timber surfaces. Using an appropriate filler, fill all nail holes flush with board surface.

3.6 FIXING BEVEL BACK WEATHERBOARDS

Install level, true to line and face, to NZBC E2/AS1: 9.4 **Timber weatherboards**. Use a **Herman Pacific** proprietary weatherboard set out tool for adjusting vertical set-out and in the case of rebated boards, to provide a 2mm expansion gap between successive boards. Pilot drill all fixings slightly smaller than gauge of fixing to ensure a snug fit and to minimise risk of moisture entry. Nail weatherboards to every fixing point with one nail, just clear of the lapped board below. Nails to be driven in with a slightly upward slope. Refer to **Herman Pacific** Table 1 Nail fixing.

Butt end or scarf joints, mitre external corners and scribe internal corners. Orientate scarf joints to face away from prevailing winds and weather. Back flash internal corners. Fit soakers to Butt end joints, scarf joints and external corners. Random stagger Butt end joints/Scarf joints across adjacent boards.

Refer to **Herman Pacific** website for external and internal Corner construction details.

- 3.7 **INSTALL FLASHINGS**
Install flashings, covers and soakers as detailed on the drawings and to NZBC E2/AS1.
- 3.8 **COMPLETE**
Ensure the work is complete with all flashings, finishings and trim properly installed so the cladding system is completely weathertight.
- 3.9 **Completion**
REPLACE
Replace all damaged or marked elements.
- 3.10 **LEAVE**
Leave work to the standard required for following procedures.
- 3.11 **REMOVE**
Remove all debris, unused materials and elements from the site.
- 4. SELECTIONS**
- 4.1 **WEATHERBOARDS - HORIZONTAL**
Species: HERMPAC Western Red Cedar
Grade: HERMPAC Premium Clears No.1 (PC1)
Surface finish: Band Sawn Face (BSF)
Moisture content: 14 - 18% at fixing
Internal corner battens: HP 123 batten
- 4.2 **COVER BOARDS, BOXED CORNERS AND SCRIBERS**
Species: HERMPAC Western Red Cedar
Grade: HERMPAC Premium Clears No.1 (PC1)
Cover boards: HP 201 and 202 cover batten (69 x 18.5, 90 x 18.5mm)
Scriber: HP11 (60 x 17mm), HP12 (40 x 17mm) or HP13 (40 x 10mm) scriber.
Surface finish: Band Sawn Face (BSF)
Moisture content: 14 - 18% at fixing
- 4.3 **FASCIA**
Species: HERMPAC Western Red Cedar
Grade: HERMPAC Premium Clears No.1 (PC1)
Surface finish: Band Sawn Face (BSF)
- 4.4 **INTERNAL AND EXTERNAL CORNER BACK FLASHINGS**
Material: Hermpac aluminium mill finish flashing
Size: 75mm x 75mm x 90° angle
- 4.5 **FACTORY FINISH COAT - OIL BASED PRIMER AND UNDERCOAT**
Brand: Machinecoat (NZ) Ltd
Surface coating type: DULUX 10B17
Coating process: Machinecoat (NZ) Ltd. Spray Application
Primer colour: HERMPAC Beige
Undercoat colour: HERMPAC Green
Factory coats - Primer: One
Factory coats - Undercoat: One

4421N NURAPLY MEMBRANE ROOFING AND DECKING

1. GENERAL

This section relates to the application of **Nuralite Waterproofing Limited** NURAPLY roofing systems as external membrane waterproof coverings, adhesive bonded to:

- construction plywood
- to produce a fully adhered bituminous membrane system.

1.1 DOCUMENTS

Refer to the general section 1233 REFERENCED DOCUMENTS. The following documents are specifically referred to in this section:

NZBC B2/AS1	Durability
AS 2122.1	Combustion characteristics of plastics - Determination of flame propagation - Surface ignition of vertically orientated specimens of cellular plastics
AS 1397	Continuous hot-dip metallic coated steel sheet and strip - Coatings of zinc and zinc alloyed with aluminium and magnesium
NZS 4214	Methods of determining the total thermal resistance of parts of buildings
MGNZ CoPTM	Code of Practice for Torch-on Membrane Systems for Roofs and Decks
BRANZ Good practice guide	Membrane roofing

1.2 MANUFACTURER/SUPPLIER DOCUMENTS

Manufacturer's and supplier's documents relating to this part of the work:

BRANZ Appraisal 547 - Nuraply Roof Membranes
BRANZ Appraisal 732 - Nuraply Nuratherm Insulating Roof System
NURAPLY Systems design and specification manual
NURALITE Waterproofing Limited: CAD drawings
Manufacturer/supplier contact details

Company: **Nuralite Waterproofing Limited**
Web: www.nuralite.co.nz
Email: john@nuralite.co.nz
Telephone: 09 579 2046
0800 Nuralite (0800 687 254)

Warranties

1.3 WARRANTY - MANUFACTURER

The NURAPLY applicator to provide warranty for the system under normal environmental and use conditions against failure.

20 years: Warranty period

From: Date of completion of the application

Provide this warranty on the NURALITE Waterproofing Limited Materials Performance Warranty form.

1.4 WARRANTY - INSTALLERS

The Nuraply applicator warrants this work under normal environmental and use conditions against failure of materials, waterproofing and execution.

5 years: By the NURAPLY Applicator

From: Date of completion of the application

Provide this warranty on the installer's standard form.

Requirements

1.5 NO SUBSTITUTIONS

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

1.6 QUALIFICATIONS

Roofing to be carried out by competent workers licensed by NURALITE Waterproofing Limited and experienced with NURALITE materials systems and specialist techniques.

Provide on request evidence of experience prior to commencing work.

1.7 INFORMATION REQUIRED FOR CODE COMPLIANCE

Provide the following compliance documentation: -

- Applicators approval certificate from the distributor
- Distributors warranty
- Installer's / applicator's warranty

- Producer Statement - Construction from the applicator / installer
- Other information required by the BCA in the Building Consent Approval documents.

Performance - general

1.8 TEST

Where practicable flood test horizontal applications with a minimum 50mm depth of water for 24 hours. Make good any lack of watertightness when the surface is completely dry.

1.9 PERFORMANCE

Accept responsibility for the weather-tight performance of the completed NURAPLY roofing system, including all penetrations through the roof and junctions with walls and parapets. In the event that there are issues relating to any aspect of this work, arrange for a meeting to resolve these issues. The following should attend:

- NURAPLY roofing applicator
- NURALITE Waterproofing Limited representative
- Contractor
- Principal
- Principal's consultant(s)

1.10 AS APPROVED

"As approved" means that the materials are compatible with NURAPLY 3P roofing and are part of the system required by the roofing supplier for each specific location.

2. PRODUCTS

Materials - general

2.1 EDGE TRIM

To Nuralite Waterproofing Limited details and to suit the specific location. NURATRIM aluminium verge trim where detailed.

2.2 OUTLETS

As detailed and rebated into surfaces as required by NURALITE Waterproofing Limited.

Materials - Nuraply 3P two layer system

2.3 NURAPLY WATERPROOFING MEMBRANE, FULLY BONDED BASE LAYER

NURAPLY 3PB provides a 3mm thick first layer in two layer applications on plywood. Supplied in 1m wide x 10m long rolls.

2.4 NURAPLY WATERPROOFING MEMBRANE, MINERAL FACE TOP LAYER

NURAPLY 3PM single layer, 4mm thick reinforced fibre asphalt waterproofing membrane with textured mineral aggregate finish. Top layer over NURAPLY 3PB or NURAPLY 3PV basesheet. Supplied in 1m x 7.5m long rolls.

2.5 VENTILATORS

NURAVENTS in plywood roofs to NURALITE Waterproofing Limited specification.

Accessories

2.6 ADHESIVES

NURABOND No. 10, water based adhesive for bonding NURAPLY roofing systems to plywood substrates, to NURALITE Waterproofing Limited specification.

2.7 SEALANT

BLACKJACK, to HOLDFAST Limited specification.

Coatings

2.8 COATING OVER NURAPLY 3PM

Surface dressing: NURAGLAZE.

2.9 ACRYLIC COATING - PRIMER

NURASTONE SEALER, single coat solvent primer for preparing NURAPLY 3P membrane prior to coating with NURACOLOUR.

- 2.10 **ACRYLIC COATING**
NURACOLOUR, two coat acrylic coating for NURAPLY 3P roofing systems.
3. **EXECUTION**
- Conditions**
- 3.1 **GENERALLY**
Work and materials to MGNZ CoPTM, BRANZ Good practice guide - Membrane roofing, and to NURALITE Waterproofing Limited installation instructions.
- 3.2 **STORAGE**
Take delivery of rolls undamaged and include for site handling facilities where required. Stack on end, off the ground on a level surface and with accessories. Store in shade or cover in hot sun. Protect liquid components from freezing.
- 3.3 **LAYOUT**
If not detailed on the drawings, confirm the layout to suit site conditions and for the performance of the NURAPLY 3P system. Confirm if NURAPLY 3P ROLL-CAP batten finish is required. Confirm shape, size and spacing for rollcap timber battens. Stagger junctions of NURAPLY 3P rolls to avoid 4 layer membrane build-up at corner lap joints. Confirm the location and type of NURAVENTS.
- Installation - preparation**
- 3.4 **PRELIMINARY WORK**
Ensure that preliminary work, including formation of falls, flashing rebates, grooves, ducts, provision of battens and fillets and location of NURAVENTS and outlets rebated to levels, is complete and properly constructed to enable the system to work as intended. This work and the substrate to be smooth, clean and dry.
- 3.5 **ACCEPTANCE OF SUBSTRATE**
Confirm that the substrate, including fillets, sumps, rebated outlets and projections, will ensure NURAPLY work of the required standard. Ensure the substrate is smooth, clean and dry and falls on roofs are 1 in 30 minimum and 1 in 40 minimum for decks and 1 in 100 for gutters.
- 3.6 **PLYWOOD SUBSTRATE**
Ensure that sheets have been stretcher bond laid to falls, are rigid, with joints flush, edges arrised, upstands filleted, no lumps or hollows, smooth, clean, dry and free of debris. Plywood grain across the line of supports below.
- 3.7 **MOISTURE ABSORBENT SUBSTRATE**
Lay NURAPLY to cover the moisture absorbent dry-laid base on the same day the base is laid, or ensure that the base is kept covered and dry until NURAPLY is laid. Seal exposed NURAPLY edges at the end of each work period.
- Installation - general**
- 3.8 **WELD JOINTS**
Heat fuse joints minimum width 80mm side and 100mm end laps using NURALITE Waterproofing Limited self checking lap welding techniques.
- 3.9 **PENETRATIONS**
Form mould, weld and flash all upstands, downturns and penetrations to NURALITE Waterproofing Limited details including raised, anti-ponding water deflectors on the upside of penetrations.
- 3.10 **MOVEMENT JOINTS**
Form and weatherproof movement joints as designed to NURALITE Waterproofing Limited details.
- 3.11 **JUNCTIONS**
Check that adjoining walls and parapets are prepared ready for the installation of NURAPLY roofing. Confirm that openings have been prepared ready for the installation of skylights and other penetrations through the roof.
Required work includes the following:
- 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).

- 3.12 **COATINGS, TOPPINGS AND OVERLAYS**
Ensure the specified NURACOLOUR, NURAGLAZE or NURACOAT coating or topping system is placed within 5 days of completing laying. Thoroughly wash clean NURAPLY 3P surface before application of NURASTONE SEALER and NURACOLOUR, NURACOAT or toppings/overlays.
- 3.13 **Installation - Nuraply 3P two layer system**
FIRST LAYER ON PLYWOOD
Lay the first NURAPLY 3PB layer into NURABOND NO.10 bedding compound to the NURAPLY 3P suppliers requirements, with joints to be welded lapped a minimum of 80mm down the roll edges and 100mm across the roll ends. Lay in order from low points, sumps, through gutters, valleys, eaves, verges main roof and upstands to cover flashings.
- 3.14 **LAYING AND JOINTING SECOND LAYER - MINERAL FACE**
Lay the second NURAPLY 3PM layer by heat fusing over the cleaned repaired and NURAFLEX primed (if necessary) surface of the first layer in the same sequence. Joints in the second layer must not correspond with joints in the first layer. Second layer joints to be welded lap-joints, minimum 80mm wide down roll edges and minimum 100mm wide across roll ends, to the NURAPLY 3PM supplier's requirements. Roll junctions must be staggered to avoid 4 layer lap-weld build-up of NURAPLY 3P at corners. Ensure unobstructed drainage flow at outlets.
- 3.15 **Finishing**
APPLY SURFACE DRESSING TO NURAPLY 3P
Apply NURASTONE SEALER and NURACOLOUR to NURALITE Waterproofing LIMITED details. NURACOAT BAC is applied without the need for NURASTONE SEALER.
- 3.16 **APPLY SURFACE DRESSING TO NURAPLY 3PM**
If required, apply NURAGLAZE as two thin coats to NURALITE Waterproofing LIMITED details.
- 3.17 **Conditions - completion**
ACCESS BOARDS
Provide access boards for later operations and remove when no longer needed.
- 3.18 **FOOT TRAFFIC**
Do not allow construction foot traffic on the NURAPLY 3P installation after laying to avoid dirt and damage to the surface.
- 3.19 **ACCEPTANCE**
Arrange for an inspection of the completed work. Protect and maintain roofing until completion of the contract works.
- 3.20 **SUBSEQUENT WORK**
Make good any covering cut or deformed by later work. Making good to take the form of inserting a new whole or part infill sheet to maintain the appearance of the covering as originally laid.
- 3.21 **Completion**
CLEAN UP
Clean up as the work proceeds.
- 3.22 **LEAVE**
Leave work to the standard required by following procedures as specified and to NURALITE Waterproofing LIMITED details.
- 3.23 **REMOVE**
Remove debris, unused materials and elements from the site.

4521AR APL RESIDENTIAL ALUMINIUM WINDOWS AND DOORS

1. GENERAL

This section relates to the fabrication, supply and installation by either an **Altherm, First or Vantage** fabricator of:

- Residential aluminium windows and doors
- Metro Series aluminium windows and doors
- APL Architectural Series aluminium windows and doors
- Metro Thermal Heart aluminium windows and doors
- Smartwood composite aluminium / timber windows and doors
- Roof windows and overhead glazing
- Balustrading
- Hardware and furniture
- Flashings and sealants

1.1 ABBREVIATIONS AND TERMS

SLS	Serviceability limit state
ULS	Ultimate limit state
WANZ	Windows Association of New Zealand
PQAS	Powder Coating Quality Assurance System

Documents

1.2 DOCUMENTS

Refer to the general section 1233 REFERENCED DOCUMENTS. The following documents are specifically referred to in this section:

NZBC E2/AS1	External moisture
NZBC F4/AS1	Safety from falling
NZBC H1/VM1	Energy efficiency
NZBC H1/AS1	Energy efficiency
AS/NZS 1580.108.1	Methods of test for paints and related materials - Determination of dry film thickness on metallic substrates - Non destructive methods
AS/NZS 1170.2	Structural design actions - Wind loads
NZS 1170.5	Structural design actions - Earthquake actions - New Zealand
AS/NZS 1734	Aluminium and aluminium alloys - Flat sheet, coiled sheet and plate
AS/NZS 1866	Aluminium and aluminium alloys - Extruded rod, bar, solid and hollow shapes
AAMA 2604.05	Performance requirements and test procedures for high performance organic coatings on aluminium extrusions and panels
NZS 3604	Timber-framed buildings
AS 3715	Metal finishing - Thermoset powder coatings for architectural applications
BS 3900	Methods of tests for paints, Part C5: Determination of film thickness
NZS 4211	Specification for performance of windows
NZS 4223.3	Glazing in buildings - Human impact safety requirements
AS/NZS 4680	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles
WANZ Installation Guide	The WANZ Guide to Window Installation as described in E2/AS1 Amendment 5
WANZ PQAS	Powder Coating Quality Assurance System
WANZ SFA 3503-03	Anodic Oxide coatings on wrought aluminium for external architectural application (2005)
BRANZ BU 337	Protecting Window Glass from Surface Damage
AAMA 2604	Voluntary specification, performance requirements and test procedures for high performance organic coatings on aluminium extrusions and panels
AAMA 2605	Voluntary specification, performance requirements and test procedures for superior performing organic coatings on aluminium extrusions and panels
US Federal Specification	
TT-S-001543A	Sealing compound, silicone rubber base (for caulking, sealing and glazing in buildings and other structures)
TT-S-00230C	Sealing compound, elastomeric type, single component (for caulking, sealing and glazing in buildings and other structures)

1.3 MANUFACTURER'S DOCUMENTS

Manufacturer's and supplier's documents relating to work in this section are contained within:

Altherm Specifier's Guide

First Specifier's Guide

Vantage Specifier's Guide

Copies of the above literature are available from:

Web: www.altherm.co.nz
www.firstwindows.co.nz
www.vantagejoinery.com
Email: specifiersguide@apl.nz
Telephone: 09 309 3251
Facsimile: 09 309 3298

Warranties

1.4 WARRANTY - MANUFACTURER/FABRICATOR

Provide a material manufacturer/fabricator warranty:

5 years: For fabrication

1.5 WARRANTY - INSTALLER

Provide an installer warranty:

2 years: For installation

- Provide this warranty in the installer standard form.

Requirements

1.6 NO SUBSTITUTIONS

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

1.7 QUALIFICATIONS

Work to be carried out by tradesmen experienced, competent and familiar with the materials and techniques specified.

1.8 COMPLIANCE

Windows and doors to be manufactured and installed to NZBC E2/AS1.

1.9 CERTIFICATION

Provide evidence of a certificate by a laboratory accredited by International Accreditation of New Zealand that the windows and doors offered comply with the requirements of NZS 4211

Performance

1.10 PERFORMANCE - WINDOWS AND DOORS

To NZS 4211, including:

- deflection, opening sashes, air infiltration, water penetration, ultimate strength, torsional strength of sashes, marking.

1.11 STRUCTURAL/WEATHER-TIGHTNESS

The structural and weather-tight performance of the completed joinery, the glazing and infill panels is the responsibility of the window fabricator.

Performance - Wind (design by contractor)

1.12 DESIGN PARAMETERS - NON SPECIFIC DESIGN

Design the installation to the wind zone parameters of NZS 3604, table 5.1.

Refer to SELECTIONS for wind zone.

Finishes

1.13 CERTIFY COATINGS - POWDER COATING

Certify on request, compliance with this specification and support with control and sampling records. Test for film thickness to BS 3900, part C5, method No. 4, using method (b) or to AS/NZ 1580.108.1 for certifying thickness and method (a) where any dispute arises as to the thickness provided.

The coating should be applied by an applicator who can certify that the coating has been applied in accordance with the specification.

2. PRODUCTS

Materials

2.1 ALUMINIUM EXTRUSIONS

Alloy designation to comply with AS/NZS 1866. Branded and extruded for anodising or powder coating.

2.2 ALUMINIUM SHEET AND STRIP

Complying with AS/NZS 1734 of suitable thickness. Rolled for anodising or powder coating.

Alloy designation: 5251 - H16 or 5005 - H16

2.3 STAINLESS STEEL SHEET AND STRIP

Type: 316 austenitic steel

Finish grade: 2B (satin lustre)

2.4 GLASS

Refer to the glazing section for glass types and installation.

Reveals

2.5 REVEALS - TIMBER PAINTED

Timber reveals for paint finish with all sides primed grooved for wall linings or flush finished for architraves.

Flashings

2.6 FLASHINGS GENERALLY

To NZBC E2/AS1, 9.1.10 **Windows and Doors**. 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 installation - direct fix systems

2.7 SILL PAN FLASHING

To NZBC E2/AS1, 9.1.10.5 **Windows and Door Sills**. Flashing for direct fix claddings to collect and drain water that may penetrate through the window or door unit. Size to extend from the inner most point of the aluminium frame out over the external face of the cladding.

