

New Zealand Building Code (NZBC)

3.1 In the opinion of BRANZ, Linea® Weatherboard - Cavity Construction if designed, used, installed and maintained in accordance with the statements and conditions of this Certificate, will meet the following provisions of the NZBC:

Clause B1 STRUCTURE: Performance B1.3.1, B1.3.2 and B1.3.4. Linea® Weatherboard - Cavity Construction meets the requirements for loads arising from self-weight, earthquake, wind, human impact and creep [i.e. B1.3.3 (a), (f), (h), (j) and (q)]. See Paragraphs 9.1 - 9.3.

Clause B2 DURABILITY: Performance B2.3.1 (b), 15 years. Linea® Weatherboard - Cavity Construction meets this requirement. See Paragraphs 10.1 and 10.2.

Clause C3 SPREAD OF FIRE: Performance C3.3.5. Linea® Weatherboard - Cavity Construction meets this requirement. See Paragraph 12.1.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.2. Linea® Weatherboard - Cavity Construction meets this requirement. See Paragraphs 14.1 - 14.5.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Linea® Weatherboard - Cavity Construction meets this requirement and will not present a health hazard to people.

3.2 This Certificate appraises an **Alternative Solution** in terms of New Zealand Building Code compliance.

4.1 Linea® Weatherboards are produced with a smooth face and are pre-primed with an acrylic primer on the front face and both edges. The weatherboards are 16 mm thick and are available 135 mm, 150 mm and 180 mm wide. All boards are supplied 4200 mm long.

4.2 Linea® Weatherboards are manufactured from a reduced density cellulose fibre cement formulation. The boards are formed, cut to length and then cured by high-pressure autoclaving. After autoclaving, a bevel is cut on the back face of the weatherboards, the front corner at the bottom of the board is chamfered and the ends are tongue and grooved for jointing. Linea® Weatherboards are manufactured to meet the requirements of AS/NZS 2908.2.

Accessories

4.3 Accessories used with Linea® Weatherboard - Cavity Construction which are supplied by James Hardie New Zealand Ltd are:

- Linea® Trim - a 16 mm thick fibre cement trim manufactured from a reduced density cellulose fibre cement formulation. Linea® Trim is pre-primed with an acrylic primer on the front face and both edges, and is available in sizes of 135 mm and 180 mm wide by 4200 mm long, and 84 mm and 100 mm wide by 2600 mm long.
- External and internal corner mouldings - chromate treated aluminium external box corner, 90° internal corner 'W' mould and 135° internal corner 'W' mould. The mouldings are available in 2700 mm lengths.
- Corner soakers - 90° soakers are available for 135 mm, 150 mm and 180 mm Linea® Weatherboards. The soakers are available in chromate treated aluminium, copper and stainless steel.

- Cavity vent strip - uPVC, available in 2700 mm lengths.
- 4.4 Accessories used with Linea® Weatherboard - Cavity Construction which are supplied by the building contractor are:

- Building wrap - paper or wrap complying with NZBC Acceptable Solution E2/AS1, Table 23, or breather-type membranes covered by a valid BRANZ Appraisal Certificate for use as wall wraps.
- Flexible sill, head and jamb flashing tape - flexible flashing tapes complying with NZBC Acceptable Solution E2/AS1, Paragraph 4.3.11, or flexible flashing tapes covered by a valid BRANZ Appraisal Certificate for use around window and door joinery openings.
- Cavity battens - nominal 50 mm wide by 25 mm thick (minimum finished size of 45 mm wide by 18 mm thick) timber treated to Hazard Class H3.1.
- Building wrap support - polypropylene strap, 75 mm galvanised mesh, galvanised wire, or additional vertical battens for securing the building wrap in place and preventing bulging of the bulk insulation into the drainage cavity. (*Note: mesh and wire galvanising must comply with AS/NZS 4534.*)
- Joinery head flashings - folded from aluminium or galvanised steel to suit the window or door trim opening. Refer to NZS 3604, Section 4 and NZBC Acceptable Solution E2/AS1, Table 20 for durability requirements.
- Planted sill and scribes - timber treated to Hazard Class H3.1, pre-primed before installation.
- Window and door trim cavity air seal - air seals complying with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.6, or self-expanding, moisture cure polyurethane foam air seals covered by a valid BRANZ Appraisal Certificate suitable for use around window, door and other wall penetration openings.
- Flexible sealant - sealant complying with NZBC Acceptable Solution E2/AS1, or sealant covered by a valid BRANZ Appraisal Certificate for use as a weather sealing sealant for exterior use.
- Cavity batten fixings - 40 x 2.8 mm flat head hot-dip galvanised nails.
- Linea® Weatherboard fixings - 60 x 3.15 mm flat head hot-dip galvanised Hardiflex nails or stainless steel ring shank Hardiflex nails (for concealed nailing), and 75 x 3.15 mm jolt head hot-dip galvanised nails or stainless steel ring shank nails (for face nailing).
- Linea® Trim fixings - 60 x 3.15 mm or 75 x 3.15 mm hot-dip galvanised jolt head nails and stainless steel ring shank jolt head nails.

(*Note: Stainless steel fixings must be Grade 316 and hot-dip galvanising must comply with AS/NZS 4680.*)

Paint System Specification

4.5 Paint systems are not supplied by James Hardie Building Products and have not been assessed, therefore are outside the scope of this Certificate.

4.6 All exposed faces, including top edges at sills and all bottom edges of Linea® Weatherboard, Linea® Trim and accessories must be finished with a latex exterior paint system complying with any of Parts 7, 8, 9, or 10 of AS 3730.

Handling and Storage

5.1 Handling and storage of all materials supplied by James Hardie Building Products or the building contractor, whether on site or off site, is under the control of the building contractor. Linea® Weatherboards must be stacked flat, off the ground and supported on a level platform. They must be

kept dry at all times either by storing under cover or providing waterproof covers to the stack. Care must be taken to avoid damage to edges, ends and surfaces. Weatherboards must always be carried on edge.

5.2 Accessories must be stored so they are kept clean, dry and undamaged. All accessories must be used within the maximum storage period recommended by the manufacturer.

6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for Linea® Weatherboard - Cavity Construction. The Technical Literature must be read in conjunction with this Certificate. All aspects of design, use, installation and maintenance contained in the Technical Literature and within the scope of this Certificate must be followed.

Framing

Timber Treatment

7.1 Timber wall framing behind Linea® Weatherboard - Cavity Construction must be treated as required by NZS 3602.

Timber Framing

7.2 Studsmustbeprovidedatmaximum600mmcentres. Nogs must be fitted flush between the studs at maximum 800 mm centres (for studs at 600 mm centres) or maximum 1200 mm centres (for studs at 400 mm centres).

7.3 Timber framing must comply with NZS 3604 or be to a specific design using NZS 3603 and NZS 4203. Where specific design is required, the framing must be of at least equivalent stiffness to the framing provisions of NZS 3604.

7.4 Timber framing must have a maximum moisture content of 24% at the time of the cladding application. *(If weatherboards are fixed to framing with a moisture content of greater than 24% problems may occur at a later date due to excessive timber shrinkage.)*

General

8.1 Punchings in the cavity vent strip provide a minimum ventilation opening area of 1000 mm² per lineal metre of wall.

8.2 At ground level the bottom edge of Linea® Weatherboards must be kept clear of paved surfaces, such as footpaths, by a minimum of 100 mm and unpaved surfaces by 175 mm in accordance with NZBC Acceptable Solution E2/AS1, Table 18. The ground clearances to finished floor levels as set out in NZS 3604 must be adhered to.

8.3 At balcony, deck or low pitch roof/wall junctions, the bottom edge of Linea® Weatherboards must be kept clear of any adjacent surface, or above the top surface of any adjacent roof flashing by a minimum of 35 mm in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.3.6.

8.4 All buildings must have barriers to airflow in the form of interior linings with all joints stopped, or alternatively, unlined gables and walls must incorporate a rigid sheathing or an air barrier which meets the requirements of NZBC Acceptable Solution E2/AS1, Table 23. Where rigid

sheathings are used, the fixing length must be increased by a minimum of the thickness of the sheathing.

8.5 Where cladding penetrations are wider than the cavity batten spacing, allowance must be made for airflow between adjacent cavities by leaving a minimum gap of 10 mm between the bottom of the cavity and the flashing to the opening.

8.6 Where Linea® Weatherboard - Cavity Construction abuts other cladding systems, designers must detail the junction to meet their own requirements and the performance requirements of the NZBC. Details not included within the Technical Literature have not been assessed and are outside the scope of this Certificate.

Structure

Mass

9.1 The mass of the 135 mm wide Linea® Weatherboard when installed on the wall is 24.9 kg/m² at equilibrium moisture content (EMC). The mass of the 150 mm wide board is 25.7 kg/m² at EMC and the mass of the 180 mm wide board is 23.9 kg/m² at EMC. Linea® Weatherboard - Cavity Construction is therefore considered a light wall cladding in terms of NZS 3604.