2.8 SUPPORT ANGLE

A Standard aluminium support angle for use below the sill pan for deeper claddings to transfer the weight of the window back to the frame. Size to suit cladding thickness.

Components

2.9 GLAZING GASKETS

Thermoplastic rubber. Do not stretch glazing gaskets during installation. Measure and cut gaskets 5-10% over length before installation.

2.10 HARDWARE AND FURNITURE

Hinges, stays, catches, fasteners, latches, locks and furniture as offered by the window and door manufacturer. Refer to SELECTIONS for type and finish. Key alike all lockable window hardware able to be keyed alike.

2.11 SAFETY STAYS

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

2.12 FIXING BRACKETS

Designed by manufacturer to specific design.

2.13 WEATHERING/INSTALLATION SEALANT

Building sealant used in accordance with manufacturer's instructions for weather sealing aluminium frames to the cladding, complying with US Federal Specification TT S 0011534A, or a one-part polyurethane moisture curing, elastic joint sealant of medium modulus (\pm 25% movement) to US Federal Specification TT S 00230C.

- Finishes**
- 2.14 DURALLOY POWDER COATED ALUMINIUM
Polyester powder organic coating in accordance with WANZ PQAS and AS 3715.
- 2.15 DURATEC POWDER COATED ALUMINIUM
Polyester powder organic coating in accordance with WANZ PQAS and AAMA 2604.
- 2.16 FLUROSET POWDER COATED ALUMINIUM
PVF² fluoropolymer powder coating in accordance with AAMA 2605 and WANZ PQAS.
- 3. EXECUTION**
- Conditions - generally**
- 3.1 DO NOT DELIVER
Do not deliver to site any elements which cannot be unloaded immediately into suitable conditions of storage.
- 3.2 UNLOAD WINDOW JOINERY
Unload, handle and store elements in accordance with the window manufacturer's requirements.
- 3.3 AVOID DISTORTION
Avoid distortion of elements during transit, storage and handling.
- 3.4 PREVENT DAMAGE
Store windows and doors on site in a clean and dry environment in such a manner as to prevent damage to prefinished surfaces. Stack the units in a vertical position resting on their sills, with layers interleaved between to prevent rubbing. Keep paper and cardboard wrappings dry.
- 3.5 PROPRIETARY ELEMENTS
Fix in accordance with the window manufacturer's requirements.
- 3.6 PROTECTIVE COVERINGS
Retain protective coverings and coatings to BRANZ BU 337 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.
- 3.7 ADDITIONAL PROTECTION
Supply and fix additional protection as necessary to prevent marking of surfaces which will be visible on completed work.
- Conditions - fixings and fastenings**
- 3.8 SUPPLY OF FIXINGS
Use only fixings and fastenings recommended by the manufacturer of the component being fixed and to comply with the ULS wind pressure stated in SELECTIONS. Ensure fixings and fastenings exposed to the weather are of aluminium, or Type 316 stainless steel or if not exposed to the weather may they be hot-dip galvanized steel with a coating weight of 610 g/m² complying with AS/NZS 4680.
- 3.9 INSTALLATION FIXING
To NZBC E2/AS1, 9.1.10.8, **Attachments for windows and doors**. Fix windows/doors through reveal to frame with a pair of 75 x 3.15mm minimum galvanised jolt head nails or a pair of 8 gauge x 65mm minimum stainless steel screws. Fix at a maximum of 450 centres along all reveals and a maximum of 150mm from reveal ends. Ensure fixings do not penetrate metal flashings.
Install packers between reveals and framing at fixing points, except at the head.
- Assembly**
- 3.10 FABRICATION
Fabricate frames as detailed on shop drawings. Install glazing, hinges, stays and running gear as scheduled. Provide temporary bracing and protection. Temporarily secure all opening elements for transportation.
- 3.11 TIMBER / PVC REVEALS
Before fixing to aluminium frames, ensure that timber reveals which are being painted have been primed on all surfaces. Securely fix reveals through aluminium fin.

- 3.12 **HARDWARE GENERALLY**
Factory fit all required and scheduled hardware. Account for all keys and deliver separately to the site manager.
- 3.13 **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.
- 3.14 **Installation - windows and doors**
SUPPLY OF FIXINGS
Use only fixings and fastenings recommended by the manufacturer of the component being fixed and to comply with the ULS wind pressure stated in SELECTIONS.
- 3.15 **EXPOSED FIXINGS AND FASTENINGS**
Ensure fixings and fastenings exposed to the weather are of aluminium, or Type 304 stainless steel.
- 3.16 **PROTECTED FIXINGS AND FASTENINGS**
Fixings and fastenings not exposed to the weather may be hot-dip galvanized steel with a coating weight of 610 g/m² complying with AS/NZS 4680.
- 3.17 **CORROSION PROTECTION**
Before fixing, apply suitable barriers of bituminous coatings, stops or underlays between dissimilar metals in contact, or between aluminium in contact with concrete.
- 3.18 **CONFIRM PREPARATION OF EXTERIOR WALL OPENINGS**
Confirm that exterior 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 to NZBC E2/AS1:9.1.5 **Wall underlays to wall openings.**
 - Full height 20mm jamb battens to NZBC E2/AS1 figure 72A (direct fix only)
 - claddings neatly finished off to all sides of openings
 - installation of flashings (those which are required to be installed prior to frames).
 - application of waterproof sealer to all door and window sills in concrete floor or concrete sill situations. To door sills only, apply a suitable membrane over the sealer
 - all in accordance with the shop drawings, where applicable.
- 3.19 **INSTALLATION**
Fix to comply with the reviewed shop drawings and installation details including flashings and bedding compounds, pointing sealants and weathering sealants.
- 3.20 **INSTALLATION DIRECT FIX**
Install to window manufacturers details and drawings including sill pans to window and door units.
- 3.21 **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 unit by 20mm plus any jamb scribe width at each end.
- 3.22 **COMPLETE AIR SEAL**
To NZBC E2/AS1:9.1.6 **Air seals.** Form an air-tight seal by means of proprietary expanding foam or sealants used with PEF backing rods, applied between the window / door reveal and structural framing to a depth of 10 - 20mm, to provide a continuous air tight seal to the perimeter of the window or door.
- 3.23 **FIX HARDWARE**
Fix all sash and door hardware and furniture as scheduled.

- Application - jointing and sealing**
- 3.24 **SEAL FRAMES ON SITE**
Seal frames to each other and to adjoining structure and finishes, all as required by the window and sealant manufacturer and to make the installation weathertight.. In very high and extra high or greater wind zones, seal between the window head and the head flashing. Do not seal the junction between the sill member and the cladding or sill flashing which must remain open.
- 3.25 **PREPARE JOINTS**
Ensure joints are dry. Remove loose material, dust and grease. Prepare joints in accordance with the sealant manufacturer's requirements, using required solvents and primers where necessary. Mask adjoining surfaces which would be difficult to clean if smeared with sealant.
- 3.26 **BACK UP**
When using back-up materials do not reduce depth of joint for sealant to less than the minimum required by the manufacturer of the sealant. Insert polyethylene rod or tape back-up behind joints being pointed with sealant.
- 3.27 **SEALANT FINISH**
Tool sealant to form a smooth fillet with a profile and dimensions required by the sealant manufacturer. Remove excess sealant from adjoining surfaces, using the cleaning materials nominated by the sealant manufacturer and leave clean.
- Cleaning**
- 3.28 **REMOVE TRADE DEBRIS**
Remove trade debris by appropriate means on a floor by floor basis as each floor is completed and again before any work is covered up by others. Arrange for general removal.
- 3.29 **TRADE CLEAN**
Trade clean window frames, operable windows and doors, glass and other related surfaces inside and out at the time of installation to remove marks, dust and dirt, to enable a visual inspection of all surfaces.
- Completion**
- 3.30 **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.
- 3.31 **REPLACE**
Replace damaged, cracked or marked elements.
- 3.32 **PROTECTION**
Protect finishes against damage from adjacent and following work.
- 3.33 **IN-SITU TOUCH-UP TO POWDER COATED ALUMINIUM**
In situ touch-up of polyester or fluoropolymer coated aluminium is only permitted to minor surface scratching. Otherwise replace all damaged material.
- 3.34 **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.
- 3.35 **MANIFESTATIONS**
Apply manifestations to comply with NZS 4223.3, 303.1 Manifestations.

4711K EARTHWOOL THERMAL INSULATION

1. GENERAL

This section relates to **Earthwool® Insulation** by **Knauf** installed, fixed or fitted as thermal insulation:
It includes:

- Earthwool® Wall Insulation
- Earthwool® Ceiling Insulation

Documents

1.1 DOCUMENTS

Refer to the general section 1233 REFERENCED DOCUMENTS. The following documents are specifically referred to in this section:

NZBC H1/AS1	Energy efficiency
AS/NZS 3000	Electrical installations
NZS 4218:2004	Energy efficiency - Small building envelope
NZS 4220	Code of practice for energy conservation in non-residential buildings
NZS 4243.1	Energy efficiency - Large buildings - Building thermal envelope
NZS 4246	Energy efficiency - Installing insulation in residential buildings
AS/NZS 4859.1	Materials for the thermal insulation of buildings - General criteria and technical provisions
AS/NZS 60598.2.2	Luminaires- Particular Requirements - Recessed luminaires
AS/NZS 60695.11.5	Fire hazard testing - Test flames - Needle-flame test method - Apparatus, conformity test arrangement and guidance
ISO 9705	Fire tests - Full-scale room test for surface products

1.2 MANUFACTURER/SUPPLIER DOCUMENTS

Manufacturer's and supplier's documents relating to this part of the work:

Knauf Insulation Product Guide New Zealand
Earthwool® Wall and Ceiling Datasheets (roll and segments)

Earthwool® Acoustic Insulation Datasheet

Earthwool® Ceiling Blanket Datasheet

Earthwool® Underfloor Datasheet

Earthwool® Roof Blanket Datasheet

Earthwool® Installation Instructions

BRANZ Appraisal 648 - Knauf Earthwool Insulation

Manufacturer/supplier contact details

Company: **Knauf Insulation New Zealand**

Web: www.knaufinsulation.co.nz

Email: info.nz@knaufinsulation.co.nz

Telephone: 0800 KNAUFI (562 834)

Technical Support: tech.nz@knaufinsulation.com

Customer Service: sales.nz@knaufinsulation.com

Warranties

1.3 WARRANTY - MANUFACTURER/SUPPLIER

Provide a material manufacturer/supplier warranty:

50 years: For materials

- Provide this warranty on the manufacturer/supplier standard form.
- Commence the warranty from the date of practical completion of the contract works.

Requirements

1.4 QUALIFICATIONS

Work to be carried out by tradesmen experienced, competent and familiar with the Knauf Insulation materials and techniques specified.

1.5 NO SUBSTITUTIONS

Substitutions are not permitted to any specified Knauf Insulation, associated products, components or accessories.

2. PRODUCTS

Materials

2.1 EARTHWOOL CEILING INSULATION

Earthwool® Ceiling Insulation to AS/NZS 4859.1, NZS 4218, NZS 4243.1 and NZS 4220. Rectangular insulation segments made using recycled glass and with ECOSE® Technology. Refer to SELECTIONS for location, type, R-value and thickness.

2.2 EARTHWOOL WALL INSULATION

Earthwool® Wall Insulation to AS/NZS 4859.1, NZS 4218, NZS 4243.1 and NZS 4220. Rectangular insulation segments made using recycled glass and with ECOSE® Technology. Refer to SELECTIONS for location, type, R-value and thickness.

Components

2.3 FASTENERS

Staple gun/tacker to fix underfloor strapping.

2.4 TAPES

Polypropylene or similar strapping stapled across framing to retain insulation in wall and ceiling applications. Underfloor insulation requires polythene banding, 12mm wide with a 50 kg breaking strain.

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 compression. Do not use damaged or wet insulation material.

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 Earthwool®, check that the location and framing are dry, that the cavities are not interconnected and that mesh, wall and roof underlays and vapour barriers are in place. Install when the building is enclosed and when the construction materials have achieved the maximum permitted moisture content or less.

Application - general

3.4 INSTALL INSULATION - GENERAL

Lay, install, fit and fix to NZBC H1/AS1: Energy efficiency, 2.0 Building thermal envelope, and to manufacturer's requirements. Install in housing to NZS 4218 and NZS 4246. Install in large buildings to NZS 4243.1 and NZS 4220. Allow insulation to re-loft/relax prior to installation. Do not cover vents. Allow a clear gap around metal flues as recommended by the fireplace manufacturer. Where possible lift up electrical wires, lighting transformers/controllers and lay the insulation underneath. Refer to manufacturer's installation instructions and NZS 4246 for further details.

3.5 RECESSED LIGHT FITTINGS - CLEARANCE

Non-residential applications;

The clearance between insulation and recessed downlights

- 100mm gap to AS/NZS 3000, figure 4.9.
- Provide larger clearances where required by the light manufacturer.

Residential applications;

- Ensure new recessed downlights are one of the new classes classified in AS/NZS 60598.2.2; CA 80, CA 135, IC and IC - F
- Classification type CA 80, CA 135, to AS/NZS 60598.2.2; insulation can abut the sides
- Classification type IC and IC - F, to AS/NZS 60598.2.2; insulation can abut and cover over the top of the downlight
- Classification type NON IC to AS/NZS 60598.2.2; insulation cannot abut or cover the downlight. This class of downlights is banned from residential applications.
- Provide larger clearances where required by the light manufacturer.

- In a retrofit situation where recessed downlights are unclassified or unknown, ensure 100mm clearance between insulation and downlights to AS/NZS 3000, figure 4.9.

3.6 CHECK UNDERLAYS

Ensure wall and roof underlays are dry, clean, undamaged and free of debris before being covered.

Application - walls

3.7 FIT EARTHWOOL - TIMBER FRAMING

Friction fit **Earthwool® Wall** segments between framing members and linings. Cut on site to fill cavity and provide a close even fit. When cutting to fill a void, oversize by up to 10mm to ensure a tight fit. Ensure there is a friction fit on all faces of the insulation. If cavity depth is greater than the insulation nominal thickness, fix or strap the product to secure in accordance with installation instructions. Cut into smaller pieces for smaller spaces and around penetrations to achieve efficient thermal performance. Do not fold, tuck or compress the insulation. Refer to NZS 4246 for installation guidelines and Earthwool® Product Data Sheets, for detailed installation instructions.

Application ceiling/roof

3.8 FIT EARTHWOOL SEGMENTS - BETWEEN RAFTERS (SKILLION ROOF)

Friction fit **Earthwool® Ceiling** segments between ceiling rafters. Use a sharp craft knife to cut to required size or around penetrations if required. Maintain a minimum clearance of 25mm between the insulation and the roofing membrane (underlay) except where a solid timber (or plywood) substrate is used under the roof cladding.

3.9 CEILING INSULATION EDGE DETAIL

Where perimeter of ceiling space is too low to allow full depth of insulation plus the 25mm air gap, provide reduced perimeter insulation to NZS 4246.5.2, **Ceilings - lined**.

Completion

3.10 CLEAN UP

Clean up as the work proceeds. Ensure no spare off cuts or any other materials remain behind claddings or linings.

3.11 LEAVE

Leave work to the standard required by following procedures.

3.12 REMOVE

Remove debris, unused materials and elements from the site. Earthwool® packaging is recyclable.

4. SELECTIONS

For further details on selections go to www.knaufinsulation.co.nz
Substitutions are not permitted to the following, unless stated otherwise.

Wall insulation

4.1 EARTHWOOL WALL INSULATION

Brand:	Earthwool® Wall
R Value:	R2.8
Thickness:	90mm

Ceiling insulation

4.2 EARTHWOOL SKILLION ROOF

Brand:	Earthwool® Ceiling Segment
R-value:	R3.6
Thickness:	175mm

5113G GIB® PLASTERBOARD LININGS

1. GENERAL

This section relates to the supply, fixing and jointing of GIB® plasterboard linings and accessories to timber and steel framed walls and ceilings to form:

- standard systems
- superior finish quality systems
- bracing systems
- fire rated garage boundary wall systems
- wet area systems

1.1 ABBREVIATIONS

The following abbreviations are used throughout this part of the specification:

AWCINZ Association of Wall and Ceiling Industries New Zealand

Documents

1.2 DOCUMENTS REFERRED TO

Documents referred to in this section are:

NZBC E2/AS1	External moisture
AS 1397	Continuous hot-dip metallic coated steel sheet and strip - Coatings of zinc and zinc alloyed with aluminium and magnesium
AS/NZS 2588	Gypsum plasterboard
AS/NZS 2589	Gypsum linings - Application and finishing
NZS 3604	Timber-framed buildings
AS/NZS 4600	Cold-formed steel structures
BRANZ technical paper P21:	A wall bracing test and evaluation procedure
NASH	Residential and Low-Rise Steel Framing Part 1 2010 Design Criteria

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

Manufacturer's and supplier's documents which refer to work in this section are:

- GIB® Site Guide (Jan 2010)
- GIB Aqualine® Wet Area Systems (March 2007)
- GIB® Ezybrace® Systems (June 2011)
- GIB® Ezybrace® Software (2011)
- GIB® Ezybrace® for Steel Frame Housing (NASH) Software (2011)
- GIB® Rondo® Metal Ceiling Batten Systems
- GIB® Goldline® Platinum Tape-on Trims
- GIB® UltraFlex high impact corner mould

BRANZ Appraisal 294 (2011) - GIB® Ezybrace® Systems

BRANZ Appraisal 427 - GIB Aqualine® Wet Area Systems

Copies of the above literature are available at

Web: www.gib.co.nz

Telephone: 0800 100 442

Requirements

1.4 NO SUBSTITUTIONS

Substitutions are not permitted to any specified GIB® systems, GIB® system components, GIB® plasterboard, associated GIB® products or GIB® accessories.

1.5 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.

For example:

- National Certificate of Interior Systems; or
- Certified Business member of AWCINZ.

Performance

1.6 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.

1.7 BRACING REQUIREMENTS

Provide braced wall systems using GIB® Ezybrace® Systems (June 2011) or GIB® Ezybrace® Software (2011) to meet the requirements of NZS 3604 when tested to BRANZ Technical paper P21. Alternatively use GIB® Ezybrace® for Steel Frame Housing (NASH) Software 2011 to meet the requirements of NASH Residential and Low-Rise Steel Framing Part 1 2010 Design Criteria. Refer to drawings for location and type.

2. PRODUCTS

Materials

2.1 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 SELECTIONS for location, type, thickness and finish.

GIB® Standard plasterboard

GIB Wideline® plasterboard

GIB Ultraline® and/or GIB® Ultraline PLUS high quality surface plasterboard

GIB Fyrelime® fire resistant plasterboard

GIB Braceline® & GIB® Noiseline dual purpose wall bracing & noise control plasterboard

GIB Aqualine® wet area plasterboard

GIB FibreRock® Impact Resistant Gypsum lining

Components

2.2 CEILING BATTENS

GIB® Rondo® metal ceiling battens, batten joiners and perimeter channel.

2.3 SCREWS

GIB® Grabber® drywall screws.

2.4 NAILS

GIB® Nails (gold passivated).

Size: 30mm, 40mm

2.5 TAPE ON TRIMS AND EDGES

GIB® Goldline® tape-on trims

GIB® UltraFlex high impact corner mould

2.6 METAL ANGLE TRIMS

GIB® galvanized steel slim angle trims.

2.7 CONTROL JOINTS

GIB® Rondo® P35 control joints.

GIB® Goldline® tape-on trims

Accessories

2.8 ADHESIVE

Timber frame and/or steel frame:

GIBFix® One ultra low VOC water based wallboard adhesive

GIBFix® All-Bond solvent based wallboard adhesive

2.9 JOINTING COMPOUND

Bedding compound:	GIB Tradeset®, GIB Lite Blue®, GIB MaxSet®, GIB ProMix® All Purpose, GIB Plus 4®
Finishing compound:	GIB ProMix® All Purpose, GIB® Trade Finish®, GIB® Trade Finish® Lite, GIB ProMix® Lite, GIB® U-Mix, GIB Plus 4®
Cove:	GIB-Cove® Bond

2.10 JOINTING TAPE

GIB® paper jointing tape.