Impact Resistance

9.2 Linea® Weatherboard - Cavity Construction will resist human impacts likely to be encountered in normal residential use. The likelihood of impact damage to the cladding when used in light commercial situations should be considered at the design stage, and appropriate protection such as the installation of bollards and barriers provided for vulnerable areas.

Wind Zones

9.3 Linea® Weatherboard - Cavity Construction is suitable for use on buildings situated in all Building Wind Zones of NZS 3604, up to, and including Very High. *(For the scope limitations of buildings covered by this Certificate, refer to Paragraph 2.1.)*

Durability

Serviceable Life

10.1 Linea® Weatherboard - Cavity Construction installations are expected to have a serviceable life of at least 50 years provided the paint coating system is maintained in accordance with this Certificate to ensure the Linea® Weatherboards and fixings remain dry in service. Linea® Weatherboards must be painted within 3 months of fixing.

10.2 Areas of geothermal activity and coastal locations can be very corrosive to fasteners, especially coastal locations within distances of up to 500 metres of the sea including harbours, or 100 metres from tidal estuaries and sheltered inlets in some instances. These coastal locations are defined in NZS 3604 as Sea Spray Zone and Zone 1. To achieve a 50 year serviceable life in Sea Spray Zones and areas of geothermal activity, Linea® Weatherboard must be fixed with stainless steel fasteners. To achieve a 50 year serviceable life in Zone 1, Linea® Weatherboard must be fixed with stainless steel or protected hot-dip galvanised steel fasteners. Fasteners outside the Sea Spray Zone, Zone 1 and areas of geothermal activity may be hot-dip galvanised steel.

Maintenance

11.1 Regular maintenance is essential for Linea® Weatherboard - Cavity Construction installations to continue to meet the NZBC durability performance provision and to maximise their serviceable life.

11.2 Annual inspections must be made to ensure that all aspects of the cladding system, including the paint coating system, flashings and any sealed joints remain in a weatherproof condition. Any damaged areas or areas showing signs of deterioration which would allow water ingress must be repaired immediately. Sealant and paint coatings must be repaired in accordance with the sealant or paint coating manufacturer's instructions.

11.3 Regular cleaning (at least annually) of the paint coating surface is recommended to remove grime, dirt and organic growth and to maximise the life and appearance of the coating. Paint systems must be recoated at approximately 5-10 yearly intervals in accordance with the paint manufacturer's instructions.

11.4 Minimum ground clearances as set out in this Certificate must be maintained at all times during the life of the cladding. *(Failure to adhere to the minimum ground clearances given in this Certificate and the Technical Literature will adversely affect the long term durability of Linea® Weatherboard - Cavity Construction.)*

Control of External Fire Spread

12.1 Linea® Weatherboard - Cavity Construction is suitable for use where a non-combustible material is specified. When Linea® Weatherboard is finished with a paint coating of not more than 1.0 mm in thickness, it is suitable for use as an external wall cladding in all building Purpose Groups in accordance with NZBC Acceptable Solution C/AS1 Part 7, Paragraph 7.11.2(a).

Outbreak of Fire

13.1 When Linea® Weatherboard - Cavity Construction is finished with a paint coating of not more than 1.0 mm in thickness, clearance separations from chimneys and flues are not required. However, when used in conjunction with, or attached to heat sensitive materials, the heat sensitive material must be separated from chimneys and flues in accordance with the requirements of NZBC Acceptable Solution C/AS1 Part 9 for the protection of combustible materials.

External Moisture

14.1 Linea® Weatherboard - Cavity Construction, when installed in accordance with this Certificate and the Technical Literature will prevent the penetration of moisture that could cause undue dampness or damage to building elements.

14.2 The cavity must be sealed off from the roof and sub-floor space to meet code compliance with Clause E2.3.5.

14.3 Linea® Weatherboard - Cavity Construction allows excess moisture present at the completion of construction to be dissipated without permanent damage to building elements to meet code compliance with Clause E2.3.6.

14.4 The details given in the Technical Literature for weather sealing are based on the design principle of having a first and second line of defence against moisture entry for all joints, penetrations and junctions.

The ingress of moisture must be excluded by detailing joinery and wall interfaces as shown in the Technical Literature. Weathertightness details that are developed by the designer are outside the scope of this Certificate and are the responsibility of the designer for compliance with the NZBC.

14.5 The use of Linea® Weatherboard - Cavity Construction where there is a designed cavity drainage path for moisture that penetrates the cladding, does not reduce the requirement for junctions, penetrations, etc to remain weather resistant.

Internal Moisture

15.1 NZBC Acceptable Solution E3/AS1 Paragraph 1.1.1(a) requires a minimum wall R-value of 1.5 for framed cavity wall construction and therefore, the wall frame cavity must be insulated.

Water Vapour

15.2 Linea® Weatherboard - Cavity Construction is not a barrier to the passage of water vapour, and when installed in accordance with this Certificate will not create or increase the risk of moisture damage resulting from condensation.

Installation Skill Level Requirements

16.1 Installation of Linea® Weatherboard and accessories supplied by James Hardie New Zealand Ltd and the building contractor must be completed by tradespersons with an understanding of cavity construction and bevel-back weatherboard installation, in accordance with instructions given within the Linea® Weatherboard - Cavity Construction Technical Literature and this Certificate.

System Installation

Building Wrap and Flexible Sill and Jamb Tape Installation

17.1 The selected building wrap and flexible sill and jamb tape system must be installed by the building contractor in accordance with the wrap and tape manufacturer's instructions prior to the installation of the Linea® Weatherboards. Particular attention must be paid to the installation of the building wrap and sill and jamb flashing tapes around window and door openings to ensure a continuous seal is achieved and all exposed timber in the opening is protected.

Cavity Battens

17.2 Cavity battens must be installed over the building wrap to the wall framing at maximum 600 mm centres where the studs are at 600 mm centres, or at 400 mm centres when studs are at 400 mm centres. The battens must be fixed in place with 40 x 2.8 mm hot-dip galvanised flat-head nails at maximum 800 mm centres.

17.3 Where studs are at greater than 400 mm centres, a building wrap support must be installed over the building wrap between the cavity battens at maximum 300 mm centres.

Linea® Weatherboard Installation

17.4 Linea® Weatherboards may be cut on site by power saw. Holes and cut-outs may be formed by drilling a number of holes around the perimeter of the opening required and tapping out the centre with a hammer, or by using a hole saw.

17.5 Weatherboards must be dry prior to installation. Before the weatherboards are installed, cut ends and the back face of the bottom course must be sealed with an acrylic sealer to reduce the absorbency of the fibre cement.

17.6 Linea® Weatherboards must be installed starting at the bottom of the wall. A cant strip (H3.1 treated timber or fibre cement) must be fixed behind the bottom course of weatherboards to ensure the weatherboards are set at the correct angle. The cant strip must be continuous around the perimeter of the building. The bottom course of weatherboards must overhang the bottom plate by a minimum of 50 mm.

17.7 Before the weatherboards are installed, the corner detail must be prepared to suit the selected option, e.g. external box corner, corner soaker. The necessary flashings must be installed before commencing weatherboard fixing.

17.8 The first course of weatherboards must be full length, i.e. 4200 mm and commence from an external corner. Jointing of Linea® Weatherboards is made off the stud using the pre-cut tongue and groove joint. Tongue and groove joints may be located centrally between the studs, but must be no closer than 100 mm to the edge of a stud. A bead of sealant must be applied to the front side of the tongue before the corresponding board is inserted. Subsequent courses of weatherboards must be installed so that the tongue and groove joints are staggered by 600 mm minimum from joints in the previous course.

17.9 Linea® Weatherboards must have a minimum lap of 30 mm, and should be set out so as near to a full board as possible will finish under and over windows and doors and at the top of the wall. A storey rod can be used to accurately position weatherboard courses.

17.10 Linea® Weatherboards must be fixed to each stud using concealed fixings behind the lap of the boards or face nailing, except that face nailing must be provided at all corners and vertical edges of openings.

17.11 Concealed fixing must be carried out using 60 x 2.8 mm hot-dip galvanised or stainless steel Hardiflex nails depending on the location - see Paragraph 10.2. Nails must be fixed 25 mm from the top edge of the board and must be driven flush with the board surface.

17.12 Face nailing must be carried out using 75 x 3.15 mm hot-dip galvanised or stainless steel jolt-head nails depending on the location - see Paragraph 10.2. Nails must be fixed 15 mm up from the bottom of the board and punched a maximum of 2 mm below the surface of the board. When stainless steel nails are used, the top board at each lap must be pre-drilled.

17.13 Linea® Weatherboards can be hand or gun nailed. Nails must not be closer than 25 mm to the end of the board when hand nailing, or closer than 50 mm when gun nailing.

(Note: Gun nailing must only be used for concealed nailing.)