- 2.11 GAP FILLER
GIB® Gap Filler ultra low VOC multi-purpose acrylic flexible filler
3. EXECUTION
- Conditions**
- 3.1 STORAGE
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 (Jan 2010).
- 3.2 LEVELS OF PLASTERBOARD FINISH
Provide the selected plasterboard surfaces to the pre decorative levels of finish specified in AS/NZS 2589.
- 3.3 CONFIRM LEVELS OF PLASTERBOARD FINISH ACCEPTANCE
Before commencing work, agree in writing upon the surface finish assessment procedure towards ensuring that the quality of finish expectations are reasonable and are subsequently obtained and acceptable.
Do not apply decorative treatment until it is agreed in writing by the contractor, subcontractors and decorator that the specified 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 AS/NZS 2589.
- 3.4 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 (Jan 2010).
- 3.5 TIMBER FRAME MOISTURE CONTENT
Maximum allowable moisture content to AS/NZS 2589 for timber framing at lining: 18% or less for plasterboard linings. Refer to NZBC E2/AS1 and GIB® Site Guide (Jan 2010).
- 3.6 METAL FRAMING
Metal framing, to which gypsum lining is fixed, shall comply with AS 1397, AS/NZS 4600, or NASH Residential and Low-Rise Steel Framing Part 1 2010 Design Criteria, as applicable. Where adhesion of gypsum linings is required, surfaces shall be free of oil, grease, dust and other foreign materials. Refer to the metal framing manufacturers specifications where high density gypsum linings (>800 kg/m³) such as GIB Braceline® and GIB Noiseline® are specified for fixing to light gauge steel framing.
- 3.7 PROTECTION
Protect surfaces; cabinetwork, fittings, equipment and finishes already in place from the possibility of water staining and stopping damage. Refer to GIB® Site Guide.
- Application**
- 3.8 INSTALL CEILING BATTENS
Install to GIB® Rondo® Ceiling Batten Systems.
- 3.9 LINING WALLS AND CEILINGS GENERALLY
Form to GIB® Site Guide (Jan 2010). Ensure bulk insulation thickness shall not exceed that of the wall framing.
- 3.10 BOARD ORIENTATION
Minimise joints by careful sheet layout using the largest sheet sizes possible, and generally fixing horizontally. Where part sheets are required for various stud heights they should be positioned so the cut sheet is as low as possible to keep joints below eye level.
- 3.11 FORM WET AREA SYSTEMS
Form to GIB Aqualine® Wet Area Systems.
- 3.12 FORM BRACING SYSTEMS
Form to GIB® Ezybrace® Systems (June 2011).
- 3.13 FORM CONTROL JOINTS
Form control joints to GIB® Site Guide.

- 3.14 **INSTALL TAPE-ON TRIMS**
Install to GIB® Goldline® Tape-on trims literature and/or GIB® Ultraflex high impact corner mould literature.
- 3.15 **Finishing**
FINISHING GENERALLY
To GIB® Site Guide (Jan 2010) and AS/NZS 2589.
- 3.16 **Completion**
REPLACE
Replace damaged sheets or elements.
- 3.17 **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.
- 3.18 **REMOVE**
Remove debris, unused materials and elements from the site.
- 3.19 **LEAVE**
Leave work to the standard required by following procedures.

6141 GROUND, SEALED OR POLISHED CONCRETE

1. GENERAL

This section relates to the provision of a high quality concrete finish to new or existing concrete surfaces incorporating mixed design aggregates and plain concrete.

It includes:

- plain polish
- grind and seal
- grind and polish

1.1 ABBREVIATIONS AND DEFINITIONS

Refer to the general section 1232 INTERPRETATION & DEFINITIONS for abbreviations and definitions used throughout the specification.

The following definitions apply specifically to this section:

Plain polish:	The concrete is mechanically ground just enough to clean it (virtually no aggregate exposed) and clear sealed.
Grind:	The concrete is mechanically ground to expose aggregate
Grind and seal:	The concrete is mechanically ground and clear sealed.
Grind and polish:	The concrete is mechanically ground, then hardened, then polished, then sealed and finally burnished.

Documents

1.2 DOCUMENTS

Refer to the general section 1233 REFERENCED DOCUMENTS. The following documents are specifically referred to in this section:

NZS 3114	Specification for concrete surface finishes
AS/NZS 3661.1	Slip resistance of pedestrian surfaces - Requirements

Requirements

1.3 QUALIFICATIONS

Workers to be experienced, competent and familiar with the materials and techniques specified.

1.4 TECHNIQUE DISCUSSION - CONCRETE PLACEMENT

Advise the concrete placer of the areas scheduled for ground/polished finishes. Ensure the placed concrete to be ground is not overworked resulting excess sand /cement paste at the concrete surface

1.5 TECHNIQUE DISCUSSION AND FINISH STANDARD

Before commencing work, arrange a meeting to confirm the method of carrying out the work. Select an area on site, grind and finish the selected area to achieve the agreed finish. When agreement is reached, this then becomes the finish standard for the balance of the work.

2. PRODUCTS

2.1 PENETRATING SEALER

Refer to SELECTIONS.

2.2 SURFACE SEALER

Refer to SELECTIONS.

2.3 GROUT

Cement base slurry grout.

3. EXECUTION

Conditions

3.1 CONFIRM CONCRETE SURFACE

Confirm concrete surface is of the required standard for the concrete polishing and finishing processes. Do not proceed if placed concrete is not capable of delivering the specified finish. Seek written direction as to what action is required.

- 3.2 **PLACING THE CONCRETE**
Place concrete with light vibrate only, do not over vibrate. The concrete pavement or floor must be to NZS 3114:1987, a Class U3 finish. Very light power float (1 or 2 light passes).
- 3.3 **PROTECTION**
Cover glass, anodised aluminium and other surfaces to protect from damage that is caused from cementitious dust.
- Application - grind and seal**
- 3.4 **GRIND TYPE - GRIND AND SEAL**
For type and depth of grind refer to SELECTIONS.
- 3.5 **FIRST GRIND - GRIND AND SEAL**
For new slabs grind 7 -10 days minimum after placing the concrete. Grind the floor to expose the aggregate using a 20/40 grit steel bonded diamond. Aggregate should be consistent over the surface.
- 3.6 **SECOND GRIND - GRIND AND SEAL**
When the building is appropriately enclosed, linings completed before fittings, fixtures and skirtings are installed, grind the floor and start polishing the surface using a 30 grit steel bonded diamond progressing to a 120 grit steel bonded diamond.
- 3.7 **APPLY CONCRETE SEALER - GRIND AND SEAL**
Apply selected concrete sealer to manufacturer's requirements.
- Application - holes and cuts**
- 3.8 **GROUT HOLES**
Grout slurry the air holes left in the concrete surface. Polish to remove grout within 24 hours of application using a 120 grit diamond.
- 3.9 **GROUTING CONCRETE CUTS**
Grout construction cuts and decorative cuts. Polish to remove excess grout within 24 hours of application using a 120 grit diamond.
- Protect slab**
- 3.10 **PROTECT SURFACE AFTER FIRST GRIND**
Fully cover and protect from damage after the first grind and once the building is enclosed. Ensure material allows the floor to breath and is non-staining.
- 3.11 **PROTECT FINISHED POLISHED CONCRETE**
Protect floor from damage. Provide protection by laying breathable, non staining sheet material for the period between completion of polishing and completion of the contract works.
- Completion**
- 3.12 **LEAVE**
Leave work to the standard required by following procedures.
- 3.13 **REMOVE**
Remove debris, unused materials and elements from the site.

6700R RESENE PAINTING GENERAL

1. GENERAL

This section relates to the general matters related to **Resene** painting work.

1.1 ABBREVIATIONS AND DEFINITIONS

Refer to the general section 1232 INTERPRETATION & DEFINITIONS for abbreviations and definitions used throughout the specification.

The following abbreviations apply specifically to this section:

MPNZA Master Painters New Zealand Association Inc.

Documents

1.2 DOCUMENTS

Refer to the general section 1233 REFERENCED DOCUMENTS. The following documents are specifically referred to in this section:

Health and Safety in Employment Act 1992

MPNZA Specification manual

1.3 MANUFACTURER/SUPPLIER DOCUMENTS

Manufacturer's and supplier's documents related to this section are:

Resene One-Line specifications and product data manual
(hard copy or at www.resene.co.nz)

Resene Putting your safety first

Copies of the above literature are available from **Resene**

Telephone: 0800 **RESENE** (0800 737 363)

Warranties

1.4 WARRANTY - MANUFACTURER/SUPPLIER

Warrant this work under normal conditions of use against failure referring to the **Resene** Promise of Quality in the **Resene** One-Line specifications and product data manual.

Requirements

This painting specification is written based on information available at the time of writing.

1.5 NO SUBSTITUTIONS

Substitutions are not permitted to any specified **Resene** coating system, or associated components and products. Do not combine paints from different manufacturers in a paint system.

If in the applicator's own expertise and judgement an amendment to this specification is required, or where a substrate preparation, or required painting system is not covered in this specification, this shall be brought to the attention of the contract administrator and any amendment agreed before work proceeds any further.

1.6 QUALIFICATIONS

Painters to be experienced competent workers, familiar with the materials and the techniques specified and with the **Resene** coating systems and be members of the Master Painters New Zealand Association Inc.

The applicator is to have the necessary skill, experience and equipment to undertake the work. The applicator remains responsible for ensuring proper completion of the work.

Painters to be selected from the **Resene** Eco.Decorator programme. The **Resene** Eco.Decorator programme is designed to recognise a nationwide network of environmentally responsible, quality focussed painting contractors.

Refer to www.resene.co.nz/ecodecorator.htm for a list of Eco.Decorators in your area.

1.7 HEALTH AND SAFETY

Refer to and comply with the requirements of the Health and Safety in Employment Act 1992 including the obligation to:

- Eliminate hazards and if hazards cannot be eliminated or isolated, then minimise the hazards in this work by using the proper equipment and techniques as required by the MPNZA Painters hazard handbook and **Resene** Putting your safety first handbook.
- Supply protective clothing and equipment.
- Inform the contractor as well as the employees and others on site of those hazards and put in place procedures for dealing with emergencies.

- 1.8 SAFETY DATA SHEETS
Obtain from **Resene** (phone 0800 **RESENE**, or www.resene.co.nz) the safety data sheet for each product used and comply with the required safety procedures. Keep sheets on site.
- 1.9 **Performance**
RESENE INSPECTION
Permit representatives of **Resene** to inspect the work in progress and to take samples of their products from site if requested. **Resene** will take care when inspecting the work, but does not accept any responsibility for the proper completion of the work before or after such inspection.
- 1.10 INSPECTION OF THE WORK
Inspection of the whole of the work at each of the stages set out in SELECTIONS may be made. Agree on a programme that will facilitate such inspection, including notification when each part and stage of the work is ready for inspection.
2. **PRODUCTS**
- 2.1 **Materials**
MATERIALS GENERALLY
Do not combine paints from different manufacturer's in a paint system.
Use only Resene products (which are guaranteed for consistency and performance under AS/NZS ISO 9001 and APAS) prepared, mixed and applied as directed in the Resene One-Line Specifications and Product Data Manual. This specification has been written using where practical and available both low/no VOC and Environmental Choice approved products.
- 2.2 EXPOSED DARK COLOURS
Darker colours in areas of high sun exposure place significant stress on the coating and substrate. **Resene** 'CoolColour' technology reduces heat absorption of a wide range of colours. Contact your local Resene Representative or visit www.resene.co.nz for more information or visit www.resene.co.nz/coolcolour. View a list of Resene colours that can be made using Resene CoolColour technology at www.resene.co.nz/colourlibrary.
- 2.3 THINNERS/ADDITIVES
Use only if and when expressly directed by Resene for their particular product in a particular application. Always wear gloves when handling any solvents including turpentine as harmful chemicals may be absorbed into the body through the skin.
- 2.4 **Accessories**
ACCESSORIES
Contact your local **Resene ColorShop** for a full range of accessories and usage advice.
3. **EXECUTION**
- 3.1 **Conditions**
EXECUTION
To conform to required trade practice, which shall be deemed to include those methods, practices and techniques contained in the Master Painters New Zealand Association Inc. Specification manual.
- 3.2 TREATED SURFACES
Where surfaces have been treated with preservatives or fire retardants, check with the treatment manufacturer that coating materials are compatible with the treatment and do not inhibit its performance. If they are not compatible, obtain instructions before proceeding.
- 3.3 ANCILLARY SURFACES
The descriptions of areas in schedules and elsewhere are of necessity simplified. Coat ancillary exposed surfaces to match similar or adjacent materials or areas, except where a fair-faced natural finish is required or items are completely prefinished. In cases of doubt obtain written instructions before proceeding.
- 3.4 HARDWARE
Do not paint hinges or hardware that cannot be removed. Before commencing work carefully remove hardware, fixtures and fittings, set aside where they cannot be damaged or misplaced and replace on completion. Refer to SELECTIONS for hardware, fixtures and fittings for removal.

- 3.5 PROTECTION
Supply, lay and fix dropsheets, coverings and masking necessary to protect adjoining, fixtures, fittings and spaces from paint drops, spots, spray and damage.
- 3.6 **Application - preparatory work**
SURFACE PREPARATION
Refer to the **Resene** One-Line specifications and product data manual for surface preparation sheets (or obtain them by phoning 0800 **RESENE**, or at www.resene.co.nz) listed in the materials systems schedule clauses. Carry out the preparatory work required by them for each of the substrates.
- 3.7 SHARP EDGES, CRACKS AND HOLES
Remove and/or repair sharp edges, cracks and holes if present, as outlined in the preamble of the **Resene** One-Line specifications and product data manual.
Elastomeric sealants, if used, should not be painted. The paint film will not match the flexibility of the sealant and may severely limit its effectiveness.
- 3.8 REMEDIAL WORK
If any substrate or surface, that even with the preparation work called for in this section, cannot be brought up to a standard that will allow painting or clear finishing of the required standard then do not proceed until remedial work is carried out.
- 3.9 GAP FILLING
Make good cracks, holes, indented and damaged surfaces. Use suitable gap fillers to match the surface being prepared. Any special priming requirements of the fillers must be satisfied. Allow to dry or set before sanding back level with the surface. Prime or seal timber before using putty.
Exterior and wet areas: Use only Portland cement base or water-insoluble organic base gap fillers.
- 3.10 OFF-SITE WORK
Carry out this work under cover in a suitable environment with suitable lighting. Store items, both before and after coating, in a clean, dry area protected from the weather and mechanical damage, properly stacked and spaced to allow air circulation and to prevent sticking.
- 3.11 PRIMING JOINERY
Pre-treat any cut surfaces of preservative treated timber before priming. Ensure L.O.S.P. treated joinery has dried sufficiently to lose solvent odour. Pre-treat bare timber with **Resene** TimberLock (see Data Sheet D48) to improve the durability of subsequent coats.
Liberal coat end grain, allow to soak in and then recoat.
- 3.12 CONCEALED JOINERY SURFACES
Where off-site coatings are specified they must be applied to surfaces including those concealed when incorporated into the building.
- 3.13 CONCEALED METAL SURFACES
Apply primer to suit the coating system to surfaces which will be concealed when incorporated into the building.
- 3.14 EXTERNAL DOORS
Prime or seal and paint bottom edges before hanging.
- 3.15 BEAD GLAZING
Stained, varnished, or painted joinery to have the first two coats, or the primer and one undercoat, applied to rebates and beads before glazing.
- 3.16 PUTTY FRONTING
According to the putty manufacturer's instructions allow putty to set, then prime with **Resene** Wood Primer (see Data Sheet D40). Fully protect the putty by completing the **Resene** coating system as soon as it is sufficiently firm.
- 3.17 **Application - generally**
PAINTING GENERALLY
Comply with the **Resene** One-Line specifications and product data manual data sheets and the additional requirements of this work section.

Ensure large wall areas that require more than one container of paint per coat, have enough paint boxed (mixed) together to complete the final coat. This will not apply if a single factory batch of paint, rather than shop tinted paint, is applied.

3.18 MIXING

Although generally supplied ready-mixed, thoroughly mix paints. Lift any settled pigment and ensure the paint is homogenous.

3.19 ENVIRONMENT

Defer painting of exterior surfaces until weather conditions are favourable - warm dry days without frost or heavy dews. Avoid painting in direct sunlight any surfaces that absorb heat excessively. As far as possible apply paint in the temperature range 15°C to 25°C. If temperatures fall outside the range of 10°C and 35°C do not paint unless paints with the necessary temperature tolerance have been specified. Do not apply solvent borne paint if moisture is present on the surface.

3.20 SEQUENCE OF OPERATIONS

Painting work to generally follow the following sequences:

- Complete surface preparation before commencing painting.
- Apply primers, sealers, stains, undercoats, paints and clear coatings in the sequences laid down by **Resene**.
- Allow the full drying time between coats laid down by **Resene**.
- Do not expose primers, undercoats and intermediate coats beyond **Resene's** recommendations before applying the next coat.
- Finish broad areas before painting trim.
- Ensure batch numbers of tins are matched for whole areas.
- Internally, paint ceilings before walls and walls before joinery, trim and other items.

3.21 APPLICATION

Select brush, roller, or pad and apply coatings to the requirements of **Resene** to obtain a smooth, even coating of the specified thickness, uniform gloss and colour.

3.22 LIGHTLY SAND

Lightly sand primers, sealers, undercoats and intermediate coats to remove dust pick-up, protruding fibres and coarse particles. Complete by removing dust immediately before applying the next coat.

3.23 DEFECTIVE WORK

Correct defective work immediately and recoat as required, following precisely the **Resene** system being applied.

3.24 EACH COAT

Each coat of paint and the completed paint system to have the following qualities and properties:

- Uniform finish, colour, texture, sheen and hiding power and the proper number of coats applied.
- No blemishes such as runs, sags, crinkling, fat edges, entrained paint skins, hairs, dust, bare or starved patches, cracks, brush marks, ladder marks and blistering.
- Proper covering of corners, crannies, thin edges, cracks, end grain and other difficult places of application.

Completion

3.25 CLEAN

Clean adjoining surfaces, glass and fittings of any paint contamination. Clean off glass indicators at the completion of the building works. Clean glass inside and out to a shining finish. Use the Resene Washwise on site 'paint equipment clean-up water' reclamation system to minimise the environmental impact of cleaning paint application tools.

3.26 LEAVE

Leave the whole of this work uniform in gloss and colour, of correct thickness, free from painting defects, clean and unmarked and to the standard required by following procedures.

3.27 REMOVE

Remove dropsheets, coverings and masking to leave surrounding surfaces and areas clean, tidy and undamaged. Remove debris, unused materials and elements from the site.

3.28

REPLACE

Replace hardware without damage to it or the adjoining surface and leave hardware properly fitted and in working order.

3.29

DISPOSAL OF PAINTS AND THINNERS

Note: The use and disposal of paint and thinners represents a significant environmental hazard.

Ensure all paint and thinners are disposed of in the following manner:

- When requested hand over part used paint containers to client for maintenance touch ups.
- Recycle leftover paint at a Resene ColorShop as part of the Resene "Paintwise programme". Contact your local Resene ColorShop for details or view information online at www.resene.co.nz/paintwise.htm.
- Donate left over paint to local community groups.
- Solvent based paints, paint thinners, turpentine, mineral spirits and solvents require special disposal procedures. Do not pour down sewer or storm water drains, sinks or into the ground. If they cannot be recycled they must be disposed of in a refuse dump licensed to take toxic waste.