Aluminium Joinery Installation

17.14 Aluminium joinery and associated head and sill flashings must be installed by the building contractor in accordance with the Technical Literature. A 7.5 mm nominal gap must be left between the joinery reveal

and the wall framing so a PEF rod and air seal can be installed after the joinery has been secured in place.

17.15 After installing the window and door joinery; Linea® Trim, planted sills and scribes may be installed in accordance with the Technical Literature to provide additional weatherproofing for the joinery/weatherboard junction.

Inspections

17.16 The Technical Literature must be referred to during the inspection of Linea® Weatherboard - Cavity Construction installations by building consent authorities and territorial authorities.

Finishing

17.17 The paint coating manufacturer's instructions must be followed at all times for application of the paint finish. Linea® Weatherboards and trim must be clean and dry before commencing painting.

Health and Safety

18.1 Cutting of Linea® Weatherboard must be carried out in well ventilated areas, and a dust mask and eye protection must be worn.

18.2 When power tools are used for cutting, grinding or forming holes, health and safety measures as set out in the Technical Literature must be observed because of the amount of dust generated.

18.3 Safe use and handling procedures for Linea® Weatherboard and the components that make up the cladding system are provided in the relevant manufacturer's Technical Literature.

The following is a summary of the technical investigations carried out:

Tests

19.1 The following testing has been completed by BRANZ:

- BRANZ expert opinion on NZBC E2 code compliance for Linea® Weatherboard - Cavity Construction was based on testing and evaluation of all details within the scope and as stated within this Certificate. Linea® Weatherboard - Cavity Construction was tested to AS/NZS 4284 with a BRANZ-designed extension, which became the basis of E2/VM1. The testing was completed in three stages; the first being the standard AS/NZS 4284 test, the second being the modified AS/NZS 4284 test with defects introduced in the test panel, and the third being the modified AS/NZS 4284 test with the internal linings and building wrap removed. The testing assessed the performance of the foundation detail, window head, jamb and sill details, internal and external corners. In addition to the weathertightness test, the details contained within the Technical Literature have been reviewed, and an opinion has been given by BRANZ technical experts that the system will meet the performance levels of NZBC Acceptable Solution E2/AS1 for drained cavity claddings.
- Uniform wind face load tests to simulate wind pressures on 12 mm thick Linea® Weatherboards were carried out by BRANZ, and the results were used in assessing 16 mm thick Linea® Weatherboard used in Linea® Weatherboard - Cavity Construction.

- Cone Calorimeter testing to determine the peak rate of heat release and total heat release of Linea® Weatherboard was completed by BRANZ. The testing was carried out in accordance with AS/NZS 3837.

19.2 Linea® Weatherboards have been tested by a James Hardie NATA accredited laboratory in accordance with AS/NZS 2908.2. The testing covered: soak-dry, bending strength, warm water soaking, heat/rain, freeze/thaw and apparent density. The test methods and results have been reviewed by BRANZ and found to be satisfactory.

19.3 Testing has been carried out by James Hardie Building Products to determine the modulus of rupture and inter-laminar bond strength of carbonated and non-carbonated Linea® Weatherboard. The test methods and results have been reviewed by BRANZ and found to be satisfactory.

Other Investigations

20.1 Weathertightness, structural, fire and durability opinions have been provided by BRANZ technical experts.

20.2 Site visits have been carried out by BRANZ to assess the practicability of installation, and to examine completed installations.

20.3 The manufacturer's Technical Literature has been examined by BRANZ and found to be satisfactory.

Quality

21.1 The manufacture of Linea® Weatherboard has been examined by BRANZ, and details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory.

21.2 The quality of materials, components and accessories supplied by James Hardie New Zealand Ltd is the responsibility of James Hardie New Zealand Ltd. The quality control system of James Hardie New Zealand Ltd has been assessed and registered as meeting the requirements of ISO 9001: 2000 by Telarc Limited, Registration Number 409.

21.3 Quality on site is the responsibility of the installer.

21.4 Designers are responsible for the building design, and building contractors are responsible for the quality of installation of Linea® Weatherboard and accessories in accordance with the instructions of James Hardie New Zealand Ltd.

21.5 Building owners are responsible for the maintenance of Linea® Weatherboard - Cavity Construction in accordance with the instructions of James Hardie New Zealand Ltd.

Sources of Information

- AS 3720 Guide to the properties of paints for buildings.
- AS/NZS 2908.2: 2000 Cellulose-cement products - Flat sheet.
- AS/NZS 3837: 1998 Method of test for heat and smoke release rates for materials and products using an oxygen consumption calorimeter.
- AS/NZS 4284: 1995 Testing of building facades.
- AS/NZS 4534: 1998 Zinc and zinc/aluminium-alloy coatings on steel wire.
- AS/NZS 4680: 1999 Hot-dip galvanized (zinc) coatings on fabricated ferrous articles.
- NZS 3602: 2003 Timber and wood-based products for use in building.
- NZS 3603: 1993 Timber Structures Standard
- NZS 3604: 1999 Timber framed buildings.
- NZS 4203: 1992 General structural design and design loadings for buildings
- NZS 4211: 1985 Specification for performance of windows.
- Compliance Document for New Zealand Building Code External Moisture Clause E2, Department of Building and Housing, Third Edition July 2005.
- New Zealand Building Code Handbook and Approved Documents, Building Industry Authority, 1992.
- The Building Regulations 1992, up to, and including October 2004 amendment.

Amendment No.1, dated 6 March 2007.

The Appraisal Certificate has been amended to update the Certificate holders name; to remove references to E2/AS1 Third Edition June 2004; to update the Technical Literature reference, and to amend Paragraphs 8.4, 8.5, 8.6 and 14.1.



In the opinion of BRANZ, Linea® Weatherboard - Cavity Construction is fit for purpose and will comply with the Building Code to the extent specified in this Certificate provided it is used, designed, installed and maintained as set out in this Certificate.

The Appraisal Certificate is issued only to the Certificate Holder, James Hardie New Zealand Ltd, and is valid until further notice, subject to the Conditions of Certification.

Conditions of Certification

1. This Certificate:
 - a) relates only to the product as described herein;
 - b) must be read, considered and used in full together with the technical literature;
 - c) does not address any Legislation, Regulations, Codes or Standards, not specifically named herein;
 - d) is copyright of BRANZ.
2. The Certificate Holder:
 - a) continues to have the product reviewed by BRANZ;
 - b) shall notify BRANZ of any changes in product specification or quality assurance measures prior to the product being marketed;
 - c) abides by the BRANZ Appraisals Services Terms and Conditions.
3. The product and the manufacture are maintained at or above the standards, levels and quality assessed and found satisfactory by BRANZ.
4. BRANZ makes no representation as to:
 - a) the nature of individual examples of, batches of, or individual installations of the product, including methods and workmanship;
 - b) the presence or absence of any patent or similar rights subsisting in the product or any other product;
 - c) any guarantee or warranty offered by the Certificate Holder.
5. Any reference in this Certificate to any other publication shall be read as a reference to the version of the publication specified in this Certificate.

For BRANZ


J B Warden


M E Reed

Date of issue: 4 February 2005

DESIGNER AND USER GUIDELINES

THERMAKRAFT 215 BITUMINOUS SELF SUPPORTING ROOFING UNDERLAY

Product Description	Thermakraft 215 Bituminous Self Supporting Roofing Underlay is specifically designed for use in Domestic and Commercial type buildings. Thermakraft 215 Bituminous Self Supporting Roofing Underlay will provide the following functions: 1) Permeable to water vapours. 2) Resistance to water and air penetration. 3) Resistance to dust and excessive air movement. 4) Is self supporting up to 1200mm rafter/purlin spacing.															
Applications	Thermakraft 215 Bituminous Self Supporting Roofing Underlay provides the ideal temporary protection against wind, snow and rain prior to the application of the wall cladding or roofing material. It is ideally used to reduce condensation under roofing. Care should be taken not to expose Thermakraft 215 Bituminous Self Supporting Roofing Underlay to continuous wet and windy conditions. Apply during mild conditions.															
Note	Applications outside our recommendations or if unusual conditions exist the suitability of Thermakraft 215 Bituminous Self Supporting Roofing Underlay should be established by contacting a representative of Thermakraft Industries (NZ) Ltd.															
Standard Roll Dimensions	Thermakraft 215 Bituminous Self Supporting Roofing Underlay is coloured black. Rolls are girth wrapped and labelled with the company name and manufacture batch number. <table><tr><td>Roll Sizes</td><td>1250mm x 40m</td><td>50m²</td><td>18 kg</td></tr><tr><td></td><td>1250mm x 20m</td><td>25m²</td><td>9 kg (2 per pack)</td></tr><tr><td></td><td>1450mm x 34.5m</td><td>50m²</td><td>18 kg</td></tr></table>				Roll Sizes	1250mm x 40m	50m ²	18 kg		1250mm x 20m	25m ²	9 kg (2 per pack)		1450mm x 34.5m	50m ²	18 kg
Roll Sizes	1250mm x 40m	50m ²	18 kg													
	1250mm x 20m	25m ²	9 kg (2 per pack)													
	1450mm x 34.5m	50m ²	18 kg													
Standards	Thermakraft 215 Bituminous Self Supporting Roofing Underlay complies with the requirements of AS/NZS 4200.1: 1994 Pliable Building Membranes and Underlays.															
Durability	Thermakraft 215 Bituminous Self Supporting Roofing Underlay when In accordance with the approved document E2 of the Building Code and: • is installed correctly. • is not subjected to unreasonable conditions of exposure. • is not damaged due to design defects. • is not covered by faulty or thin sheathing. • must not be exposed to the weather for more than 7 days. • is not subjected to prolonged humidities in excess of 90% RH. Thermakraft 215 Bituminous Self Supporting Roofing Underlay will last for 50 years.															

THERMAKRAFT 215 Bituminous Self Supporting Roofing Underlay

Installation	Thermakraft 215 Bituminous Self Supporting Roofing Underlay may be run <u>vertically</u> over purlins with a 150mm lap. Fix securely to purlins with galvanised fixing clips. The membrane should be firmly laid to avoid excessive dishing between purlins. Avoid prolonged exposure by installing the roof immediately.	
NOTE:	However if used vertically individual runs should be limited to 10 metres. Thermakraft 215 Bituminous Self Supporting Roofing Underlay may be run <u>horizontally</u> across rafter/trusses with a 150mm lap, prior to fixing of purlins or battens. Secure to rafters/trusses using appropriate fixing clouts or clips. Avoid prolonged exposure by installing the roof immediately.	
NOTE:	To conform to NZS 3604: 1999 Section 11.2, underlays under an 8° pitch shall be laid horizontally and the upper sheets shall be lapped over the lower sheet on the roof.	
Availability	Thermakraft 215 Bituminous Self Supporting Roofing Underlay is available from leading hardware and builders supplies merchants and roofing manufacturers. In case of difficulty contact our office toll free 0800-806-595 for assistance.	
Storage	Thermakraft 215 Bituminous Self Supporting Roofing Underlay should be stored on end and kept dry.	
Fire Retardancy	Thermakraft 215 Bituminous Self Supporting Roofing Underlay is a bitumen based product and is therefore not intended for use as a fire retardant product.	
Classification	In accordance With AS/NZS 4200.1 Duty: Heavy Flammability Index: Unclassified	
Technical Data	(As per AS/NZS 4200.1 and NZS 2295) Nominal Weight 370 g/m ² Tensile Strength MD 15.57 kN/m Tensile Strength CD 7.50 kN/m Edge Tear 99.8 N Ph Reaction 7.3 nominal Permeability 197 g/m ² / day Water Absorption 277 g/m ² nominal Water Penetration Pass	

The information contained in this document is believed to be correct and accurate. However all due care should be exercised by those who use it. If in doubt contact a **Thermakraft Industries (NZ) Ltd** representative for advice. Care should be taken to ensure that fixing clips, nails and staples used with **Thermakraft 215 Bituminous Self Supporting Roofing Underlay** are of a type that will have a life of not less than 50 years.



Thermakraft Industries (NZ) Ltd

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**SPECIFY WITH
CONFIDENCE**

BRANZ Appraisals

**Technical Assessments of
products for building and
construction**

**BRANZ
APPRAISAL
CERTIFICATE
No. 467 (2005)**

**TITAN® &
EXOTEC®
FAÇADE PANEL
RAINSCREEN**

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Product

1.1 Titan® & ExoTec® Façade Panel Rainscreen is a negative expressed joint cladding system for specific design buildings of timber frame and timber frame infill construction.

1.2 The system consists of a rigid air barrier (RAB), timber battens to form a cavity, weather seal tapes, horizontal joint socket and Titan® and ExoTec® façade panels. The Titan® and ExoTec® façade panels are finished with a latex paint system.

1.3 The system incorporates a primary and secondary means of weather resistance (first and second line of defence) against water penetration by separating the façade panels from the rigid air barrier with a nominal 20 mm cavity. The cavity allows for any occasional ingress of water that may get past the external skin to drain to the exterior of the building, and any remaining moisture to dry by evaporation.



Scope

2.1 Titan® & ExoTec® Façade Panel Rainscreen has been appraised as an external wall cladding system for buildings within the following scope:

- category I to V buildings as defined in NZS 4203, except that housing and communal residential buildings that fall within the scope limitations of NZBC Acceptable Solution E2/AS1 Third Edition June 2004, Paragraph 1.1 are excluded; and,
- constructed with timber framing, or timber frame infill complying with the NZBC; and,
- subjected to maximum wind pressures for structural and weathertightness design of 1.0 kPa Serviceability Limit State (SLS) and 1.5 kPa Ultimate Limit State (ULS) where studs are at maximum 600 mm centres, and 3.0 kPa SLS and 4.5 kPa ULS where studs are at maximum 400 mm centres; and,
- where the maximum seismic displacement under serviceability conditions is 10 mm; and,
- where the cavity is drained and ventilated at every 10 m maximum; and,
- with a rigid air barrier installed at the back of the cavity.

2.2 All buildings incorporating Titan® & ExoTec® Façade Panel Rainscreen must be subject to specific engineering and weathertightness design. Building designers are responsible for the frame design and for the incorporation of the Titan® & ExoTec® Façade Panel Rainscreen into their design in accordance with the instructions of James Hardie Building Products.

2.3 Titan® & ExoTec® Façade Panel Rainscreen must only be installed to vertical flat surfaces.

2.4 Window and door joinery installations in the Titan® & ExoTec® Façade Panel Rainscreen system must be subject to specific weathertightness design. Building designers are responsible for verifying the performance of the joinery installation details. *(The Appraisal of Titan® & ExoTec® Façade Panel Rainscreen relies on the joinery being the subject of specific engineering design with regards to wind load and deflection for the design wind pressure.)*

2.5 The system must be installed using detailing as set out in the Technical Literature.

(Note: The Titan® & Exotec® Façade Panel Rainscreen system can be used to provide structural bracing and fire resistance rated construction, but these aspects have not been assessed by this Certificate and are outside its scope.)

Building Regulations

New Zealand Building Code (NZBC)

3.1 In the opinion of BRANZ, Titan® & ExoTec® Façade Panel Rainscreen if designed, used, installed and maintained in accordance with the statements and conditions of this Certificate, will meet or contribute to meeting the following provisions of the NZBC:

Clause B1 STRUCTURE: Performance B1.3.1, B1.3.2 and B1.3.4. Titan® & ExoTec® Façade Panel Rainscreen meets the requirements for loads arising from self-weight, earthquake, wind, human impact and creep [i.e. B1.3.3 (a), (f), (h), (j) and (q)]. See Paragraphs 9.1 – 9.6.

Clause B2 DURABILITY: Performance B2.3.1 (b), 15 years. Titan® & ExoTec® Façade Panel Rainscreen meets this requirement. See Paragraph 10.1.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.2. Titan® & ExoTec® Façade Panel Rainscreen meets this requirement. See Paragraphs 14.1 – 14.6.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Titan® & ExoTec® Façade Panel Rainscreen meets this requirement and will not present a health hazard to people.

3.2 This Certificate appraises an Alternative Solution in terms of New Zealand Building Code Compliance.

Technical Specification

4.1 System components and accessories for Titan® & ExoTec® Façade Panel Rainscreen which are supplied by James Hardie New Zealand Ltd are:

Fibre Cement Sheets

- Titan® façade panels are medium density fibre cement produced with a smooth face and are sealed with an acrylic primer on the front and back face and all four edges. The sheets are 9 mm thick and are available 1190 mm wide by 2400, 2700 and 3000 mm long.
- ExoTec® façade panels are high density compressed fibre cement produced with a smooth face and are sealed with an acrylic primer on the front and back face and all four edges. The sheets are 9 mm thick and are available 1190 mm wide by 1800, 2400 and 3000 mm long.
- RAB sheets are produced with a smooth face and are sealed with an acrylic primer on the front face and all four edges. The sheets are 5.5 mm thick and are available 1200 mm wide by 2400 and 3000 mm long.
- The Titan® and ExoTec® façade panels and RAB sheets are manufactured from cellulose fibre cement. The sheets are formed, cut to length and then cured by high-pressure autoclaving. They are manufactured to meet the requirements of AS/NZS 2908.2.

Accessories

- Cavity batten packer – 3 mm thick by 40 mm wide fibre cement manufactured to meet the requirements of AS/NZS 2908.2. The packers are available in 1200 mm lengths.
- Aluminium socket – manufactured from Grade 5005

aluminium alloy. It is extruded 1.2 mm thick by 82 mm wide with a 9 mm wide T-lip located 45 mm down from the top edge. The socket is available in 2400 and 3000 mm lengths.