3.30

MAINTENANCE

Good maintenance of coating systems involves a routine of regular cleaning as well as regular inspections.

Regular inspections of the coating systems are recommended to identify breakdown, accidental damage to or undesirable deterioration of the paint.

Refer the Resene Caring for your paint finish brochure and the Resene website, www.resene.co.nz/comm/services/maintenance.htm.

7126RH RINNAI HOT WATER SYSTEMS

1. GENERAL

This section relates to the supply and installation of **Rinnai New Zealand Limited** hot water systems.
It includes:

- Rinnai gas water heating units
- Rinnai storage and electric water heaters
- Rinnai supplied HJ Cooper storage and electric water heaters

Documents

1.1 DOCUMENTS

Refer to the general section 1233 REFERENCED DOCUMENTS. The following documents are specifically referred to in this section:

NZBC C/AS1-AS7	Protection from fire
NZBC G10/AS1	Piping for gas used as an energy source
NZBC G12/AS1	Water supplies
AS/NZS 1596	Storage and handling of LP Gas
AS/NZS 3823.1.1	Performance of electrical appliances - Air conditioners and heat pumps - Part 1.1: Non-ducted air conditioners and heat pumps - Testing and rating for performance
AS/NZS 3823.1.2	Performance of electrical appliances - Air conditioners and heat pumps - Part 1.2: Ducted air conditioners and air-to-air heat pumps - Testing and rating for performance
AS/NZS 3823.2	Performance of electrical appliances - Air conditioners and heat pumps - Energy labelling and minimum energy performance standard (MEPS) requirements
NZS 4603	Energy efficiency - Domestic type hot water systems
NZS 4602	Low pressure copper thermal storage electric water heaters
NZS 4607	Installation of thermal storage electric water heaters: valve vented systems
AS/NZS 5601.1: 2010	Gas installations Part 1: General installations
Electricity (Safety) Regulations 2010	
Gas (Safety and Measurement) Regulations 2010	
Plumbers, Gasfitters and Drainlayers Act 2006	

1.2 MANUFACTURER/SUPPLIER DOCUMENTS

Manufacturer's and supplier's documents relating to work in this section are:

Rinnai Operation and Installation Guides

Manufacturer/supplier contact details

Company: **Rinnai New Zealand Limited**

Web: www.rinnai.co.nz

Email: info@rinnai.co.nz

Telephone: 0800 RINNAI (0800 746 624)

Warranties

1.3 WARRANTY - MANUFACTURER/SUPPLIER

Provide a material manufacturer/supplier warranty:

The manufacturer/supplier warranty period will depend on the type, model, parts, labour and application of the selected product. Refer to Rinnai New Zealand Limited for confirmation of appropriate warranty details.

- Provide this warranty on the Rinnai New Zealand Limited standard form.
- Commence the warranty from the date of practical completion of the contract works.

1.4 WARRANTY - INSTALLER

Provide an installer warranty:

The installer warranty period will depend on the type, model, parts, labour and application of the selected product. Refer to Rinnai New Zealand Limited for confirmation of appropriate warranty details.

- Provide this warranty on the installer standard form.
- Commence the warranty from the date of practical completion of the contract works.

Requirements

1.5 NO SUBSTITUTIONS

Substitutions are not permitted to any specified Rinnai products, or associated products, components or accessories.

- 1.6 **COMPLY**
Comply with the Gas (Safety and Measurement) Regulations 2010, Electricity (Safety) Regulations 2010 and the network utility operator's requirements. Give notices for inspections and carry out tests as required.
- 1.7 **QUALIFICATIONS**
Gasfitters to be experienced competent workers, familiar with the materials and the techniques specified. Carry out all work under the direct supervision of a Certifying Gasfitter under the Plumbers, Gasfitters and Drainlayers Act 2006.
- 1.8 **INFORMATION FOR MAINTENANCE MANUAL**
Supply maintenance manual information to requirements set out in the 1239 OPERATION & MAINTENANCE section.
- Performance**
- 1.9 **FINAL INSPECTION AND TEST**
Submit the work for inspection and test and prove to the satisfaction of the network utility operator that the installation complies with all Acts and Regulations and has been tested for leakage and proved to be sound. Testing should be at the time of completion. Confirm this timing before carrying out any tests. Test and demonstrate the system according to manufacturer's specification.
- 1.10 **GAS CERTIFICATE OF COMPLIANCE**
Provide a Certificate of Compliance (CoC) as required by the Gas (Safety and Measurement) Regulations 2010 to the owner, and when required provide a copy to the energy supplier before connection.
- 1.11 **GAS SAFETY CERTIFICATION**
Provide a Gas Safety Certificate (GSC) as required by the Gas (Safety and Measurement) Regulations 2010 and provide a copy to the owner and when required the BCA. To be provided at completion of the work, prior to Practical Completion.
- 1.12 **APPLIANCE COMPLIANCE**
Supplier to provide a Supplier Declaration of Compliance (SDoC) in accordance with the requirements of the Gas (Safety and Measurement) Regulations 2010.
- 2. PRODUCTS**
- Materials - hot water gas heating units**
- 2.1 **CONTINUOUS FLOW GAS HOT WATER HEATING UNIT**
Rinnai INFINITY® continuous flow gas hot water heating unit with an integral gas burner. Water temperature electronically preset by digital controllers where selected. Refer to SELECTIONS for controller type.
- Components**
- 2.2 **FLUES**
Matching Rinnai Flue system.
- 2.3 **SECURITY BRACKET**
Rinnai INFINITY® security bracket.
- 2.4 **RECESS BOX**
Rinnai INFINITY® recess box for housing the external Rinnai INFINITY® unit, pipe work and power supply behind a hinged door.
- 2.5 **PIPE COVER**
Rinnai INFINITY® pipe cover (where a recess box is not being used), attaches to the base of the Rinnai INFINITY® unit.
- 3. EXECUTION**
- Installation - general**
- 3.1 **HANDLE AND STORE**
Handle and store units, cylinders, 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 according to manufacturer's instructions.

- 3.2 **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.
- 3.3 **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.
- 3.4 **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.
- 3.5 **PIPE SIZE**
Plumber to check and confirm adequate pipe size, incoming mains and meter on site as a part of the installation. Pipe sizing calculation to NZBC G12/AS1, table 4.
- 3.6 **Installation - gas hot water systems**
INSTALL CONTINUOUS FLOW GAS HOT WATER HEATING UNIT
Install Rinnai INFINITY™ continuous flow gas hot water heating unit complete with the necessary fittings to Rinnai requirements and to NZBC G12/AS1, 6.11, Water heater installation. Install flue (if applicable) to Rinnai details and requirements and digital controllers in location specified. Install in Rinnai recess box with security bracket where specified. Refer to section 7221 GAS APPLIANCES for installation of gas appliances.
- 3.7 **INSTALL GAS APPLIANCES**
Fit and connect gas appliances complete with flues as required to the appliance manufacturer's requirements and AS/NZS 5601.1. Also refer to section 7221 GAS APPLIANCES for installation.
- 3.8 **Completion**
REPLACE
Replace damaged or marked elements.
- 3.9 **LEAVE**
Leave work to the standard required by following procedures.
- 3.10 **REMOVE**
Remove debris, unused materials and elements from the site.

7411 RAINWATER SPOUTING SYSTEMS

1. GENERAL

This section relates to rainwater disposal systems including spouting and downpipes:
- metal

Documents

1.1 DOCUMENTS REFERRED TO

Documents referred to in this section are:

NZBC E1/AS1	Surface water
AS 1273	Unplasticised PVC (uPVC) downpipe and fittings for rainwater
NZMRM CoP	NZ metal roof and 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 ABBREVIATIONS AND TERMS

The following abbreviations are used throughout this part of the specification:

BMT	Base metal thickness
MRM	New Zealand Metal Roofing Manufacturers Inc
Spouting	Roof gutter bracketed off the roof edge or fascia.
Gutter	Internal gutter or gutter formed as integral part of the roof fabric.

Requirements

1.3 QUALIFICATIONS

Work to be carried out by tradesmen experienced, competent and familiar with the materials and techniques specified.

Warranties

1.4 WARRANTY

Warrant this work under normal environmental and use conditions against:

3 years:	For weatherproofing by substandard workmanship:
From:	Commence the warranty from the date of completion of installation
Form:	Installers standard warranty form

1.5 WARRANTY - MATERIAL

Warrant this work under normal environmental and use conditions:

10 Years	For failure of coating adhesion
10 Years	For weatherproofing by material penetration
Form:	Manufacturer's standard warranty form
From:	Commence the warranty from the date of completion of installation

Performance

1.6 TEST

Test the completed rainwater disposal system with water to ensure spoutings are laid to correct falls, that both spouting and downpipes are unobstructed and that no ponding occurs in spoutings.

2. PRODUCTS

Materials - metal

2.1 SPOUTING

Complete with matching brackets to suit spouting and screws. All exposed brackets to be colour matched before installation. Brackets to be hot-dipped galvanised, zincalume, aluminium, stainless steel or brass as specified and to suit application. Electroplated components are not acceptable.

2.2 DOWNPIPES

Complete with stand-off brackets, screw fixed.

Components

2.3 DROPPERS

uPVC droppers, compatible with spouting material and sized to fit inside the downpipe.

- 2.4 **FASTENERS GENERALLY**
Minimum Class 4 durability and not less than the roofing material being fixed.
- 2.5 **RIVETS**
Sealed aluminium, minimum diameter 4mm.
- 2.6 **SEALANT**
MS Polymer sealant.
3. **EXECUTION**
- Conditions**
- 3.1 **HANDLE AND STORE**
Handle and store downpipes, spouting 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. Avoid exposure to sunlight if strippable film is still on the product.
- 3.2 **SUBSTRATE**
Check that fascias, bargeboards or cladding are level and true to line and face and will allow work of the required standard without distortion to the product alignment. Do not proceed until they are up to standard.
- Application - metal**
- 3.3 **INSTALLATION GENERALLY**
Install to NZMRM CoP NZ metal roof and wall cladding Code of Practice recommendations where not otherwise specified.
- 3.4 **INSTALL PRE-PAINTED METAL SPOUTING**
Establish minimum falls necessary (minimum 1:500, 2mm in 1 metre) to outlets to prevent ponding and screw fix brackets true-to-line at 750mm centres maximum for external gutters less than 175mm wide and at 600mm centres maximum for gutters 175mm to 300mm wide. In areas where snow fall is possible the centres should be reduced to 600mm maximum. Lap spouting joints a minimum of 40mm and silicone seal and pop rivet to the manufacturer's recommendations. Cut out neatly for and fit the pre-formed downpipe dropper and silicone seal around the lap joint. All installation to NZMRM CoP NZ metal roof and wall cladding Code of Practice recommendations.
- 3.5 **INSTALL DROPPERS**
Install either 2 outlets or one outlet and an overflow to each spouting section. Cut out neatly for and fit the pre-formed downpipe dropper and rivet and seal around the joint. All installation to NZMRM CoP NZ metal roof and wall cladding Code of Practice recommendations.
- 3.6 **INSTALL DOWNPIPES**
Form downpipes complete with angle bends as needed with joints lapped and sealed. Screw fix with pipe clips to rigidly stand off the wall plumb and discharging into stormwater gully or inlet pipe. All installation to NZMRM CoP NZ metal roof and wall cladding Code of Practice recommendations.
- 3.7 **INSTALL OUTLETS AND OVERFLOWS**
Install outlets and overflows where required to NZMRM CoP NZ metal roof and wall cladding Code of Practice, clause 8.6.2 Outlets and overflows.
- Completion**
- 3.8 **REPLACE**
Replace damaged or marked elements.
- 3.9 **LEAVE**
Leave the whole of this work discharging completely and freely into the stormwater system and free of all debris. Leave work to the standard required by following procedures.
- 3.10 **REMOVE**
Remove debris, unused materials and elements from the site.

7701 ELECTRICAL BASIC

1. GENERAL

This section relates to the wiring for domestic and small scale commercial installations, including:

- power
- lighting
- electrical automation
- security system
- complete with componentry
- electrically-powered fittings
- fire rated sealers, liners and accessories

1.1 ABBREVIATIONS AND DEFINITIONS

Refer to the general section 1232 INTERPRETATION & DEFINITIONS for abbreviations and definitions used throughout the specification.

The following abbreviations apply specifically to this section:

CFL	compact fluorescent lamp
ELV	extra low voltage
GLS	general lighting service
IP	international (ingress) protection classification
LCD	liquid crystal display
LED	light emitting diode
MCB	miniature circuit breaker
NUO	Network Utility Operator
PCB	printed circuit board
PIR	passive infrared
RCBO	residual current-operated circuit breaker with over current protection
RCCB	residual current-operated circuit breakers
RCD	residual current device
SIA	security integration architecture
TPS	tough plastic sheathed
TCF	Telecommunications Carriers' Forum

Documents

1.2 DOCUMENTS

Refer to the general section 1233 REFERENCED DOCUMENTS. The following documents are specifically referred to in this section:

NZBC E2/AS1	External moisture
NZBC F6/AS1	Visibility in escape routes
NZBC F7/AS1	Warning systems
NZBC G4/AS1	Ventilation
NZBC G9/AS1	Electricity
AS/NZS 1125	Conductors in insulated electric cables and flexible cord
AS/NZS 1768	Lightning protection
AS/NZS 2201.1	Intruder alarm systems - Client's premises - Design, installation, commissioning and maintenance
AS 2293.1	Emergency escape lighting and exit signs for buildings - System design, installation and operation
AS 2293.3	Emergency escape lighting and exit signs for buildings - Emergency escape luminaires and exit signs
AS/NZS 3000	Electrical installations (known as the Australian/New Zealand Wiring Rules)
AS/NZS 3008.1.2	Electrical installations - Selection of cables - Cables for alternating voltages up to and including 0.6/1 kV - Typical New Zealand installation conditions
AS/NZS 3100	Approval and test specification-general requirements for electrical equipment
AS/NZS 3112	Approval and test specification - Plugs and socket-outlets
AS/NZS 3113	Approval and test specification - Ceiling roses
AS/NZS 3190	Approval and test specification - Residual current devices (current-operated earth-leakage devices)
AS/NZS 3350.1	Safety of household and similar electrical appliances - General requirements
AS/NZS 3439.3	Low-voltage switchgear and controlgear assemblies - Particular requirements for low-voltage switchgear and controlgear assemblies intended to be installed in places where unskilled persons have access for their use - Distribution boards

AS 3786	Smoke alarms
NZS 4514	Interconnected smoke alarms for houses
AS/NZS 5000.2	Electric cables - Polymeric insulated - for working voltages up to and including 450/750v
AS/NZS 60598.2.2	Luminaires - Particular requirements - Recessed luminaires
IEC 61643	Components for low voltage surge protection devices
Electricity (Safety) Regulations 2010	
TCF Premises Wiring Code of Practice 2011	

Warranties

1.3 WARRANTY

Warrant the complete electrical installation under normal environmental and use conditions against failure of materials and execution.

1 year: Warranty period

Requirements

1.4 COMPLY

Comply with the Electricity (Safety) Regulations 2010, AS/NZS 3000, AS/NZS 3008.1.2 and TCF Premises Wiring Code 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.

1.5 QUALIFICATIONS

Carry out work under the supervision of an electrical licensed supervisor.

1.6 SAFETY OF INSTALLATION - DESIGN BY ELECTRICIAN

Before installation work commences provide a declaration of conformity. The declaration of conformity is to comply with the Electrical (Safety) Regulations (2010), regulations 57 and 58. It must be signed by the designer of the installation.

1.7 ELECTRICAL CERTIFICATE OF COMPLIANCE

Supply a certificate of compliance (CoC) to the owner, and if required the NUO, as required by the Electricity (Safety) Regulations (2010), prior to connection.

- Arrange for the NUO to inspect before the meter installation, listed work inspection, polarity check and supply becoming live.
- Arrange for an inspector to inspect as required by regulation 70.

1.8 ELECTRICAL SAFETY CERTIFICATE

Provide an Electrical Safety Certificate (ESC), as required by the Electricity (Safety) Regulations 2010, to the owner and when required the BCA. To be provided at completion of the work, prior to Practical Completion.

2. PRODUCTS

2.1 CABLES

Tough plastic sheathed copper conductors to AS/NZS 5000.2, stranded above 1.0mm², 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 MCB rating, or produce an excessive voltage drop.

Lighting circuits:	Domestic: 1.5mm ² on 10 amp MCBs
Lighting circuits:	Commercial: 1.5mm ² on 16 amp MCBs
Power circuits:	2.5mm ² on 16 amp MCBs for domestic and unenclosed or unfilled cavity construction
	2.5mm ² on 16 amp MCBs for domestic insulated construction, or filled cavity
	2.5mm ² on 20 amp MCBs for unenclosed or unfilled cavity construction
	2.5mm ² on 16 amp MCBs for insulated construction, or filled cavity, or lengths over 30 metres

Hot water cylinder circuits: Single phase: 2.5mm² on 20 amp MCBs

Heat resistant cable for final connections to all heated appliances, and high temperature cable in ambient conditions that may be above 35°C.

2.2 DISTRIBUTION BOARD

Flush surface mount boards manufactured to AS/NZS 3439.3 and installed in accordance with AS/NZS 3000. Manufactured from engineering grade resin with a glow wire rating of 850°C, complete with neutral and earth busbars, and insulated comb phase bar. Distribution boards to have 20% spare capacity for future additions and alterations.

- 2.3 **CIRCUIT PROTECTION**
General requirements including main switch 63A or 100A. Residual current protection 30mA, ensure RCCBs' meet Type A and comply with AS/NZS 3190. MCBs to 4.5kA or 6kA rated.
- 2.4 **WALL BOXES**
Standard grid size or equivalent to be manufactured from plastic or metal, with 2 or more gang size to be metal with steel inserts for accessory securing screws. Screw fixed.
- 2.5 **SWITCH UNITS**
Single pole switches to be 16 amp minimum rated, double pole or intermediate to be 16 amp minimum rated. All switches to be 230 volt a.c. polycarbonate flushplate units. Refer to drawings/schedules for number of switches per unit, dimmer units, neon (indicator or toggle) units and 2 way units.
- 2.6 **SWITCHED SOCKET UNITS**
10 amp, 230 volt flat 3 pin socket outlets fitted with safety shutters and manufactured to AS/NZS 3100, AS/NZS 3112 and AS/NZS 3113, single or multi gang as detailed.
- 2.7 **SURGE PROTECTION**
Protection for the homes appliances with IEC 61643 Class II surge protection devices fitted to the switchboard. For variable electronic equipment fit IEC 61643 Class III surge protection to switched socket outlets.
- 2.8 **EXHAUST FANS**
Ceiling, wall or duct mounted exhaust fans for ventilation to NZBC G4/AS1, and compliant with AS/NZS 3350.1.
3. **EXECUTION**
- 3.1 **DISTRIBUTION BOARD**
Fit to AS/NZS 3000 and board manufacturer's requirements. Recess into wall or surface mount and ensure fire containment properties of the enclosure are maintained.
- 3.2 **CIRCUIT PROTECTION**
Install MCBs at distribution board to AS/NZS3000 to protect each final sub circuit.
- 3.3 **EARTH BONDS**
Bond together and to earth all plumbing fittings not adequately isolated, to AS/NZS 3000, the Electricity (Safety) Regulations 2010 and the fitting manufacturer's requirements.
- 3.4 **MAIN EARTH**
Provide a plastic toby box to contain and protect the earth electrode. Fix the connecting earth wiring closely and securely against wall surfaces.
- 3.5 **EARTH LEAKAGE PROTECTION**
Install RCD protection to AS/NZS 3000.
- 3.6 **DOMESTIC INSTALLATIONS**
Install 30mA RCD protection at the distribution board for all final sub circuits to control socket outlets and lighting except for fixed or stationary cooking equipment, to AS/NZS 3000.
- 3.7 **HIGH RISK AREA INSTALLATIONS**
Install 30mA RCDs at the distribution board for areas not covered in Domestic installations, or using fixed wired RCD protected socket outlets in areas that may represent increased risk of electric shock to the user:
- Wet areas: bathrooms, laundries, kitchens.
 - Near pools and water features.
 - Where intended for use with cleaning equipment.
 - Hand-held tools subject to movement in use, i.e. work-shops, garages.