- Inseal® 3259 Tape – black, compressible, medium density PVC (Polyvinyl Chloride) closed-cell foam. The foam is coated on one face with pressure sensitive acrylic adhesive. The other face is covered by a silicone release paper. The tape is 1.5 mm thick and is supplied in rolls 50 and 80 mm wide and 50 m long.
- Inseal® 3109/Butyl Tape – 1 mm thick black Butyl rubber membrane with 6 x 9 mm Inseal® 3109 adhered along each edge of one face with an acrylic adhesive. Inseal® 3109 is compressible, black, low density PVC foam. The tape is supplied in rolls 50 and 80 mm wide and 12 m long.
- Cavity vent strip – uPVC, available in 2700 mm lengths.

4.2 Accessories used with Titan® & ExoTec® Rainscreen which are supplied by the building contractor are:

- Cavity battens – nominal 50 mm wide by 25 mm thick (minimum finished size of 45 mm wide by 18 mm thick) timber treated to Hazard Class H3.1.
- Timber packers – nominal 50 mm wide by 25 mm thick (minimum finished size of 45 mm wide by 18 mm thick) timber treated to Hazard Class H3.1.
- Joinery flashings – folded from aluminium or galvanised steel to specific weathertightness design to suit the window or door trim opening. Refer to NZS 3604, Section 4 and NZBC Acceptable Solution E2/AS1 Third Edition June 2004, Table 20 for durability requirements.
- Horizontal drained joint flashing – folded from aluminium or galvanised steel to specific weathertightness design. Refer to NZS 3604, Section 4 and NZBC Acceptable Solution E2/AS1 Third Edition June 2004, Table 20 for durability requirements.
- Flexible sealant – sealant covered by a valid BRANZ Appraisal Certificate for use as a weather sealing sealant for exterior use.
- RAB sheet fixings – 40 x 2.8 mm hot-dip galvanised flat head Hardiflex nails.
- Cavity batten fixings – 40 x 2.8 mm hot-dip galvanised flat head Hardiflex nails.
- Titan® façade panel fixings – 65 x 10g Grade 316 stainless steel wood screws, or 60 x 3.15 mm hot-dip galvanised or Grade 316 stainless steel, ring shank Hardiflex nails. (Note: The screw head must be minimum 9 mm diameter.)
- ExoTec® façade panel fixings – 65 x 10g Grade 316 stainless steel wood screws. (Note: The screw head must be minimum 9 mm diameter.)

Paint System Specification

4.3 All exposed façade panel surfaces (including panel edges) must be finished with a latex exterior paint system complying with any of Parts 7, 8, 9 or 10 of AS 3730. Proprietary paint systems, including fillers have not been assessed, and are outside the scope of this Certificate.

Handling and Storage

5.1 Handling and storage of all materials supplied by James Hardie New Zealand Ltd and the building contractor, whether on or off site, is under the control of the building contractor. The Titan® and ExoTec® façade panels and RAB sheets must be stacked flat, off the ground and supported on a level platform. They must be kept dry at all times either by storing under cover or providing waterproof covers to the stack. Care must be taken to avoid damage to edges, ends and surfaces. Sheets must always be carried on edge.

5.2 Cavity battens and other accessories must be stored so they are kept clean, dry and undamaged. All accessories must be

used within the maximum storage period recommended.

Technical Literature

6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for Titan® & ExoTec® Façade Panel Rainscreen. The Technical Literature must be read in conjunction with this Certificate. All aspects of design, use, installation and maintenance contained in the Technical Literature and within the scope of this Certificate must be followed.

Design Information

Framing

Timber Treatment

7.1 Timber wall framing behind the Titan® & ExoTec® Façade Panel Rainscreen system must be treated as required by NZS 3602.

Timber Framing

7.2 Timber framing must be minimum No. 1 framing grade in accordance with NZS 3631. The building designer is responsible for the framing design using wind pressures calculated in accordance with NZS 4203 considering local factors. Some guidance is given within the Technical Literature.

7.3 Nominal 75 mm wide studs must be provided at all vertical RAB sheet and façade panel edges. (This can also be achieved by nailing two nominal 50 mm wide studs together.)

7.4 Timber framing must have a maximum moisture content of 24% at the time of the RAB sheet application. (If RAB sheets are fixed to framing with a moisture content of greater than 24% problems may occur at a later date due to excessive timber shrinkage.)

Fibre Cement Sheet Setout

7.5 All vertical and horizontal RAB sheet edges must be supported and fixed directly to the wall framing. At the base of the wall, the RAB sheet must hang 8 mm below the supporting framing.

7.6 All vertical Titan® and ExoTec® façade panel edges must be supported and fixed through the cavity battens to the wall framing. At the base of the wall, the Titan® and ExoTec® panels must hang 50 mm below the supporting framing.

General

8.1 Punchings in the cavity vent strip provide a minimum ventilation opening area of 1000 mm² per lineal metre of wall.

8.2 At ground level, the bottom edge of the Titan® & ExoTec® Façade Panel Rainscreen system must be kept clear of paved surfaces, such as footpaths, by a minimum of 100 mm and unpaved surfaces by 175 mm in accordance with NZBC Acceptable Solution E2/AS1 Third Edition June 2004, Table 18. The ground clearances to finished floor levels as set out in Table 18 must be adhered to at all times.

8.3 The rainscreen must be drained every 10 m maximum. Horizontal Titan® & ExoTec® façade panel joints at intermediate floor levels, or sheet joints between floor levels may be formed using the aluminium socket to create a negative expressed non-drained joint.

8.4 The aluminium socket must not be allowed to come into contact with treated timber battens that contain copper (e.g. CCA, copper azole or ACQ). The socket must be separated from the battens by the fibre cement packer.

8.5 Where the system abuts other cladding systems, the building designer must detail the junction to meet their own requirements and the performance requirements of the NZBC. These details are outside the scope of this Certificate.

Structure

Mass

9.1 The mass of the Titan® & ExoTec® Façade Panel Rainscreen system is approximately 22 kg/m² at equilibrium moisture content.

Impact Resistance

9.2 The system will resist human impact loads likely to be encountered. The likelihood of damage to the system from other soft and hard body impacts should be considered at the design stage, and appropriate protection such as the installation of bollards and barriers provided for vulnerable areas.

Wind Loading

9.3 The system is suitable for use when subjected to maximum wind pressures of 1.0 kPa Serviceability Limit State (SLS) and 1.5 kPa Ultimate Limit State (ULS) where studs are at 600 mm centres, and 3.0 kPa SLS and 4.5 kPa ULS where studs are at 400 mm centres.

Seismic Loading

9.4 The system is suitable for use where the maximum seismic displacement is 10 mm under serviceability conditions.

RAB Sheet Fixing

9.5 The RAB sheets must be fixed to the wall framing (studs and nogs) at maximum 300 mm centres. The fixings must be installed a minimum of 12 mm from the edge of the sheet.

Titan® and ExoTec® Façade Panel Fixing

9.6 Titan® and ExoTec® façade panels must be fixed through the cavity battens to the wall framing at maximum centres as specified in Table 1. The fixings must be installed a minimum of 18 mm from the edge of the sheet.

Table 1: Titan® and ExoTec® Façade Panel Fixing Centres

Façade Panel	Maximum Stud Spacing (mm)	Fixing Type	Maximum Fixing Centres to Edge of Sheet (mm)	Maximum Fixing Centres to Body of Sheet (mm)
Titan®	600	60 x 3.15 mm Hardiflex nail	200	250
Titan® and ExoTec®	600	65 x 10g wood screw	200	300
Titan®	400	60 x 3.15 mm Hardiflex nail	150	150
Titan® and ExoTec®	400	65 x 10g wood screw	200	200

Durability

Serviceable Life

10.1 Provided the Inseal® 3259 tape and Inseal® 3109 foam component of the Inseal® 3109/Butyl Tape is not exposed to the weather or ultra-violet (UV) light for a total of more than 30 days; and provided the system is maintained in accordance with this Certificate, and the Titan® and ExoTec® façade panels and fixings are continuously protected by a weathertight coating

and remain dry in service, Titan® & ExoTec® Façade Panel Rainscreen is expected to have a serviceable life of at least 15 years. If the Inseal® 3259 tape or Inseal® 3109 foam component of the Inseal® 3109/Butyl Tape is exposed to the weather or UV light for a total of more than 30 days, then it must be replaced with new material.

Maintenance

11.1 Regular maintenance is essential for Titan® & ExoTec® Façade Panel Rainscreen installations to continue to meet the NZBC durability performance provision and to maximise the serviceable life of the system.

11.2 Annual inspections must be made to ensure that all aspects of the cladding system, including the paint coating system, flashings, weather seal tapes and any sealed joints remain in a weatherproof condition. Any damaged areas or areas showing signs of deterioration which would allow water ingress must be repaired immediately. Sealant, paint coatings and the like must be repaired in accordance with the sealant or paint coating manufacturer's instructions.