- 3.8 **SET-OUT**
The position of outlets and equipment shown on drawings is indicative of requirements. Confirm documents and site conditions are not in conflict with other services or features. 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.
- 3.9 **CABLING**
Install wiring systems to AS/NZS 3000. 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.
- 3.10 **CABLING CIRCUITS**
Install all circuits with the appropriately rated cable and circuit protection. Install with a maximum of 8 light switch units or 4 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.
- 3.11 **SURGE PROTECTION**
Install surge protection devices to manufacturer's requirements and in accordance with AS/NZS 3000 and AS/NZS 1768. When fitting IEC 61643 Class II protection at the switchboard, protect the device by a dedicated MCB.
- 3.12 **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 SELECTIONS for schedules of fittings.
- 3.13 **BATHROOM ELECTRICAL FIXTURES**
Install all electrical fixtures. Connect the following bathroom and toilet electrical items:
- Heated towel rails: Install to manufacturers requirements and installed in accordance with AS/NZS 3000 and the NZBC G9/AS1
- Mirror demisters: Locate centrally above the wash hand basin(s). Connect wiring to room lighting unless specified otherwise.
- Exhaust fans: Install exhaust fans to manufacturer requirements. Installed in accordance with AS/NZS 3000 and NZBC G4/AS1.
- 3.14 **LABELLING**
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.
- 3.15 **Completion**
COMPLETION
Leave installation operating correctly, with equipment clean and operational.

Approved Document for New Zealand Building Code Structure Clause B1

Prepared by the Building Industry Authority
This Approved Document is prepared by the
Building Industry Authority, which is a statutory
body established by the Building Act 1991.



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References (Revised by Amendment 4)

For the purposes of New Zealand Building Code compliance, acceptable reference documents include only the quoted edition and specific amendments as listed below.

Standards New Zealand		Where quoted
NZS/AS 1650: 1989	Hot-dipped galvanised coatings on ferrous articles	AS2 1.0.5 b), AS3 1.8.6
NZS 1900:-	Model building bylaw	
Ch 11: 1985	Special structures. Division 11.2 Farm buildings <i>Amend: 1</i>	VM1 13.1
NZS 3101:-	Concrete structures standard	
Part 1: 1995	The design of concrete structures <i>Amend: 1, 2</i>	VM1 3.1, 11.1
NZS 3106: 1986	Code of practice for concrete structures for the storage of liquids <i>Amend: 1, 2</i>	VM1 3.2
NZS 3107: 1978	Specification for precast concrete drainage and pressure pipes	VM1 11.1
NZS 3109: 1997	Concrete construction	AS3 1.8.2, 1.8.5 b), 2.2.1 c), 2.2.3
NZS 3112:-	Methods of test for concrete	
Part 2: 1986	Tests relating to the determination of strength of concrete <i>Amend: 1</i>	AS3 1.8.3 c)
NZS 3402: 1989	Steel bars for the reinforcement of concrete	AS3 1.8.5
NZS 3404:-	Steel structures standard	
Part 1: 1997	Steel structures standard	VM1 5.1
NZS 3421: 1975	Specification for hard drawn mild steel wire for concrete reinforcement	AS3 1.8.5
NZS 3422: 1975	Specification for welded fabric of drawn steel wire for concrete reinforcement	AS3 1.8.5
NZS 3441: 1978	Specification for hot-dipped zinc-coated steel coil and cut lengths <i>Amend: 1, 2</i>	AS2 1.0.5 c), AS3 1.7.9
NZS 3601: 1973	Metric dimensions for timber <i>Amend: 1, 2</i>	AS2 1.0.4
NZS 3603: 1993	Timber structures standard <i>Amend: 1, 2</i>	VM1 6.1, VM4 5.3.1
NZS 3604: 1999	Timber framed buildings <i>Amend: 1</i>	AS1 3.1, AS2 2.3.5, 2.3.6, AS3 1.1.1, 1.9.1 b), 1.9.2, 1.9.5, 2.2.1 b)

Amend 5
Jul 2001

		Where quoted
NZS 3605: 1992	Specification for timber piles and poles for use in building	VM4 5.3.1
NZS 3631: 1988	New Zealand national timber grading rules	AS2 1.0.3
NZMP 3640: 1992	Specification of the minimum requirements of the NZ Timber Preservation Council Inc <i>Amend: 1</i>	VM4 5.3.1, AS2 1.0.5 c)
NZS/AS 3725: 1989	Loads on buried concrete pipes	VM1 11.1
NZS 4203: 1984	Code of practice for general structural design and design loadings for buildings <i>Amend: 1</i>	VM1 1.4.3, 2.1
NZS 4203: 1992	Code of practice for general structural design and design loadings for buildings <i>Corrigendum: 1</i>	VM1 1.4.2, 2.2, VM4 2.0.1, B1.0.2
NZS 4210: 1989	Code of practice for masonry construction: materials and workmanship <i>Amend: 1, 2</i>	AS3 1.8.1, 1.8.3 f) and g)
NZS 4211: 1985	Specification for performance of windows <i>Amend: 1, 2, 3</i>	VM1 12.1
NZS 4219: 1983	Specification for seismic resistance of engineering systems in buildings <i>Amend: 1, 2</i>	VM1 14.1
NZS 4223:- Part 1: 1985	Code of practice for glazing in buildings The selection and installation of glass in buildings <i>Amend: 1, 2</i>	AS1 7.1
Part 2: 1985	The selection and installation of manufactured sealed insulating glass units <i>Amend: 1, 2</i>	
Part 3: 1999	Human impact safety requirements	
NZS 4229: 1999	Concrete masonry buildings not requiring specific engineering design <i>Amend: 1</i>	AS1 2.1, AS3 1.1.1, 1.8.4, 1.9.2, 1.9.5, 2.2.1 b)
NZS 4230:- Part 1: 1990	Code of practice for the design of masonry structures Structures <i>Amend: 1, 2</i>	VM1 4.1
Part 2: 1990	Commentary <i>Amend: 1, 2</i>	VM1 4.1
NZS 4251:- Part 1: 1998	Solid plastering Cement plasters for walls, ceilings and soffits	AS1 5.1
NZS 4297: 1998	Engineering design of earth buildings	VM1 8.1
NZS 4299: 1998	Earth buildings not requiring specific design <i>Amend: 1</i>	AS1 4.1

		Where quoted
NZS 4402:-	Methods of testing soils for civil engineering purposes. Parts 2, 4 and 5:1986 and 1988	VM1 11.1
Part 2:	Soil classification tests	
Test 2.2: 1986	Determination of liquid limit	Definitions
Test 2.6: 1986	Determination of the linear shrinkage	Definitions
Part 4:	Soil compaction tests	
Test 4.2.3: 1988	Relative densities	VM4 4.1.1
NZS 4431: 1989	Code of practice for earth fill for residential development	VM1 10.1
	<i>Amend: 1</i>	
NZS 4452: 1986	Code of practice for the construction of underground pipe sewers and drains	AS1 6.1
	<i>Amend: 1</i>	
NZS 7401: 1985	Specification for solid fuel burning domestic appliances	AS3 2.1
	<i>Amend: 1</i>	
NZS 7421: 1990	Specification for installation of solid fuel burning domestic appliances	AS3 2.1, 2.2.4
NZS 7643: 1979	Code of practice for the installation of unplasticized PVC pipe systems	AS1 6.2
	<i>Amend: 1</i>	
British Standards Institution		
BS 8004: 1986	Code of practice for foundations	VM4 4.0.3
Standards Australia		
AS 1214: 1983	Hot-dip galvanised coatings on threaded fasteners (ISO metric coarse thread series)	AS2 1.0.5 b)
AS/NZS 1664:-	Aluminium structures	
Part 1: 1997	Limit state design	VM1 7.1
	<i>Amend: 1</i>	
Part 2: 1997	Allowable stress design	VM1 7.2
	<i>Amend: 1</i>	
AS 2159: 1995	Rules for the design and installation of piling (known as the SAA Piling Code)	VM4 4.0.3
	<i>Amend: 1</i>	
AS/NZS 4600: 1996	Cold-formed steel structures	VM1 5.2
American Society of Testing and Materials		
ASTM D1143: 1981	Test method for piles under static axial compressive load	VM4 4.0.3
New Zealand Geomechanics Society		
	Guidelines for the field descriptions of soils and rocks in engineering use. Nov 1988	VM1 11.1
Transit New Zealand		
	Bridge manual: Design and evaluation: 1994	VM1 11.1
	<i>Amend: 1</i>	

References

Amend 3
Jul 2001

For the purposes of New Zealand Building Code compliance, acceptable reference documents include only the quoted edition and specific amendments as listed below.

Standards New Zealand			Where Quoted	
	NZS 3101:-	Concrete structures standard		
	Part 1: 1995	The design of concrete structures	AS1 3.1.1	
	NZS 3602:-			
Amend 5 Apr 2004	Part 1: 1995	Timber and wood-based products for use in building	AS1 3.2.2	Amend 5 Apr 2004
Amend 4 Apr 2004	Part 1: 2003	Timber and wood-based products for use in building	AS1 3.2.1	
Amend 3 Jul 2001	NZS 3604: 1999	Timber framed buildings	AS1 3.2.3	Amend 5 Apr 2004
		<i>Amend: 1</i>		
	NZS 4251:-	Solid plastering		
	Part 1: 1998	Cement plaster for walls, ceilings and soffits	AS1 3.3.1	
	NZS 4297: 1998	Engineering design for earth buildings	AS1 3.4.1	
Amend 2 Dec 2000	NZS 4299: 1998	Earth buildings not requiring specific design	AS1 3.4.1	
		<i>Amend: 1</i>		

References

Amend 4
Jul 2001

For the purposes of New Zealand Building Code compliance, acceptable reference documents include only the quoted edition and specific amendments as listed below.

Amend 4
Jul 2001

Standards New Zealand

- NZS/AS 1657: 1992 Fixed platforms, walkways, stairways and ladders – Design, construction and installation (known as the SAA Code for fixed platforms, walkways, stairways, and ladders)
- NZS 3114: 1987 Specification for concrete surface finishes
Amend: 1
- NZS 3116: 1991 Interlocking concrete block paving
- NZS 4121: 2001 Design for access and mobility – Buildings and associated facilities

Standards Australia

- AS 2890:- Off street parking
- Part 1: 1993 Car parking facilities
- Part 2: 1989 Commercial vehicle facilities
- AS/NZS 3661:- Slip resistance of pedestrian surfaces
- Part 1: 1993 Requirements
- Part 2: 1994 Guide to the reduction of slip hazards

British Standards Institution

- BS 585:- Wood stairs.
- Part 1: 1989 Specification for stairs with closed risers for domestic use, including straight and winder flights and quarter or half landings
- BS 5395:- Stairs, ladders and walkways
- Part 2: 1984 Code of practice for the design of helical and spiral stairs

Where quoted

AS1 11.0.3

AS1 Table 2

AS1 Table 2

AS1 11.0.1,
12.0.2

AS1 10.1, 10.2
AS1 11.0.2

VM1 1.0.2,
AS1 2.1.1, 3.1.4,
Table 2
AS1 2.1.3

AS1 4.5.3

AS1 4.4.1

References

Amend 1
Sep 1993

For the purposes of New Zealand Building Code compliance, acceptable reference documents include only the quoted edition and specific amendments as listed below.

	Standards New Zealand	Where quoted
	NZS/BS 970:- Specification for wrought steels for mechanical and allied engineering purposes	
	Part 1: 1991 General inspection and testing procedures and specific requirements for carbon, carbon manganese, alloy and stainless steels	AS1 Table 4, Table 6
Amend 1 Sep 1993	NZS/BS 1560:- Circular flanges for pipes, valves and fittings (class designated)	
	Part 3:- Steel, cast iron and copper alloy flanges	
	Section 3.1: 1989 Specification for steel flanges	AS1 Table 3
	NZS/AS 2033: 1980 Installation of polyethylene pipe systems	AS1 Table 3
	NZS/BS 2494: 1990 Specification for elastomeric seals for joints in pipework and pipelines	AS1 Table 3
	NZS 3107: 1978 Specification for precast concrete drainage and pressure pipes	AS1 Table 1
	NZS 3124: 1987 Specification for concrete construction for minor works	AS1 Table 6
	NZS 3302: 1983 Specification for ceramic pipes, fittings and joints	AS1 Table 1, Table 3
	NZS 3441: 1978 Specification for hot-dipped zinc-coated steel coil and cut lengths <i>Amend: 1, 2</i>	AS1 Table 4, Table 6
Amend 2 Aug 1994		
	NZS 3604: 1999 Timber framed buildings <i>Amend: 1</i>	AS1 3.9.7
Amend 5 July 2001		
	NZS 4229: 1999 Concrete masonry buildings not requiring specific design <i>Amend: 1</i>	AS1 3.9.7
Amends 1 and 4		
	NZS 4442: 1988 Welded steel pipes and fittings for water, sewage and medium pressure gas	AS1 Table 1, Table 3
	NZS 4452: 1986 Code of practice for the construction of underground pipe sewers and drains <i>Amend: 1</i>	AS1 3.9.8
Amend 1 Sep 1993		
	NZS 7604: 1981 Specification for high density polyethylene drain and sewer pipe and fittings	AS1 Table 1
	NZS 7609:- Acrylonitrile butadiene styrene (ABS) pipes and fittings for pressure applications	
	Part 1: 1990 Pipes <i>Amend: A</i>	AS1 Table 1, Table 3
Amend 1 Sep 1993		
	Part 2: 1990 Solvent cement fittings <i>Amend: A</i>	AS1 Table 1, Table 3

		Where quoted	
Amend 1 Sep 1993	NZS 7642: 1971	Specification for unplasticised PVC soil and ventilating pipe, fittings and accessories <i>Amend: A, 1, 1A, 2, 2A</i>	AS1 Table 4
	NZS 7643: 1979	Code of practice for the installation of unplasticised PVC pipe systems <i>Amend: 1</i>	AS1 Table 3, 3.9.8
	NZS 7649: 1988	Unplasticized PVC sewer and drain pipe and fittings	AS1 Table 1
British Standards Institution			
Amend 1 Sep 1993	BS 1470: 1987	Specification for wrought aluminium and aluminium alloys for general engineering purposes: plate, sheet and strip <i>Amend: 6032</i>	AS1 Table 4, Table 6
	BS 2870: 1980	Specification for rolled copper and copper alloys: sheet, strip and foil	AS1 Table 4, Table 6
	BS 6561: 1985	Specification for zinc alloy sheet and strip for building	AS1 Table 4, Table 6
Standards Association of Australia			
	AS 1254: 1991	Unplasticised PVC (UPVC) pipes and fittings for storm and surface water applications	AS1 Table 1, Table 3
	AS 1273: 1991	Unplasticised PVC (UPVC) downpipes and fittings for rainwater	AS1 Table 4, Table 6
	AS 1741: 1991	Vitrified clay pipes and fittings with flexible joints – sewerage quality	AS1 Table 1
Amend 1 Sep 1993	AS 2280: 1991	Ductile iron pressure pipes and fittings	AS1 Table 1, Table 3
Amend 4 Dec 2000	AS 3706:- Part 1: 1990	Geotextiles – Methods of test General requirements, sampling, conditioning, basic physical properties and statistical analysis	VM1 9.0.4
New Zealand Legislation			
	Resource Management Act 1991		VM1 2.1.2

References

For the purposes of New Zealand Building Code compliance, acceptable reference documents include only the quoted edition and specific amendments as listed below. Dates in brackets indicate that the Standard was reviewed and reissued without change that year.

		Where quoted
	Standards New Zealand	
	NZS/AS 1397: 1993 Steel sheet and strip – hot-dipped zinc-coated or aluminium/zinc coated	AS1 Table 2
	NZS 2295: 1988 Building papers (breather type) <i>Amend: A</i>	AS1 1.4.1 b)
	NZS/AS 2908:- Part 1: 1992 Cellulose-cement products Corrugated sheets	AS1 Table 2
	NZS 3403: 1978 Specification for hot-dip galvanized corrugated steel sheet for building purposes	AS1 Table 2
Amend 4 Jul 2001	NZS 3604: 1999 Timber framed buildings <i>Amend: 1</i>	VM1 1.1.2, 1.2.2, AS1 1.0.4 b), 2.5.2, Figure 1, Figure 3
Amend 3 Dec 2000	NZS 3617: 1979 Specification for profiles of weatherboards, fascia boards, and flooring	AS1 2.1.1
	NZMP 3640: 1992 Specification of the minimum requirements of the NZ Timber Preservation Council Inc. <i>Amend: 1</i>	AS1 2.3.2 a), 2.3.3 b)
	NZS 4203: 1992 General structural design and design loadings for buildings <i>Corrigendum: 1</i>	VM1 1.2.2, AS1 1.2
	NZS 4206: 1992 Concrete interlocking roofing tiles	AS1 Table 2
	NZS 4210: 1989 Code of practice for masonry construction: materials and workmanship <i>Amend: 1, 2</i>	AS1 2.2.3
	NZS 4211: 1985 Specification for performance of windows <i>Amend: 1, 2, 3</i>	AS1 3.1.2, 3.1.3
	NZS 4217:- Part 1: 1980 Pressed metal tile roofs Specification for roofing tiles and their accessories	AS1 Table 2
	Part 2: 1980 Code of practice for preparation of the structure and the laying and fixing of metal roofing tiles	AS1 Table 2
	NZS 4251:- Part 1: 1998 Solid plastering Cement plasters for walls, ceilings and soffits	AS1 2.3.2 c), 2.3.5 c)
Amend 3 Dec 2000	NZS 4299: 1998 Earth buildings not requiring specific design <i>Amend: 1</i>	AS1 2.6.1

British Standards Institution

BSCP 143:-	Code of practice for sheet roof and wall coverings
Part 5: 1964	Zinc
Part 12: 1970	Copper. Metric units
(1988)	<i>Amend: 863, 5193</i>
Part 15: 1973	Aluminium. Metric units
(1986)	<i>Amend: 4473</i>
BS 1521: 1972	Specification for waterproof building papers
	<i>Amend: 3519</i>
BS 3137: 1972	Methods for determining the bursting strength
(1995)	of paper and board
BS 6915: 1988	Specification for design and construction of fully
	supported lead sheet roof and wall coverings
BS 6925: 1988	Specification for mastic asphalt for building and
	civil engineering (limestone aggregate)

Where quoted

AS1 Table 2

AS1 Table 2

AS1 Table 2

AS1 2.3.5 b)

AS1 2.5.3

AS1 Table 2

AS1 Table 2,
5.1.3 a)**Standards Australia**Amend 3
Dec 2000

AS 2050: 1995	Fixing of roofing tiles
AS/NZS 2269: 1994	Plywood – structural
AS/NZS 4284: 1995	Testing of building façades

VM1 1.3.1

AS1 2.3.3 b)

VM1 1.1.1, 1.2.1

American Society for Testing and Materials

ASTM E96: 1992	Test methods for water vapour transmission
	of materials

AS1 1.4.1 c)

Building Research Association of New Zealand

BRANZ Bulletin 330: 1995	Thin flooring materials – 2. Preparation
	and laying. Appendix 1

AS1 6.0.2 d)

New Zealand Forest Research Institute

Measurement of moisture content of assembled timber framing: 1993

AS1 6.0.2 a)

References

For the purposes of New Zealand Building Code compliance, referenced documents shall be deemed to include any amendments issued prior to the date of the Approved Document as displayed at the foot of the page on which the references are listed.

Standards New Zealand

NZS 4214: 1977 Methods of determining the total thermal resistance of parts of buildings

American Society for Testing and Materials

ASTM C236: 1989 Standard test for steady state thermal performance of building assemblies by means of a guarded hot box

Building Research Association of New Zealand

BRANZ House Insulation Guide: 1995

Where quoted

AS1 Definitions,
1.1.2

AS1 1.1.2

AS1 1.1.3

References

For the purposes of New Zealand Building Code compliance, referenced documents shall be deemed to include any amendments issued prior to the date of the Approved Document as displayed at the foot of the page on which the references are listed.

New Zealand Legislation

Fencing of Swimming Pools Act 1987

Where quoted

AS1 3.1.1

References

For the purposes of New Zealand Building Code compliance, acceptable reference documents include only the quoted edition and specific amendments as listed below.

		Where quoted
	Standards New Zealand	
	NZS 3331: 1972 Specification for quality of vitreous china sanitary appliances	AS1 2.6.1
Amend 4 Jul 2001	NZS 4121: 2001 Design for access and mobility – Buildings and associated facilities	AS1 4.2.7
	Standards Australia	
	AS 1449: 1994 Wrought alloy steels – Stainless and heat-resisting steel plate, sheet and strip <i>Amend: 1</i>	AS1 2.3.4, 2.6.1
	AS 3588: 1989 Shower bases and shower modules	AS1 2.6.1
	Standards Australia/New Zealand	
	AS/NZS 1730: 1996 Washbasins	AS1 2.6.1
	AS/NZS 2023: 1995 Baths for ablutionary purposes	AS1 2.6.1

References

For the purposes of New Zealand Building Code compliance, referenced documents shall be deemed to include any amendments issued prior to the date of the Approved Document as displayed at the foot of the page on which the references are listed.

	Where quoted
Standards New Zealand	
NZS 4302: 1987 Code of practice for the control of hygiene in air and water systems in buildings	AS1 1.3.1 b)
NZS 4303: 1990 Ventilation for acceptable indoor air quality	AS1 1.3.1 a) d)
NZS 5261: 1996 The installation of gas burning appliances and equipment	AS1 2.3.1 b), 2.4.1 c), 3.0.1
Standards Australia	
AS 1668:- The use of mechanical ventilation and air-conditioning in buildings	
Part 2: 1991 Mechanical ventilation for acceptable indoor-air quality	AS1 1.3.1 a) c) i) ii) d) e) f), 1.3.2
New Zealand Government Departments	
Occupational Safety and Health	
Workplace exposure standards and biological exposure indices for New Zealand 1992	VM1 2.0.1
Chartered Institution of Building Services Engineers, London	
CIBSE Code Series A: 1971	
The commissioning of air distribution systems, high and low velocity	VM1 1.0.1

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Standards Association of New Zealand

NZS 6703: 1984 Code of practice for interior lighting design

Where quoted

VM1 1.0.1,
AS1 Table 2

References

Amend 1
Sep 1993

For the purposes of New Zealand Building Code compliance, acceptable reference documents include only the quoted edition and specific amendments as listed below.

Amend 2
Dec 1995

Amend 1
Sep 1993

Publications by Government Departments, New Zealand

Ministry of Commerce

ECP 1: 1993	New Zealand electrical code of practice for electrical installations – caravans and caravan parks	VM1 1.0.1
ECP 2: 1993	New Zealand electrical code of practice for electrical installations in damp situations	VM1 1.0.1
ECP 3: 1993	New Zealand electrical code of practice for electrical safety of apparatus and material	VM1 1.0.1
ECP 4: 1993	New Zealand electrical code of practice for electrical installations – supply by generating systems not exceeding low voltage	VM1 1.0.1
ECP 5: 1993	New Zealand electrical code of practice for electrical installations – cold cathode discharge lighting	VM1 1.0.1
ECP 7: 1993	New Zealand electrical code of practice for extra-low voltage installations	VM1 1.0.1
ECP 11: 1993	New Zealand electrical code of practice for inspection and testing of low voltage installations for certification purposes	VM1 1.0.1
ECP 12: 1993	New Zealand electrical code of practice for electrical installations – the safe use of electricity in medical locations and associated areas	VM1 1.0.1
ECP 19: 1994	New Zealand electrical code of practice for determination of maximum demand in electrical installations	VM1 1.0.1
ECP 21.2: 1993	New Zealand electrical code of practice for electric security fences	VM1 1.0.1
ECP 24: 1993	New Zealand electrical code of practice for the safety of electricity in a hazardous area	VM1 1.0.1
ECP 28: 1993	New Zealand electrical code of practice for selection and installation of cables	VM1 1.0.1
ECP 29: 1993	New Zealand electrical code of practice for electrical installations of boat marinas and pleasure vessels	VM1 1.0.1
ECP 33: 1993	New Zealand electrical code of practice for installations of mineral insulated cables and equipment	VM1 1.0.1
ECP 34: 1993	New Zealand electrical code of practice for electrical safety distances	VM1 1.0.1
ECP 35: 1993	New Zealand electrical code of practice for power systems earthing	VM1 1.0.1
ECP 36: 1993	New Zealand electrical code of practice for harmonic levels	VM1 1.0.1
ECP 41: 1993	New Zealand electrical code of practice for single wire earth return systems	VM1 1.0.1
ECP 50: 1993	New Zealand electrical code of practice for repair of domestic electrical equipment	AS1 1.0.1
ECP 51: 1993	New Zealand electrical code of practice for electrical wiring work in domestic premises	AS1 1.0.1

Where quoted

References

For the purposes of New Zealand Building Code compliance, acceptable reference documents include only the quoted edition and specific amendments as listed below. Dates in brackets indicate that the Standard was revised and reissued without change that year.

		Where quoted
	Standards New Zealand	
	NZS/BS 21: 1985 Specification for pipe threads for tubes and fittings where pressure-tight joints are made on the threads (metric dimensions)	AS1 Table 1
Amend 2 Dec 1995	NZS/BS 143 and 1256: 1993 Specification for malleable cast iron and cast copper alloy threaded pipe fittings <i>Amend: 1, 2, 3</i>	AS1 Table 1
Amend 2 Dec 1995	NZS/BS 1387: 1985 (1990) Specification for screwed and socketed steel tubes and tubulars and for plain end steel tubes suitable for welding or screwing to BS 21 pipe threads	AS1 Table 1
	NZS/BS 1560:- Circular flanges for pipes, valves and fittings (Class designated) Part 3:- Steel, cast iron and copper alloy flanges Section 3.1: 1989 Specification for steel flanges Section 3.2: 1989 Specification for cast iron flanges	AS1 Table 1
Amend 1 Sep 1993	NZS/BS 1740:- Specification for wrought steel pipe fittings (screwed BS 21 R-series thread) Part 1: 1971 Metric units (1990) <i>Amend: 1, 2, 3</i>	AS1 Table 1
Amend 2 Dec 1995	NZS/BS 2971: 1991 Specification for Class II arc welding of carbon steel pipework for carrying fluids	AS1 1.3.1 a), Table 1
	NZS 3501: 1976 Specification for copper tubes for water, gas, and sanitation	AS1 Table 1
	NZS 3502: 1976 Specification for copper and copper alloy tubes for general engineering purposes	AS1 Table 1
Amend 2 Dec 1995	NZS/BS 3601: 1987 (1993) Specification for carbon steel pipes and tubes with specified room temperature properties for pressure purposes	AS1 Table 1
Amend 1 Sep 1993	NZS 4203: 1984 Code of practice for general structural design and design loadings for buildings <i>Amend: 1</i>	AS1 1.0.1 a)
Amend 1 Sep 1993	NZS 4219: 1983 Specification for seismic resistance of engineering systems in buildings <i>Amend: 1, 2</i>	AS1 1.0.1 a)

		Where quoted	
NZS/BS 4504:-	Circular flanges for pipes, valves and fittings (PN designated)		
Part 3:-	Steel, cast iron and copper alloy flanges	AS1 Table 1	
Section 3.2: 1989	Specification for cast iron flanges		
NZS 5261: 1996	The installation of gas burning appliances and equipment	VM1 1.0.1, AS1 5.0.1	Amend 2 Dec 1995 Amends 1 & 3
NZS 5807:-	Code of practice for industrial identification by colour, wording or other coding		
Part 2: 1980	Identification of contents of piping, conduit and ducts	AS1 1.0.1	Amend 1 Sep 1993
NZS 7646: 1978	Specification for polyethylene pipes and fittings for gas reticulation	AS1 Table 1	
British Standards Institution			
BS 10: 1962	Specification for flanges and bolting for pipe, valves and fittings	AS1 Table 1	
BS 1640:-	Specification for steel butt-welding pipe fittings for the petroleum industry		
Part 3: 1968	Wrought carbon and ferritic alloy steel fittings. Metric units <i>Amend: 905</i>	AS1 Table 1	
Part 4: 1968	Wrought and cast austenitic chromium-nickel steel fittings. Metric units	AS1 Table 1	Amend 1 Sep 1993
BS 1723:-	Brazing		
Part 1: 1986	Specification for brazing	AS1 Table 1	
BS 1845: 1984	Specification for filler metals for brazing	AS1 Table 1	
BS 2640: 1982	Specification for Class II oxy-acetylene welding of carbon steel pipework for carrying fluids	AS1 1.3.1 a), Table 1	
BS 3799: 1974 (1994)	Specification for steel pipe fittings, screwed and socket-welding for the petroleum industry	AS1 Table 1	Amend 2 Dec 1995
Standards Association of Australia			
AS D26: 1972	Tube fittings with dryseal American standard taper pipe and unified threads for automotive and industrial use	AS1 Table 1	
AS 1167:-	Welding and brazing – Filler metals		
Part 1: 1993	Filler metal for brazing and braze welding	AS1 Table 1	Amend 2 Dec 1995
AS 1432: 1990	Copper tubes for plumbing, gasfitting and drainage applications	AS1 Table 1	
AS 3688: 1994	Water supply – Copper and copper alloy compression and capillary fittings and threaded connectors	AS1 Table 1	Amend 2 Dec 1995

		Where quoted
American Society for Testing and Materials		
ASTM		
A53-90	Specification for pipe, steel, black and hot-dipped, zinc-coated welded and seamless	AS1 Table 1
A106-91	Specification for seamless carbon steel pipe for high temperature service	AS1 Table 1
American National Standards Institute and American Society of Mechanical Engineers		
ANSI/ASME		
B16.1-1989	Cast iron pipe flanges and flanged fittings, Class 25, 125, 250 and 800	AS1 Table 1
B16.3-1985	Malleable-iron threaded fittings, Classes 150 and 300	AS1 Table 1
B16.5-1988	Pipe flanges and flanged fittings, steel-nickel alloy and other special alloys	AS1 Table 1
B16.9-1990	Factory-made wrought steel butt-welding fittings	AS1 Table 1
ANSI		
B16.11-1980	Forged steel fittings, socket-welding and threaded	AS1 Table 1
American Petroleum Institute		
API SPEC 5L-1991	Specification for line pipe	AS1 Table 1
API STD 1104-1988	Welding of pipelines and related facilities	AS1 1.3.1 b), Table 1

References

Amend 1
Sep 1993

For the purposes of New Zealand Building Code compliance, acceptable reference documents include only the quoted edition and specific amendments as listed below.

Standards New Zealand

Amend 2
Feb 1998

NZS 5261: 1996 The installation of gas burning appliances
and equipment

Miscellaneous Publication

Gas Service Technology Volume 1 –
Benn Technical Books

Where quoted

AS1 1.2.2, 5.0.1, 9.0.1

AS1 1.3.1

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For the purposes of New Zealand Building Code compliance, acceptable reference documents include only the quoted edition and specific amendments as listed below.

Standards New Zealand		Where quoted
NZS/BS 1387: 1985	Specification for screwed and socketed steel tubes and tubulars and for plain end steel tubes suitable for welding or screwing to BS 21 pipe threads	AS1 Table 1
NZS 3501: 1976	Specification for copper tubes for water, gas, and sanitation <i>Amends: 1, 2, 3</i>	AS1 Table 1
NZS 4602: 1988	Low pressure copper thermal storage electric water heaters <i>Amend: 1</i>	AS1 Table 5
NZS 4603: 1985	Installation of low pressure thermal storage electric water heaters with copper cylinders (open-vented systems) <i>Amend: 1</i>	AS1 6.9.1, 6.11.5 Amend 5 Feb 2004
NZS 4606: Part 1: 1989	Storage water heaters General requirements <i>Amends: 1, 2, 3</i>	AS1 Table 5
Part 2: 1989	Specific requirements for water heaters with single shells <i>Amend: A</i>	AS1 Table 5
Part 3: 1992	Specific requirements for water heaters with composite shells <i>Amend: A</i>	AS1 Table 5
NZS 4607: 1989	Installation of thermal storage electric water heaters: valve-vented systems	AS1 6.10.1 Amend 5 Feb 2004
NZS 4608: 1992	Control valves for hot water systems	AS1 Table 6
NZS 4613: 1986	Domestic solar water heaters	AS1 Table 5
NZS 4617: 1989	Tempering (3-port mixing) valves	AS1 6.14.2 b) Amend 5 Feb 2004
NZS 5807: 1980	Code of practice for industrial identification by colour, wording or other coding	
Part 2: 1980	Identification of contents of piping, conduit and ducts <i>Amends: 1, 2</i>	AS1 4.3.1
NZS 6214: 1988	Thermostats and thermal cutouts for domestic thermal storage electric water heaters (alternating current only)	AS1 6.5.1 Amend 5 Feb 2004
NZS 6335: 1993	Safety of household and similar electrical appliances. Particular requirements for instantaneous water heaters <i>Amends: 1, 2</i>	AS1 Table 5
NZS 6401: 1973	Specification for PVC-insulated cables for electric power and lighting	AS1 9.3.2

		Where quoted	
NZS/BS 6920:	Suitability of non-metallic products for use in contact with water intended for human consumption with regard to their effect on the quality of the water		
Part 1: 1990	Specification	AS1 2.1.2	
Part 2: 1990	Methods of tests	AS1 2.1.2	
Part 3: 1990	High temperature tests	AS1 2.1.2	
NZS 7601: 1978	Specification for polyethylene pipe (Type 3) for cold water services	AS1 Table 1	
NZS 7602: 1977	Specification for polyethylene pipe (Type 5) for cold water services <i>Amend: 1</i>	AS1 Table 1	
NZS 7610: 1991	Specification for blue polyethylene pipes up to nominal size 63 for below ground use for potable water <i>Amends: 1, 2, 3</i>	AS1 Table 1	
NZS 7643: 1979	Code of practice for the installation of unplasticized PVC pipe systems <i>Amend: 1</i>	AS1 7.4.1, 7.5.2	
British Standards Institution			
BS 6283:	Safety devices for use with hot water systems		
Part 1: 1991	Specification for expansion valves for pressures up to and including 10 bar	AS1 Table 6	
Part 3: 1991	Specification for combined temperature and pressure relief valves for pressures up to and including 10 bar	AS1 Table 6	
Part 4: 1991	Specification for drop-tight pressure reducing valves of nominal size up to and including DN 54 for supply for pressures up to and including 12 bar	AS1 Table 6	
Standards Australia			
AS 1308: 1987	Electric water heaters – Thermostats and thermal cut-outs <i>Amend: 1</i>	AS1 6.5.1	Amend 5 Feb 2004
AS 1357:	Water valves for use with unvented water heaters		
Part 1: 1992	Protection valves <i>Amend: 1</i>	AS1 Table 6	
Part 2: 1998	Control valves	AS1 6.14.2 b), Table 6	Amend 5 Feb 2004
AS 1460:	Fittings for use with polyethylene pipes		
Part 1: 1989	Mechanical jointing fittings	AS1 Table 1	
Part 2: 1989	Electrofusion fittings	AS1 Table 1	
AS 2712: 1993	Solar water heaters – Design and construction	AS1 Table 5	

		Where quoted	
AS 2845:	Water supply – Mechanical backflow prevention devices		
Part 3: 1993	Field testing and maintenance	AS1 3.6.1 b), 3.7.2 a) b) c)	Amend 5 Feb 2004
AS 3147: 1992	Approval and test specification – Electrical cables – Thermoplastic insulated for working voltages up to and including 0.6/1 kV <i>Amends: 1, 2, 3</i>	AS1 9.3.2	
Australia/New Zealand Standards			
AS/NZS 2642:	Polybutylene pipe systems		
Part 1: 1994	Polybutylene (PB) pipe extrusion compounds	AS1 Table 1	
Part 2: 1994	Polybutylene (PB) pipe for hot and cold water applications	AS1 Table 1	
Part 3: 1994	Mechanical jointing fittings for use with polybutylene (PB) pipes for hot and cold water applications <i>Amend: 1</i>	AS1 Table 1	
AS/NZS 2845:	Water supply		
Part 1: 1998	Materials, design and performance requirements	AS1 3.6.2	Amend 5 Feb 2004
AS/NZS 3500:	National plumbing and drainage code		
Part 1.2: 1998	Water supply acceptable solutions	VM1 1.0.1 a), AS1 3.5.2	
Part 4.2: 1997	Hot water supply acceptable solutions	VM1 1.0.1 b) AS1 6.15.1	Amend 5 Feb 2004
AS/NZS 1477: 1999	PVC pipes and fittings for pressure applications	AS1 Table 1	
AS/NZS 4130: 1997	Polyethylene (PE) pipes for pressure applications	AS1 Table 1	
New Zealand Regulations			
Gas Regulations 1993		AS1 Table 5	

References

For the purposes of New Zealand Building Code compliance, acceptable reference documents include only the quoted edition and specific amendments as listed below.

	Where quoted
Standards New Zealand	
NZS/BS 2494: 1990 Specification for elastomeric seals for joints in pipework and pipelines	AS1 Table 1, AS2 Table 1
NZS 3107: 1978 Specification for precast concrete drainage and pressure pipes	AS2 Table 1
NZS 3501: 1976 Specification for copper tubes for water, gas, and sanitation <i>Amends: 1, 2, 3</i>	AS1 Table 1, AS2 Table 1
NZS 3604: 1999 Timber framed buildings <i>Amend: 1</i>	AS2 5.6.1
NZS 4229: 1999 Concrete masonry buildings not requiring specific engineering design <i>Amend: 1</i>	AS2 5.6.1
NZS 4442: 1988 Welded steel pipes and fittings for water, sewage and medium pressure gas	AS2 Table 1
NZS 7643: 1979 Code of practice for the installation of unplasticized PVC pipe systems <i>Amend: 1</i>	AS1 6.1.1, 6.2.2, 6.3.1, 7.1.2, AS2 5.1.2, 6.1.2, 7.0.1, Table 1
British Standards Institution	
BS 437: 1978 Specification for cast iron spigot and socket drain pipes and fittings <i>Amend: 5877</i>	AS2 Table 1
BS 5572: 1994 Code of practice for sanitary pipework	VM1 1.0.1
Standards Australia	
AS 1579: 1993 Arc welded steel pipes and fittings for water and waste water	AS2 Table 1
AS 1589: 1994 Copper and copper alloy waste fittings	AS1 Table 1
AS 2032: 1997 Installation of uPVC pipe systems	AS2 5.1.2, 7.0.1, Table 1
AS 2887: 1993 Plastic waste fittings	AS1 Table 1
AS 3518:- Acrylonitrile butadiene styrene (ABS) pipes and fittings for pressure applications	AS2 Table 1
Part 1: 1988 Pipes	
Part 2: 1988 Solvent cement fittings	
AS 3571: 1989 Glass filament reinforced thermosetting plastics (GRP) pipes: Polyester based: Water supply, sewerage and drainage applications	AS2 Table 1
AS 4139: 1993 Fibre reinforced concrete pipes and fittings	AS2 Table 1

Australian/New Zealand Standards

AS/NZS 1260: 1999 PVC pipes and fittings for drain, waste and vent applications

AS/NZS 1646: 2000 Elastomeric seals for waterworks purposes

AS/NZS 3500:- National plumbing and drainage
Part 2.2: 1996 Sanitary plumbing and drainage Acceptable solutions
Amend: 1

AS/NZS 2280: 1999 Ductile iron pressure pipes and fittings

AS/NZS 4130: 1997 Polyethylene (PE) pipe for pressure applications

AS/NZS 4401(Int): High density polyethylene (PE-HD) pipes and fittings for soil and waste discharge (low and high temperature) systems inside buildings

European Standards

EN 12380: 1999 Air admittance valves for drainage systems – Requirements and test methods

American Society of Sanitary Engineers

ASSE 1050: 1991 Performance requirements for air admittance valves for plumbing DWV systems stack type devices

ASSE 1051: 1992 Performance requirements for air admittance valves for plumbing drainage systems

Where quoted

AS1 Table 1,
AS2 Table 1

AS2 Table 1

AS1 7.1.3, 8.0.1,
8.0.2, 8.1,
VM2 1.0.1 Comment,
AS2 6.1.3, 7.0.2, 7.1

AS2 Table 1

AS2 Table 1

AS1 Table 1

AS1 5.8.2, Table 1

AS1 5.8.2, Table 1

AS1 5.8.2, Table 1

References

For the purposes of New Zealand Building Code compliance, acceptable reference documents include only the quoted edition and specific amendments listed below.