11.3 Regular cleaning (at least annually) of the paint coating surface is required to remove grime, dirt and organic growth and to maximise the life and appearance of the coating. Paint systems must be recoated at approximately 5-10 yearly intervals in accordance with the paint manufacturer's instructions.

11.4 Minimum ground clearances as set out in this Certificate and the Technical Literature must be maintained at all times during the life of the system. *(Failure to adhere to the minimum ground clearances given in this Certificate and the Technical Literature will adversely affect the long term durability of the Titan® & ExoTec® Façade Panel Rainscreen system.)*

Control of External Fire Spread

12.1 Titan® & ExoTec® Façade Panel Rainscreen is suitable for use where a non-combustible material is specified. When Titan® and ExoTec® façade panels are finished with a paint coating of not more than 1.0 mm in thickness, they are suitable for use as an external wall cladding in all building Purpose Groups in accordance with NZBC C/AS1 Part 7, Paragraph 7.11.2(a).

Outbreak of Fire

13.1 When Titan® & ExoTec® Façade Panel Rainscreen is finished with a paint coating of not more than 1.0 mm in thickness, clearance separations from chimneys and flues are not required. However, when used in conjunction with, or attached to heat sensitive materials, e.g. Inseal® 3259 Tape and Inseal® 3109/Butyl Tape, the heat sensitive material must be separated from chimneys and flues in accordance with the requirements of NZBC Acceptable Solution C/AS1 Part 9 for the protection of combustible materials.

External Moisture

14.1 The Titan® & ExoTec® Façade Panel Rainscreen system has been tested in accordance with the requirements of AS/NZS 4284 up to 4.5 kPa ULS (refer to Paragraph 2.1). This test method is designed to verify the performance of commercial building facades. *(Titan® & ExoTec® Façade Panel Rainscreen has not been tested in accordance with the requirements of the housing and communal residential building test method, NZBC Verification Method E2/VM1.)*

14.2 Titan® & ExoTec® Façade Panel Rainscreen, when installed in accordance with this Certificate and the

Technical Literature, prevents the penetration of moisture that could cause undue dampness or damage to building elements.

14.3 The cavity must be sealed off from the roof and sub-floor space to meet code compliance with NZBC Clause E2.3.5.

14.4 Titan® & ExoTec® Façade Panel Rainscreen allows excess moisture present at the completion of construction to be dissipated without permanent damage to building elements to meet code compliance with NZBC Clause E2.3.6.

14.5 The details given in the Technical Literature for weather sealing are based on the design principle of having a first and second line of defence against moisture entry for all joints, penetrations and junctions. Weathertightness details that are developed by the designer are outside the scope of this Certificate and are the responsibility of the designer for compliance with the NZBC.

14.6 The use of Titan® & ExoTec® Façade Panel Rainscreen where there is a designed cavity drainage path for moisture that penetrates the cladding, does not reduce the requirement for junctions and penetrations to remain weather resistant.

Installation Information

Installation Skill Level Requirements

15.1 Installation of Titan® & ExoTec® Façade Panel Rainscreen components and accessories supplied by James Hardie New Zealand Ltd and the building contractor must be completed by tradespersons with an understanding of cavity construction and fibre cement installation, in accordance with the instructions given within the Titan® & ExoTec® Façade Panel Rainscreen Technical Literature, the building designers documentation and this Certificate.

System Installation

Rigid Air Barrier (RAB)

16.1 RAB sheets may be cut on site by power saw. Holes and cut-outs may be formed by drilling a number of holes around the perimeter of the opening required and tapping out the centre with a hammer, or by using a hole saw.

16.2 RAB sheets must be dry prior to installation. Before the sheets are installed, cut edges and any penetrations in the sheet must be sealed with an acrylic primer.

16.3 At the base of the wall, the RAB sheet must hang minimum 8 mm below the supporting framing. The RAB sheets must be fixed directly to the wall framing at maximum 300 mm centres with 40 x 2.8 mm hot-dip galvanised flat head Hardiflex nails. The nails must not be closer than 12 mm from the edge of the sheet.

16.4 Vertical joints in the RAB must be installed with a 2 mm gap between the sheets over nominal 75 mm wide studs. A minimum 10 mm gap must be left at all horizontal RAB sheet joints. The horizontal gap between the sheets must be flashed with 80 x 1.5 mm Inseal® 3259 Tape, 1.0 mm thick by 80 mm wide Butyl rubber or 0.55 mm thick galvanised steel or aluminium. Joints in the RAB sheets do not need to be in line with joints in the façade panels.

16.5 Penetrations through the air barrier must be sealed against the RAB sheets to ensure the integrity of the air barrier is retained.

Inseal® 3259 Tape

16.6 Prior to the installation of the cavity battens, all vertical joints in the RAB sheets and at internal and external corners must be covered with Inseal® 3259 Tape. The tape is applied directly from the roll leaving the release liner in place to prevent stretching of the tape. The tape is applied directly to the RAB sheet by pressing firmly along the entire tape to obtain maximum benefit of the pressure sensitive adhesive and to ensure a continuous seal. The release liner is removed only when the cavity battens are ready to be installed.

16.7 Inseal® 3259 Tape installed over vertical RAB sheet joints must always be covered by a cavity batten.

Cavity Battens

16.8 Cavity battens must be installed over the RAB sheets to the wall framing. The battens must be fixed in place with 40 x 2.8 mm hot-dip galvanised flat-head Hardiflex nails at maximum 400 mm centres.

16.9 Double battens must be installed behind all vertical Titan® and ExoTec® façade panel joints. At horizontal aluminium socket joints, 125 mm long vertical timber packers must be installed at 100 mm centres along the line of the joint to support the aluminium socket.

Inseal® 3109/Butyl Flashing Tape and Cavity Batten Packer

16.10 Before installation of the façade panels, Inseal® 3109/Butyl Tape must be installed behind the vertical panel joints to weatherproof the negative expressed joint. Before fixing in place, the tape must be unrolled, cut to length and allowed to 'relax'. The tape is temporarily fixed in position over the cavity battens by stapling to the battens through the outside edge of the Butyl membrane.

16.11 Cavity batten packers must be fixed to the face of all cavity battens and timber packers that do not have Inseal® 3109/Butyl Tape installed over them.

Aluminium Socket

16.12 The aluminium socket must be adhered to the back face of the façade panel. This should be completed on the ground prior to the panel's installation. The socket is installed with the T-lip positioned against the top edge of the façade panel and is adhered to the panel with two continuous beads of sealant.

Titan® and ExoTec® Façade Panel Installation

16.13 Titan® and ExoTec® façade panels may be cut on site by power saw. Holes and cut-outs may be formed by drilling a number of holes around the perimeter of the opening required and tapping out the centre with a hammer, or by using a hole saw.

16.14 Titan® and ExoTec® façade panels must be dry prior to installation. Before the panels are installed, cut edges, any damaged pre-primed factory edges and any penetrations in the panel must be sealed with an acrylic primer.

16.15 The bottom row of façade panels must overhang the bottom plate by a minimum of 50 mm. Vertical negative expressed joints are formed over the Inseal® 3109/Butyl Tape by leaving a 10 mm gap between the sheet edges. Horizontal negative expressed joints are formed by leaving a 10 mm gap between horizontal façade panel edges over the aluminium socket.

16.16 Horizontal drained joints are formed by the installation of a Z flashing which bridges the cavity and allows for cavity drainage. A 10 mm gap must be maintained between the top of the Z flashing and the underside of the façade panel above.

16.17 Titan® façade panel fixing must be carried out using 65 x 10g wood screws or 60 x 3.15 mm hot-dip galvanised or stainless steel, ring shank Hardiflex nails. ExoTec® façade panel fixing must be carried out using 65 x 10g wood screws. The fixings must not be closer than 18 mm from the edge of the panel and at vertical panel joints must penetrate through the outer edge of the Inseal® 3109/Butyl Tape beyond the line of the foam seal.

16.18 Nail fixings must be driven flush with the panel surface. Screw fixings must be countersunk 1.5-2.0 mm below the panel surface.

Joinery Installation

16.19 Window and door joinery and associated flashings, air seals etc must be installed by the building contractor in accordance with the building designer's details.

Inspections

16.20 The Technical Literature must be referred to during the inspection of Titan® & ExoTec® Façade Panel Rainscreen installations by building consent authorities and territorial authorities.

Finishing

16.21 Titan® and ExoTec® façade panels must be coated within 3 months of fixing.

16.22 Countersunk screw fixings must be filled with an exterior grade epoxy filling compound recommended for use with the selected paint system. The stopping of screw fixings is for aesthetic purposes only. The quality of finish on the Titan® and ExoTec® façade panels is dependant on the quality of finishing materials used, and applicator workmanship.

16.23 The paint coating manufacturer's instructions must be followed at all times for application of the paint finish. Titan® and ExoTec® façade panels must be clean and dry before commencing painting.

Health and Safety

17.1 Cutting of the RAB sheets and Titan® and ExoTec® façade panels must be carried out in well ventilated areas, and a dust mask and eye protection must be worn.