	Where quoted
Standards New Zealand	
NZS 4214: 1977 Methods of determining the total thermal resistance of parts of buildings	VM1 1.4.1, AS1 2.3.1
NZS 4218: 1996 Energy efficiency – housing and small building envelope	VM1 1.1.1, AS1 2.1.1, 2.2.2, 4.0.1
NZS 4243: 1996 Energy efficiency – large buildings	VM1 1.3.1, AS1 4.0.1, 6.1.1
NZS 4305: 1996 Energy efficiency – domestic type hot water systems	AS1 5.0.1
BRANZ	
ALF Manual: 1990 Annual loss factor design manual. An aid to thermal design of buildings M.R. Bassett, R.C. Bishop and I.S. van der Werff	Definition – BPI, VM1 1.2.1
BRANZ House Insulation Guide: 1995	VM1 1.4.1, AS1 2.3.
New Zealand Meteorological Service	
Average degree-day tables – selected NZ stations (Miscellaneous publication 159, 1978)	Definition – degree-day total
COMMENT:	
This publication is no longer available, but the relevant information is summarised in the Degree-days data sheets of the ALF Manual referenced above.	

KNAUFINSULATION
it's time to save energy



April 2012

EARTHWOOL®
the feel good insulation

A new generation of insulation
for Australia and New Zealand

with **ECOSE®**
TECHNOLOGY

SAVE TIME, ENERGY AND MONEY WITH EARTHWOOL INSULATION



Whatever the time of year,
Earthwool® insulation is the
perfect choice for any home.
It keeps homes cooler in summer
and warmer in winter.

WALL AND ACOUSTIC PARTITION

CEILING SEGMENT

CEILING BLANKET

UNDERFLOOR

Application																			
Rating	14kg	14kg	R-2.2	R-2.4	R-2.6	R-2.8	R-3.2	R-2.7	R-3.2	R-3.6	R-4.1	R-5.2	R-6.3	R-1.8	R-2.9	R-3.2	R-3.6	R-1.8	R-2.2
Width	430mm	430mm	580mm	580mm	430mm	430mm	580mm	430mm	430mm	430mm	430mm	430mm	430mm	1200mm	1200mm	1200mm	1200mm	480mm	480mm
	580mm	580mm			580mm	580mm		430mm	430mm	430mm	430mm	430mm	430mm					610mm	610mm
Comfort Level	SUPERIOR sound absorbing performance	ULTIMATE sound absorbing performance	BASIC energy saving for the budget conscious home owner	SUPERIOR energy saving and acoustic performance	ULTIMATE energy saving and high density sound blocking performance			BASIC energy saving performance	SUPERIOR energy saving performance		ULTIMATE energy saving performance		BASIC top up energy saving performance	SUPERIOR top-up energy saving performance and for skillion roofs			BASIC energy saving performance	SUPERIOR energy saving performance	
Thickness																			
	50mm	75mm	90mm	90mm	90mm	90mm	140mm	125mm	150mm	175mm	195mm	210mm	275mm	70mm	115mm	135mm	145mm	70mm	75mm

For further information visit knaufinsulation.co.nz

For guidance on installation scan the QR codes or go to knaufinsulation.co.nz



WALL



UNDERFLOOR



CEILING

EARTHWOOL
the feel good insulation

KNAUF INSULATION
It's time to save energy

"YOU WON'T MISS THE ITCH!"

BY MAKING THE SWITCH TO EARTHWOOL

Can insulation really feel THIS good?

Knauf Insulation's new Earthwool® products don't look or feel like any insulation you've ever experienced, that's because the natural brown colour represents a level of sustainability and ease of handling never before achieved with glasswool in New Zealand. The colour and super-soft feel of this glasswool comes from a revolutionary sustainable binder which does not contain the petro-based chemicals, added formaldehyde or artificial colours commonly used in glasswool insulation.

EARTHWOOL®

the feel good insulation



Not as itchy

The super-soft feel of Earthwool comes from a revolutionary, patented binder based on rapidly renewable materials.
Make the switch!

Enhanced indoor air quality

With no added formaldehyde, Earthwool provides high indoor air quality and is suitable for use in households with allergies.



Reduced handling

Unique compression packaging means more insulation per pack, more insulation per load.

Fire safe

Earthwool is non-combustible.

Blocks sound

Earthwool absorbs sound for a quieter home.

Made using recycled glass

Earthwool is made using recycled glass bottles and sand making it a great choice for environmentally conscious customers.



Find out more at knaufinsulation.co.nz

EARTHWOOL®

the feel good insulation

KNAUF INSULATION

it's time to save energy

Compliance with Australian, New Zealand and European Standards

EarthWool® products have superior characteristics compared to our traditional glasswool and comply with all the required Australian, New Zealand and European Standards for glasswool insulation.



BRANZ Appraisal

The EarthWool® range has been assessed by BRANZ to confirm suitability for the Building Code of Australia BCA and the New Zealand Building Code NZBC. This includes BRANZ assessment of our technical literature, quality control, installation, service performance and maintenance.

AS/NZS 4859.1:2002

EarthWool® products have been tested to this standard by BRANZ confirming the thermal performance.



CE marking

EarthWool® made with ECOSE® Technology is tested in accordance with all applicable European Norms. All our products comply with the main norm for glasswool insulation: EN 13162: 2008 "Thermal insulation products for buildings – Factory made mineral wool (MW) products – Specification".



Biosolubility

EarthWool® made with ECOSE® Technology has been independently assessed against the biopersistence requirements for Note Q, and meets the criteria of the National Health and Safety Commission (NOHSC): NOHSC: 1008 (2004) and NOHSC: 1005 (1994). As a result EarthWool® is not classified as hazardous according to the NOHSC criteria and satisfies biosolubility standards in Australia and New Zealand. In addition EarthWool® complies with the international EUCEB certification and is therefore free from suspicion of carcinogen effects and associated hazard classification.

In addition to testing for compliance with Australian and New Zealand Standards, EarthWool® is also tested to comply with other national certification schemes including:



EU



France



Germany



United Kingdom



Belgium



Spain



The Netherlands



Switzerland

All Knauf Insulation glasswool manufacturing facilities are producing in accordance to the strict requirements of ISO 9001:2000. Furthermore, most of our plants are certified in accordance to ISO 14001: 2004 and OHSAS 18001:2007 reflecting our strong ambition for continuous improvement with respect to the growing environmental, health and safety aspects.

International Recognition

Following the launch of Knauf Insulation glasswool made with ECOSE® Technology (ie EarthWool®) in 2009, our new product range has grown its market share in each country in which it has been available. It is increasingly becoming the preferred glasswool product and has received several esteemed awards, endorsements and certificates from various countries.



Knauf Insulation Warranty: EarthWool®

1. WARRANTY APPLICATION: Knauf Insulation Pty Ltd ACN 129 827 336 (Knauf) warrants that EarthWool® products (Product) are manufactured in accordance with AS-4859.1 and are fit for the purpose of insulating ceilings, external timber frame walls and internal acoustic partitions, if tested in accordance with the methodology referred to in AS/NZS 4859.1, if properly installed in accordance with the installation instructions by a qualified installer and if maintained according to relevant Standards including AS/NZS-3999.

2. WARRANTY COVERAGE: Knauf warrants to the person purchasing the Product (Covered Person) that:

- A. The Product is free from manufacturing defects for a period of 50 years from the date of purchase.
- B. When used for its intended purpose, properly installed in accordance with both Knauf and Building Research Association of New Zealand, Inc. (BRANZ) instructions by a qualified installer, tested in accordance with the methodology referred to in AS/NZS 4859.1 and maintained in dry conditions and otherwise in accordance with AS/NZS 3999, the NZBC Clauses E2 and E3 (or equivalent), the Product can be expected to maintain its thermal insulation properties for a period of 50 years from the date of purchase (Product Serviceable Life).

3. CONDITIONS OF WARRANTY: Knauf's liability to the Covered Person under this Warranty shall be subject to the following terms and conditions:

- A. The claimant must provide proof that he/she is a Covered Person including a receipt showing the date of purchase of the Product and details of the seller and the installer.
- B. The Product must be transported and stored in dry conditions at all times between purchase and installation and without bearing the weight of other materials. Knauf will have no liability under this Warranty in respect of wet or water damaged Product.
- C. The Product must be installed by a qualified installer in accordance with both Knauf and BRANZ instructions and maintained according to AS/NZS 3999, the NZBC Clauses E2 and E3 (or equivalent) and all other applicable building codes adopted by federal, state or local governments or government agencies and applicable to the installation or maintenance. Failure to properly install or maintain the Product in accordance with this Clause will void this Warranty.
- D. The Covered Person may not claim for manufacturing defects under this warranty that appear outside the Product Serviceable Life 50 years after the date of purchase.
- E. The Covered Person must provide written notice to Knauf within 30 days after discovery of any claimed defect or failure covered by this Warranty and before beginning any permanent replacement, rectification or repair. The notice must describe the location and details of the defect or failure and such information as is necessary for Knauf to investigate the claim. Photographs of the Product, showing the defect or failure, must accompany the notice. Product samples must be provided.
- F. Before commencing any replacement, repair or rectification work, the Covered Person must allow Knauf or Knauf's agent to enter the property where the Product is installed and examine, photograph and take samples of, the Product.
- G. Instead of repairing, replacing or rectifying the Product, Knauf may elect to make a full refund of the purchase price of the Product.
- H. Knauf will pay the reasonable, direct expenses of the Covered Person claiming under this Warranty. The Covered Person may submit details of their expense claim to Knauf for consideration.
- I. For the avoidance of doubt, this Warranty applies only to the Covered Person and does not transfer to any subsequent purchaser of any structure in which the Product has been installed.

4. EXCLUSIONS: Knauf will have no liability under this Warranty in respect of damage or defects resulting from, or in any way attributable to:

- (a) the storage, shipping, handling or installation of the Product in an improper manner or in a manner other than as described above;
- (b) neglect;

- (c) abuse;
- (d) misuse;
- (e) damage from incorrect design or construction of the structure in connection with which the Product is used;
- (f) acts of God including, but not limited to, cyclones, tornados, floods, earthquakes, severe weather, fire or other natural phenomena, (including, but not limited to, unusual climate conditions);
- (g) growth of mold, mildew, fungi, bacteria, or any organism; and
- (h) lack of proper maintenance.

5. CLAIMS: For any claim by the Covered Person under the terms of this Warranty:

- (a) if the Product is found to be non-compliant with this Warranty, Knauf will (at Knauf's sole option) either (i) refund the purchase price; or (ii) repair, replace or rectify the Product.
- (b) such claims must be made by written notice:
 - i. sent to the following address:
Knauf Insulation Pty Ltd
Warranty Claims Section
Unit 2/44 Borthwick Avenue,
Murarrie Queensland 4172
Australia.
Phone +61 7 3393 7300
 - ii. received within 30 days after discovery of any circumstance giving rise to liability under this Warranty;
 - iii. containing the details specified in section 3 E above and attaching documentary evidence of the matters specified in section 3 A above.

6. EXCLUSION OF INCIDENTAL AND CONSEQUENTIAL

DAMAGES: Under this warranty Knauf shall not be liable for any incidental, special, indirect or consequential damages. Any monetary compensation is limited to a refund of the purchase price of the Product except as required by law.

7. MODIFICATIONS AND ALTERATIONS OF PRODUCT: Knauf shall have no liability under this Warranty for any Product subjected to further processing or alteration by any person other than Knauf or its related companies.

8. SETTLEMENT OF CLAIM: Any refund or material replacement by Knauf pursuant to section 5 above of this Warranty shall constitute a full settlement and release of Knauf by the Covered Person of all claims, potential claims or actions of any Covered Person for damages or other relief under this Warranty.

9. OTHER RIGHTS: The benefits given by this Warranty are additional to other rights and remedies that the Covered Person may have under law.

Australian customers: Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the Product repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

10. LIMITATION OF WARRANTY: This Warranty constitutes the only warranty extended by Knauf for the Product. Knauf disclaims all other warranties, express or implied, but does not exclude any statutory warranties or consumer guarantees that may apply and which cannot be excluded at law.

11. LIMITATION OF LIABILITY: You may be entitled to statutory consumer guarantees and Knauf does not exclude, restrict or modify those consumer guarantees. In all other respects, in so far as and to the maximum extent that it may lawfully do so, Knauf excludes any liability, whether in tort (including negligence), contract, equity or otherwise, connected with, or arising in relation to, the use or installation of the Product.

This Warranty is given by Knauf Insulation Pty Ltd (ACN 129 827 336) – Unit 2/44 Borthwick Avenue, Murarrie Queensland 4172.
Phone +61 7 3393 7300. tech.au@knaufinsulation.com

Framing timber spacing

Insulation material R-value

2.4	2.8	3.2	3.6	4.0	4.4	4.8
-----	-----	-----	-----	-----	-----	-----

Total construction R-value

rafters at 1200 (3.75%)

2.7	3.1	3.5	3.8	4.2	4.5	4.8
-----	-----	-----	-----	-----	-----	-----

rafters at 900 (5%)

2.7	3.1	3.4	3.8	4.1	4.4	4.7
-----	-----	-----	-----	-----	-----	-----

rafters at 600 (7.5%)

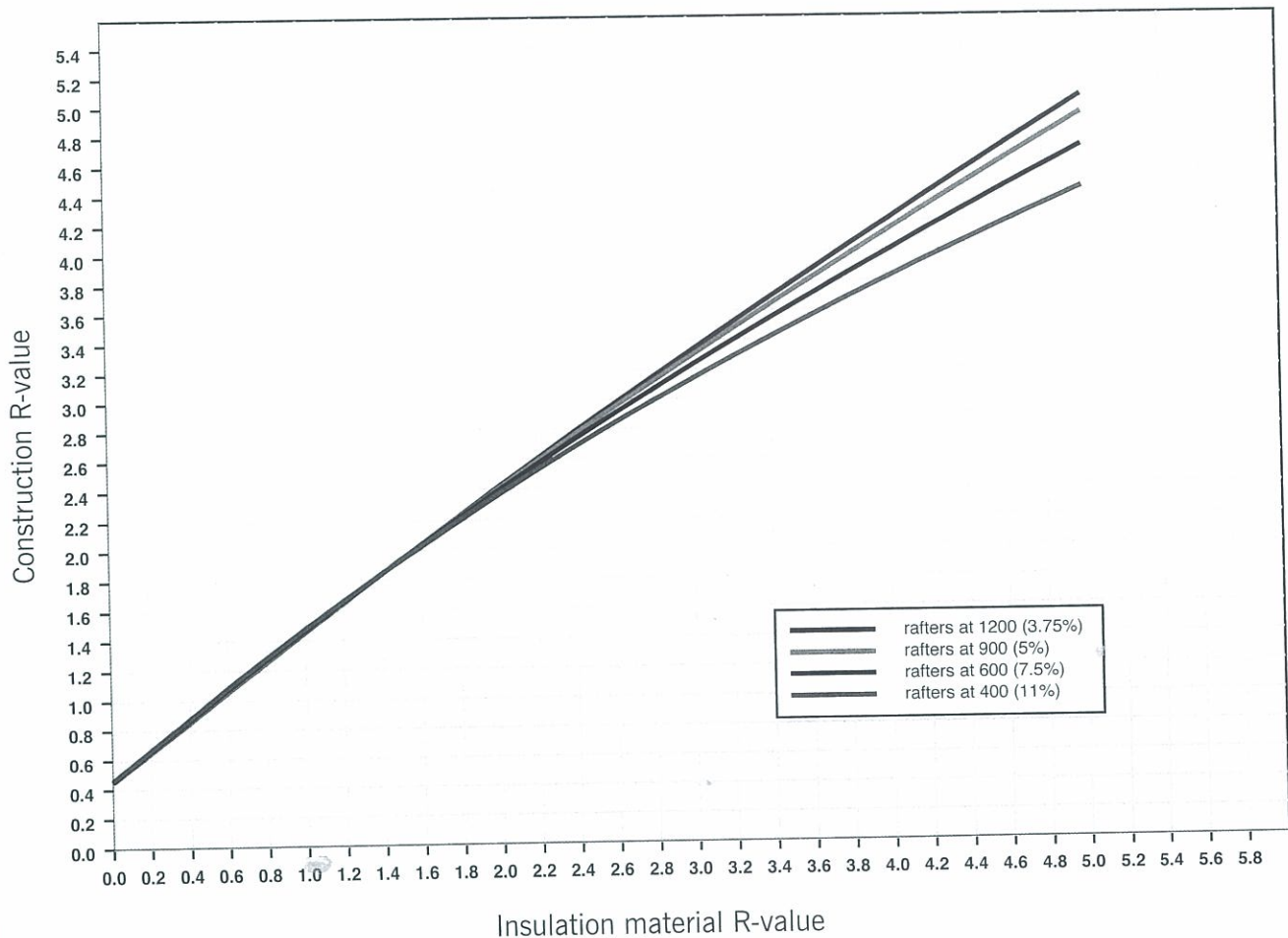
2.7	3.0	3.3	3.6	3.9	4.2	4.5
-----	-----	-----	-----	-----	-----	-----

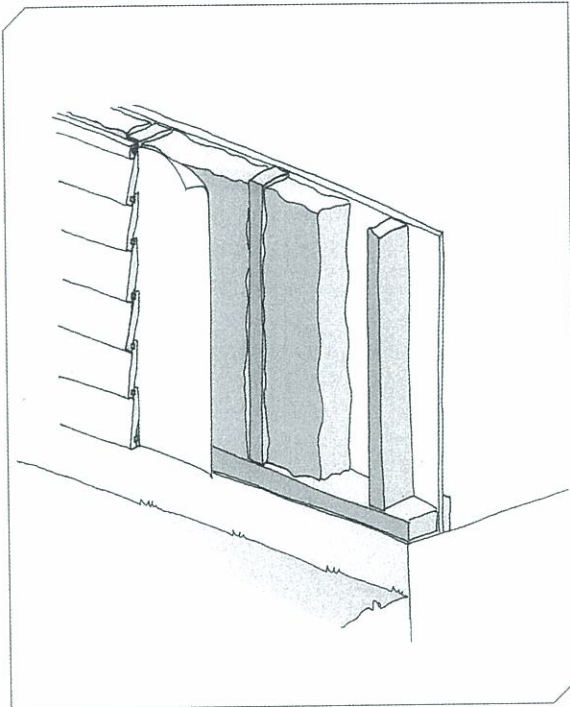
rafters at 400 (11%)