17.2 When power tools are used for cutting, grinding or forming holes, health and safety measures as set out in the Technical Literature must be undertaken because of the amount of dust generated.

17.3 Safe use and handling procedures for the RAB sheets, Titan® and ExoTec® façade panels and the components that make up the cladding system are provided in the relevant manufacturer's Technical Literature.

Basis of Appraisal

The following is a summary of the technical investigations carried out:

Tests

18.1 BRANZ expert opinion on NZBC E2 code compliance for Titan® & ExoTec® Façade Panel Rainscreen was based on testing and/or evaluation of all details within the scope of this Certificate. The Titan® & ExoTec® Façade Panel Rainscreen system was tested by BRANZ to AS/NZS 4284 with a design wind pressure of 1.1 kPa Serviceability Limit State. The testing was completed in two stages; the first being the static AS/NZS 4284 test, the second being the dynamic AS/NZS 4284 test. The testing assessed the performance of the foundation detail, window head,

jamb and sill details, vertical negative expressed joint, horizontal negative expressed joints, horizontal drained joint and internal and external corners. In addition to the weathertightness test, the details contained within the Technical Literature have been reviewed, and an opinion has been given by BRANZ technical experts that the system will meet the performance requirements of the New Zealand Building Code External Moisture Clause E2, Third Edition June 2004, when used within the scope of this Certificate.

18.2 Titan® & ExoTec® Façade Panel Rainscreen has been tested by an IANZ accredited laboratory in accordance with AS/NZS 4284 with a design wind pressure of 3.3 kPa Serviceability Limit State. The test methods and results have been reviewed by BRANZ and found to be satisfactory.

18.3 Testing has been carried out by James Hardie New Zealand Ltd to determine the performance of the Titan® & ExoTec® Façade Panel Rainscreen system under negative suction pressure. The test methods and results have been reviewed by BRANZ and found to be satisfactory.

Other Investigations

19.1 Structural and durability opinions have been given by BRANZ technical experts.

19.2 Site visits have been carried out by BRANZ to assess the practicability of installation, and to examine completed installations.

19.3 The Technical Literature for Titan® & ExoTec® Rainscreen has been examined by BRANZ and found to be satisfactory.

Quality

20.1 The manufacture of RAB sheets and Titan® façade panels by James Hardie New Zealand Ltd has been examined by BRANZ, and details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory.

20.2 The manufacture of ExoTec® façade panels by James Hardie Australia Pty Ltd has not been assessed by BRANZ, but details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory.

20.3 The quality of materials, components and accessories supplied by James Hardie New Zealand Ltd is the responsibility of James Hardie New Zealand Ltd. The quality control system of James Hardie New Zealand Ltd has been assessed and registered as meeting the requirements of ISO 9001: 2000 by Telarc Limited, Registration Number 409.

20.4 The quality of materials, components and accessories supplied by James Hardie Australia Pty Ltd is the responsibility of James Hardie Australia Pty Ltd. The quality control system of James Hardie Australia Pty Ltd has been assessed and registered as meeting the requirements of ISO 9001: 2000 by SAI Global Limited, Certificate No. QEC0034.

20.5 Quality on site is the responsibility of the installer.

20.6 Designers are responsible for the building design, including weathertightness design of penetrations, and building contractors are responsible for the quality of installation of the Titan® & ExoTec® Façade Panel Rainscreen components and accessories in accordance with the instructions of James Hardie New Zealand Ltd.

20.7 Building owners are responsible for the maintenance of Titan® & ExoTec® Façade Panel Rainscreen in accordance with the instructions of James Hardie New Zealand Ltd.

Sources of Information

- AS 3730 Guide to the properties of paints for buildings.
- AS/NZS 2908.2: 2000 Cellulose-cement products - Flat sheet.
- AS/NZS 4284: 1995 Testing of building facades.
- NZS 3602: 2003 Timber and wood-based products for use in building.
- NZS 3604: 1999 Timber framed buildings.
- NZS 3631: 1988 New Zealand timber grading rules.
- NZS 4203: 1992 General structural design and design loadings for buildings.
- Approved Document for New Zealand Building Code External Moisture Clause E2, Building Industry Authority, Third Edition June 2004.
- New Zealand Building Code Handbook and Approved Documents, Building Industry Authority, 1992.
- The Building Regulations 1992, up to, and including October 2004 Amendment.



In the opinion of BRANZ, Titan® & ExoTec® Façade Panel Rainscreen is fit for purpose and will comply with the Building Code to the extent specified in this Certificate provided it is used, designed, installed and maintained as set out in this Certificate.

The Appraisal Certificate is issued only to the Certificate Holder, James Hardie New Zealand Ltd, and is valid until further notice, subject to the Conditions of Certification.

Conditions of Certification

1. This Certificate:
 - a) relates only to the product as described herein;
 - b) must be read, considered and used in full together with the technical literature;
 - c) does not address any Legislation, Regulations, Codes or Standards, not specifically named herein;
 - d) is copyright of BRANZ.
2. The Certificate Holder:
 - a) continues to have the product reviewed by BRANZ;
 - b) shall notify BRANZ of any changes in product specification or quality assurance measures prior to the product being marketed;
 - c) abides by the BRANZ Appraisals Services Terms and Conditions.
3. The product and the manufacture are maintained at or above the standards, levels and quality assessed and found satisfactory by BRANZ.
4. BRANZ makes no representation as to:
 - a) the nature of individual examples of, batches of, or individual installations of the product, including methods and workmanship;
 - b) the presence or absence of any patent or similar rights subsisting in the product or any other product;
 - c) any guarantee or warranty offered by the Certificate Holder.
5. Any reference in this Certificate to any other publication shall be read as a reference to the version of the publication specified in this Certificate.

For BRANZ

P Robertson
Chief Executive

Date of issue: 5 May 2005



BRANZ Appraised

Appraisal No.517 [2006]

BRANZ Appraisals

Technical Assessments of products
for building and construction

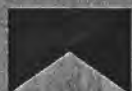
BRANZ
APPRAISAL
No. 517 (2006)

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Product

1.1 ProtectoWall® is a self adhesive damp-proof membrane (DPM), designed to be applied to the exterior face of basement retaining walls to prevent water vapour penetrating to the interior face in spaces where moisture may cause damage.

1.2 The product is supplied as self-adhering, cold-applied, polymer-rubber modified bitumen sheets in roll form.



Please Note: Installation of Pro-Drain 8 drainage/protection board has not been completed.

Scope

2.1 ProtectoWall® has been appraised for use as a damp-proof membrane for basement walls within the following scope:

- the scope limitations of NZBC Acceptable Solution E2/AS1, Section 12; and,
- with dry, clean and sound continuous substrates of reinforced precast or in-situ concrete complying with NZS 3101, or concrete masonry complying with NZS 4210, NZS 4229 and NZS 4230; and,
- where the membrane is adequately protected against damage during backfilling and in service; and,
- where subsoil drainage and free draining granular backfill has been placed behind basement walls; and,
- where they are not subject to hydrostatic pressure.

2.2 The product must be installed by Marshall Waterproofing NZ/AUS Ltd Approved and Trained Installers.

Building Regulations

New Zealand Building Code (NZBC)

3.1 In the opinion of BRANZ, ProtectoWall® if designed, used, installed and maintained in accordance with the statements and conditions of this Certificate, will meet the following provisions of the NZBC:

Clause B2 DURABILITY: Performance B2.3.1 (a) not less than 50 years. ProtectoWall® meets this requirement. See Paragraph 10.1.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.3. ProtectoWall® meets this requirement. See Paragraphs 12.1 – 12.3.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. ProtectoWall® meets this requirement and will not present a health hazard to people.

3.2 This Certificate appraises ProtectoWall® as an **Acceptable Solution** in terms of New Zealand Building Code compliance. The membrane complies with NZBC Acceptable Solution E2/AS1, Paragraph 12.2.1 (a), (b) and (c), and Paragraph 12.2.2 (b).

4.1 Materials supplied by Marshall Waterproofing NZ/AUS Ltd are as follows:

ProtectoWall®

- A self-adhering sheet waterproofing membrane system consisting of a tough fabric reinforcement laminated between two layers of SBS (styrene-butadiene-styrene) modified rubberized asphalt. ProtectoWall® is tacky on both sides of the membrane providing adhesion to the substrate and an adhesive face to hold the protection board in place.
- The membrane is 1.5 mm thick, and supplied in rolls 762 mm wide x 15.24 m long and 900 mm wide x 15.24 m long.

Protecto Wrap #100 Primer

- A high-tack SBS rubber based primer for use on all surfaces (prior to the application of the membrane). Supplied in 4 and 20 litre cans.

Jiffy Seal 500 Detail Tape

- A conformable sheet membrane used for detailing around protrusions and footings. Supplied in 150 mm wide x 15 m long rolls.