2.6	2.9	3.2	3.5	3.8	4.0	4.3
-----	-----	-----	-----	-----	-----	-----

1. R-5.0 is the highest practicable R-value of common insulation materials that can be used with 190 mm rafters

Membrane low slope with 190 mm rafters and battens





Framing timber spacing

studs 600, dwangs 800 (14%)

studs 600, dwangs 600 (16%)

studs 400, dwangs 800 (18%)

studs 400, dwangs 600 (20%)

(22%) framing ratio

(24%) framing ratio

Insulation material R-value

1.8 2.0 2.2 2.4 2.6 **2.8**

Total construction R-value

1.9 2.0 2.1 2.2 2.3 2.4

1.9 2.0 2.1 2.2 2.3 2.3

1.8 1.9 2.0 2.1 2.2 **2.3**

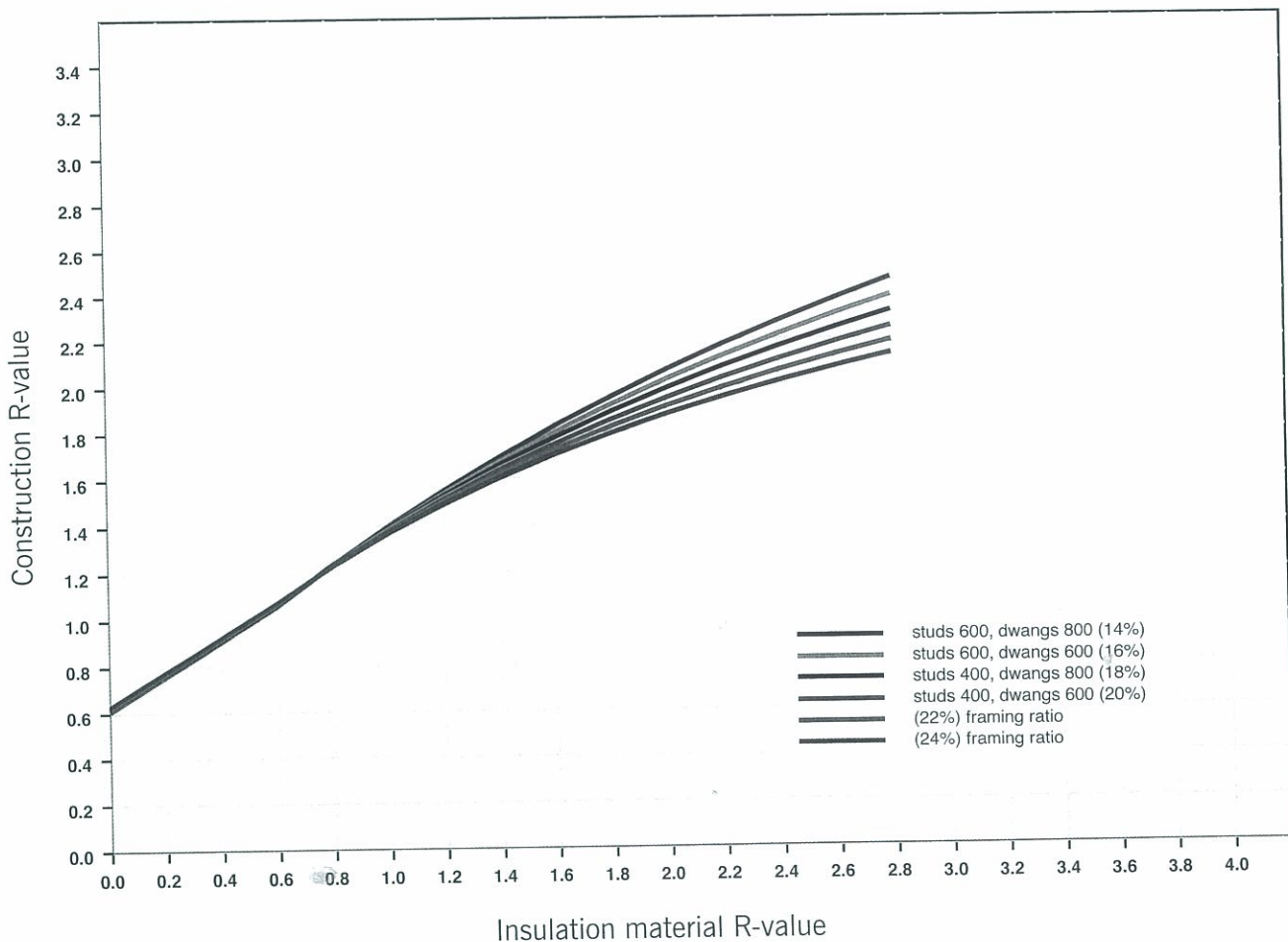
1.8 1.9 2.0 2.1 2.1 2.2

1.8 1.9 1.9 2.0 2.1 2.1

1.7 1.8 1.9 2.0 2.0 2.1

1. All insulants should be placed against wall underlay
2. Under E2/AS1 bevel-back weatherboard construction can be direct-fixed up to a risk factor score of 12
3. R-2.8 is the highest practicable R-value of common insulation materials that can be used with 90 mm studs

Bevel-back weatherboard direct-fixed 90 mm frame



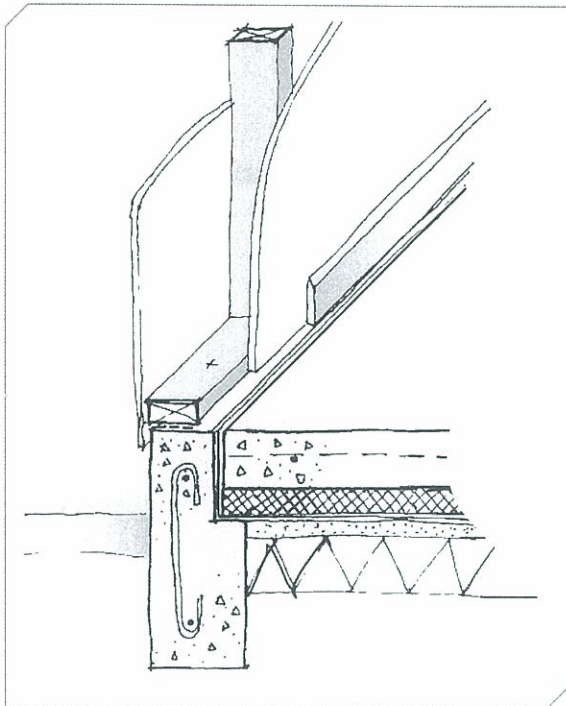
ELEMENT

FLOORING

CONSTRUCTION

Concrete**Slab on ground with no thermal break**

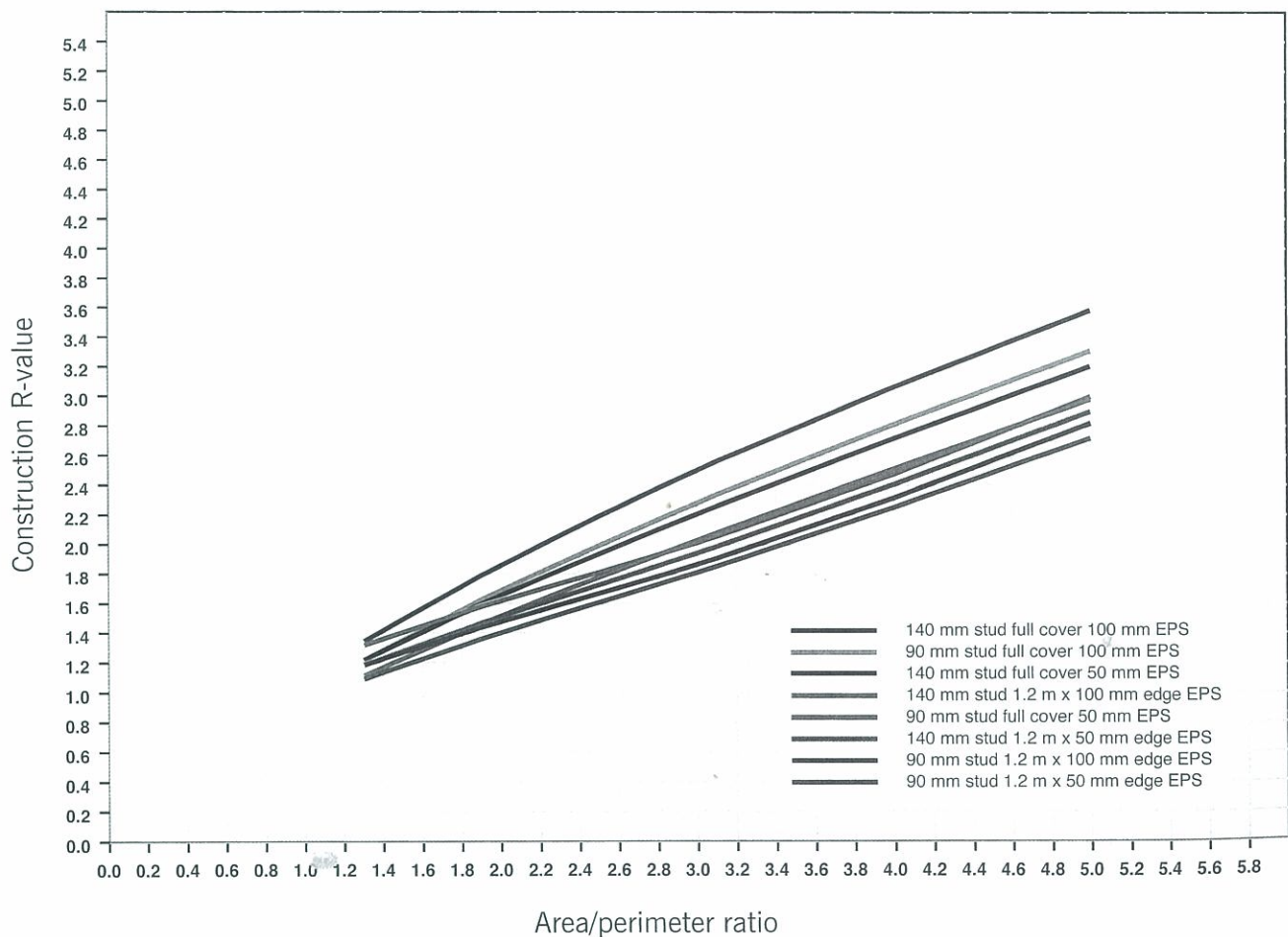
Either full or edge insulation under slab

**Construction****Area/perimeter ratio**

1.3	1.9	2.2	2.5	2.8	3.1	4.0
-----	-----	-----	-----	-----	-----	-----

Total construction R-value

140 mm stud full cover 100 mm EPS	1.3	1.7	1.9	2.1	2.3	2.5	4.7
90 mm stud full cover 100 mm EPS	1.2	1.6	1.8	1.9	2.1	2.3	3.8
140 mm stud full cover 50 mm EPS	1.2	1.5	1.7	1.9	2.1	2.2	3.7
140 mm stud 1.2 m x 100 mm edge EPS	1.3	1.5	1.6	1.8	1.9	2.0	3.2
90 mm stud full cover 50 mm EPS	1.1	1.4	1.6	1.7	1.9	2.0	3.1
140 mm stud 1.2 m x 50 mm edge EPS	1.1	1.4	1.5	1.7	1.8	1.9	2.7
90 mm stud 1.2 m x 100 mm edge EPS	1.1	1.4	1.5	1.6	1.7	1.9	
90 mm stud 1.2 m x 50 mm edge EPS	1.0	1.3	1.4	1.6	1.7	1.8	

Slab on ground, full or edge insulation under slab

12.3 SINGLE GLASS CONTINUED																		
Glass Type	Thickness (mm)	VLT	VLR	UV	FRC	WERS Fading Zone 1,2,3	WERS Condensation Zone 1,2,3	U Value	R Value	WERS Heating Zone 1	WERS Heating Zone 2	WERS Heating Zone 3	SHGC	CF	SC	WERS Cooling Zone 1	WERS Cooling Zone 2	WERS Cooling Zone 3
		Visible Light Transmission %	Visible Light Reflectance %	UV Elimination %	Fading Reduction Coefficient	WERS Fading Zone 1,2,3	WERS Condensation Zone 1,2,3			WERS Heating Zone 1	WERS Heating Zone 2	WERS Heating Zone 3	Solar Heat Gain Coefficient	Coolness Factor (Luminous Efficacy)	Shading Coefficient	WERS Cooling Zone 1	WERS Cooling Zone 2	WERS Cooling Zone 3
Solarplus TS 30 Arctic/Blue #2	6	18	10	96	0.12	★★★★★	★	5.25	0.19	★	★	★	0.33	0.48	0.38	★★★★★	★★★★★	★★★★★
Solarplus TS 30 Grey #2	6	14	8	96	0.08	★★★★★	★	5.25	0.19	★	★	★	0.33	0.36	0.39	★★★★★	★★★★★	★★★★★
Clear Laminated																		
Clear	6.38	89	8	99	0.45	★★★★★	★	5.72	0.17	★★	★★	★★	0.79	0.97	0.92	★★	★★	★★
Clear	6.76	88	8	99	0.41	★★★★★	★	5.63	0.18	★★	★★	★★	0.78	0.97	0.91	★★	★★	★★
Clear	8.38	87	8	99	0.44	★★★★★	★	5.70	0.18	★★	★★	★★	0.78	0.96	0.91	★★	★★	★★
Clear	10.38	86	8	99	0.42	★★★★★	★	5.62	0.18	★★	★★	★★	0.78	0.95	0.91	★★	★★	★★
Clear	12.38	86	8	99	0.41	★★★★★	★	5.56	0.18	★★	★★	★★	0.76	0.97	0.88	★★	★★	★★
Anti Bandit	7.52	88	8	100	0.38	★★★★★	★	5.55	0.18	★★	★★	★★	0.77	0.98	0.89	★★	★★	★★
Anti Bandit	11.52	87	7	100	0.37	★★★★★	★	5.45	0.18	★★	★★	★★	0.74	1.01	0.86	★★	★★	★★
Tinted Laminated																		
Grey	6.38	42	5	99	0.23	★★★★★	★	5.72	0.17	★	★	★	0.61	0.59	0.71	★★	★★	★★
Double Grey	6.76	24	5	100	0.12	★★★★★	★	5.70	0.18	★	★	★	0.52	0.40	0.60	★★	★★	★★
Bronze	6.38	52	5	99	0.24	★★★★★	★	5.72	0.17	★	★	★	0.64	0.70	0.74	★★	★★	★★
Double Bronze	6.76	31	6	100	0.12	★★★★★	★	5.60	0.18	★	★	★	0.52	0.51	0.60	★★	★★	★★
Green	6.38	72	7	99	0.36	★★★★★	★	5.72	0.17	★★	★★	★★	0.72	0.86	0.84	★★	★★	★★
Double Green	6.76	60	7	100	0.30	★★★★★	★	5.70	0.18	★	★	★	0.68	0.76	0.79	★★	★★	★★
Sky Blue	6.38	54	6	99	0.34	★★★★★	★	5.72	0.17	★	★	★	0.68	0.68	0.79	★★	★★	★★
Cool Blue	6.38	74	7	99	0.41	★★★★★	★	5.80	0.17	★★	★★	★★	0.75	0.85	0.87	★★	★★	★★
Double Cool Blue	6.76	64	7	99	0.37	★★★★★	★	5.70	0.18	★★	★★	★★	0.70	0.79	0.81	★★	★★	★★
Note - for 8.38 to 12.38 use the same data																		
Tinted Float Laminated																		
Evergreen (3eg/3cl)	6.38	75	7	99	0.34	★★★★★	★	5.77	0.17	★	★	★	0.59	1.09	0.69	★★	★★	★★
Evergreen (3eg/3cl)	6.38	64	6	99	0.27	★★★★★	★	5.77	0.17	★	★	★	0.50	1.10	0.58	★★	★★	★★
Evergreen (5eg/3cl)	8.38	72	7	99	0.32	★★★★★	★	5.69	0.18	★	★	★	0.56	1.11	0.65	★★	★★	★★
Evergreen (6eg/4cl)	10.38	65	6	99	0.27	★★★★★	★	5.90	0.17	★	★	★	0.50	1.12	0.58	★★	★★	★★
Evergreen (6eg/6cl)	12.38	64	6	99	0.27	★★★★★	★	5.90	0.17	★	★	★	0.50	1.10	0.58	★★	★★	★★
Translucent Laminated																		
Opalcent (Arctic Snow)	6.38	57	13	99	0.26	★★★★★	★★	5.72	0.17	★	★	★	0.64	0.77	0.74	★★	★★	★★
Soft White (Cool White)	6.38	80	10	99	0.40	★★★★★	★	5.70	0.18	★★	★★	★★	0.76	0.91	0.88	★★	★★	★★
Opal White (Pure White)	6.38	7	63	99	0.27	★★★★★	★	5.80	0.17	★	★	★	0.21	0.29	0.24	★★	★★	★★
Note - for 8.38 to 12.38 use the same data																		
Low-E Laminated																		
6.38 ComfortPlus #4	6.38	58	7	99	0.26	★★★★★	★	3.60	0.28	★★	★★	★★	0.52	0.96	0.60	★★★★★	★★★★★	★★★★★
8.38 Solar E #4	8.38	58	7	99	0.26	★★★★★	★	3.47	0.28	★★	★★	★★	0.51	0.98	0.59	★★★★★	★★★★★	★★★★★
Sunergy Clear (3c/3sy) #4	6.38	68	9	98	0.38	★★★★★	★	4.20	0.24	★★	★★	★★	0.59	0.99	0.69	★★★★★	★★★★★	★★★★★
Sunergy Clear (4c/6sy) #4	10.38	66	8	98	0.37	★★★★★	★	4.10	0.24	★★	★★	★★	0.56	1.01	0.65	★★★★★	★★★★★	★★★★★
Sunergy Green (4c/6sy) #4	10.38	54	7	99	0.27	★★★★★	★	4.10	0.24	★★	★★	★★	0.41	1.13	0.48	★★★★★	★★★★★	★★★★★
Sunergy Azur (4c/6sy) #4	10.38	54	7	99	0.27	★★★★★	★	4.10	0.24	★★	★★	★★	0.42	1.11	0.49	★★★★★	★★★★★	★★★★★
Optilite Select Clear #4	6.38	81	11	99	0.38	★★★★★	★	3.63	0.28	★★	★★	★★	0.68	1.03	0.79	★★★★★	★★★★★	★★★★★
Optilite Select Green #4	6.38	70	10	99	0.32	★★★★★	★	3.62	0.28	★★	★★	★★	0.49	1.23	0.57	★★★★★	★★★★★	★★★★★
Optilite Select Grey #4	6.38	47	8	99	0.21	★★★★★	★	3.63	0.28	★★	★★	★★	0.43	0.93	0.50	★★★★★	★★★★★	★★★★★
Other Laminates																		
Clear WHP Laminates	6.76	84	7	99	0.41	★★★★★	★	5.72	0.17	★★	★★	★★	0.80	0.90	0.93	★★	★★	★★
GreenWHP Laminates	6.76	71	6	99	0.30	★★★★★	★	5.70	0.18	★★	★★	★★	0.73	0.84	0.85	★★	★★	★★
Clear SoundStop	7	88	7	37	0.90	★★★★	★	5.70	0.18	★★	★★	★★	0.77	0.98	0.89	★★	★★	★★
Clear SafeLite	7	88	7	37	0.90	★★★★	★	5.70	0.18	★★	★★	★★	0.77	0.98	0.89	★★	★★	★★
Clear SafeLite UV	7	84	7	99	0.37	★★★★★	★	5.70	0.18	★★	★★	★★	0.77	0.94	0.89	★★	★★	★★
Obscure Stipplite	6.76	84	7	99	0.41	★★★★★	★	5.70	0.18	★★	★★	★★	0.80	0.90	0.93	★★	★★	★★