JS 160H Mastic

- A rubberized, adhesive, liquid membrane used to seal all terminations, around all penetrations in the membrane and over all mechanical fastenings. Supplied in 310 ml tubes and 4 litre cans.

Pro-Drain 8

- A drainage/protection board used to protect the DPM from backfill material. Available in 1.2 m x 2.1 m sheets.

Handling and Storage

5.1 Handling and storage of all materials whether on or off site is under the control of the installer. Dry storage must be provided for all products and the membranes must be protected from sunlight and UV radiation. Rolls of membrane must be stored on end.

Technical Literature

6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for the ProtectoWall® membrane. The Technical Literature must be read in conjunction with this Certificate. All aspects of design, use, installation and maintenance contained in the Technical Literature and within the scope of this Certificate must be followed.

Design Information

Substrate Design

7.1 Substrate design must be in accordance with the NZBC to a relevant standard, such as NZS 3101 for concrete and NZS 4210, NZS 4230 or NZS 4229 for concrete masonry.

7.2 The substrate must have a surface finish that is smooth, clean and free from defects or irregularities which may damage the membrane.

Control Joints

8.1 Where control or construction joints are formed in the substrate, Marshall Waterproofing NZ/AUS Ltd must be consulted for use of the membranes over these joints.

Backfilling and Drainage

9.1 The membrane must be protected against damage by the placement of a protection material between the membrane and the granular fill.

9.2 Backfilling, drainage and the backfill capping must be in accordance with NZBC Acceptable Solution E2/AS1, Section 12. The minimum requirement for backfilling is that a granular, free-draining material is used with the top of the backfill capped with an impervious clay fill that may be covered with topsoil if required. The impervious capping and topsoil must slope at a minimum of 1:30 fall away from the wall.

9.3 A minimum 100 mm diameter subsoil perforated drainage pipe must be installed at the bottom of the wall. The pipe must be covered with a geotextile filter fabric, be laid at a minimum 1:200 fall and discharge to a drainage outlet. Provision for cleaning the pipe must also be provided.

Durability

Serviceable Life

10.1 ProtectoWall® is a suitable DPM material (modified bitumen sheet) as set out in NZBC Acceptable Solution E2/AS1, Paragraph 12.2.2 (b), therefore it is expected to have a serviceable life of at least 50 years provided it is installed and maintained in accordance with the Technical Literature and this Certificate and is continually protected from sunlight and UV radiation.

Maintenance

11.1 Annual inspections must be made of the membrane top edge seal and protection, the backfill capping, and the drainage pipe to ensure all are functioning as originally designed.

11.2 If required, the drainage pipe must be cleared to remove any sediment or silt build-up. The slope of the backfill capping must be maintained at all times.

External Moisture

12.1 ProtectoWall® membrane, when installed in accordance with this Certificate and the Technical Literature, will prevent water vapour from penetrating to the interior face of basement retaining walls in spaces where moisture may cause damage. The membrane has a vapour flow resistance of not less than 90 MN s/g as required by NZBC Acceptable Solution E2/AS1, Paragraph 12.2.1 (a).

12.2 The membrane self-adheres, and can be used to form sealed joints and to seal penetrations as required by NZBC Acceptable Solution E2/AS1, Paragraph 12.2.1 (b). The top edge of the membrane must be sealed to the wall as set out in the Technical Literature, and must be protected.

12.3 Building designers must ensure junctions with other membranes, such as at the floor/wall junction, form a waterproof joint. Junctions have not been assessed and are outside the scope of this Certificate.

Installation Skill Level Requirement

13.1 Installation of the ProtectoWall® membrane must be completed by Marshall Waterproofing NZ/AUS Ltd Trained and Approved Installers.

System Installation

Substrate Preparation

14.1 All surfaces must be checked to ensure they are dry, clean, smooth and free from sharp edges, loose or foreign materials, oil, grease or other deleterious material that may affect adhesion or may damage the membrane.

Priming

14.2 Prior to application of the membrane all prepared surfaces must be primed with Protecto Wrap #100 primer at a rate of 5 m² per litre, and must be touch dry before proceeding.

Membrane Installation

14.3 Starting at the top of the wall, the membrane must be installed in accordance with the Technical Literature. Sheet edges must be overlapped a minimum of 50 mm as marked on the sheets. End laps must be a minimum of 100 mm. Where a horizontal joint is unavoidable, care must be taken to ensure the joint is lapped with the upper sheet over the lower sheet. Internal and external corners must be detailed using Jiffy Seal 500 Detail tape as detailed in the Technical Literature.

Backfilling

14.4 Protection material must be installed before backfilling. Backfilling must commence immediately after the membrane is installed to ensure the membrane is not left exposed to sunlight or UV radiation.

Inspections

14.5 The Technical Literature must be referred to during the inspection of membrane installations by building consent authorities and territorial authorities.

Health and Safety

15.1 Safe use and handling procedures for the membrane system are provided in the Technical Literature.

Basis of Appraisal

The following is a summary of the technical investigations carried out:

Tests

16.1 The following testing of ProtectoWall® has been undertaken by the following organisations:

- Bursting strength, peel strength, tensile strength and elongation by Hauser Laboratories, June 1984.
- Water absorption by Hauser Laboratories, August 1995.
- Breaking strength, elongation, water resistance, low temperature flexibility, water vapour transmission, lap joint strength, crack bridging by Inchcape Testing Services, June 1994.
- Water resistance of Jiffy Seal 140/60 by Inspection Concepts, October 1990.

- Fungus and micro-organism resistance, seam breaking strength, breaking strength, dimensional stability, waterproofness by Ramtech Laboratories, August 1999.
- Self sealability test on Jiffy seal products by Ramtech Laboratories, June 1994.

Test methods and results have been reviewed by BRANZ and found to be satisfactory.

Other Investigations

17.1 A durability opinion has been given by BRANZ technical experts.

17.2 Practicability of installation has been assessed by BRANZ and found to be satisfactory.

17.3 The Technical Literature has been examined by BRANZ and found to be satisfactory.

Quality

18.1 The manufacture of the membrane and primer has not been examined by BRANZ, but details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory.

18.2 The quality management system of the membrane and primer manufacturer, ProtectoWrap Company has been assessed by ICC Evaluation Service Inc and is covered in ES Report No. 1127.

18.3 The quality of materials supplied to the market is the responsibility of Marshall Waterproofing NZ/AUS Ltd.

18.4 Quality of installation on site is the responsibility of the installer.

18.5 Designers are responsible for the building design, and building contractors are responsible for the quality of construction of substrate systems in accordance with the instructions of Marshall Waterproofing NZ/AUS Ltd.

18.6 Building owners are responsible for the maintenance of the membrane systems in accordance with the instructions of Marshall Waterproofing NZ/AUS Ltd.

Sources of Information

- NZS 3101: 1995 The design of concrete structures.
- NZS 4210: 2001 Masonry construction materials and workmanship.
- NZS 4229: 1999 Concrete masonry buildings not requiring specific engineering design.
- NZS 4230: 2004 Design of reinforced concrete masonry structures.
- Compliance Document for New Zealand Building Code External Moisture Clause E2, Department of Building and Housing, Third Edition July 2005.
- New Zealand Building Code Handbook and Approved Documents, Building Industry Authority, 1992.
- The Building Regulations 1992, up to, and including October 2004 Amendment.



BRANZ

In the opinion of BRANZ, ProtectoWall® is fit for purpose and will comply with the Building Code to the extent specified in this Certificate provided it is used, designed, installed and maintained as set out in this Certificate.

The Appraisal Certificate is issued only to the Certificate Holder, Marshall Waterproofing NZ/Aus Ltd, and is valid until further notice, subject to the Conditions of Certification.

Conditions of Certification

1. This Certificate:
 - a) relates only to the product as described herein;
 - b) must be read, considered and used in full together with the technical literature;
 - c) does not address any Legislation, Regulations, Codes or Standards, not specifically named herein;
 - d) is copyright of BRANZ.
2. The Certificate Holder:
 - a) continues to have the product reviewed by BRANZ;
 - b) shall notify BRANZ of any changes in product specification or quality assurance measures prior to the product being marketed;
 - c) abides by the BRANZ Appraisals Services Terms and Conditions.
3. The product and the manufacture are maintained at or above the standards, levels and quality assessed and found satisfactory by BRANZ.
4. BRANZ makes no representation as to:
 - a) the nature of individual examples of, batches of, or individual installations of the product, including methods and workmanship;
 - b) the presence or absence of any patent or similar rights subsisting in the product or any other product;
 - c) any guarantee or warranty offered by the Certificate Holder.
5. Any reference in this Certificate to any other publication shall be read as a reference to the version of the publication specified in this Certificate.

For BRANZ

P Robertson
Chief Executive

Date of issue: 3 July 2006

PYRO IV CLASSIC

PYROCLASSIC FIRES LTD

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cleanest and
most efficient
woodburner



Pyro IV in Wineberry on Raised Hearth

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in New Zealand by
Pyroclassic Fires Limited

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- The benefits of over 30 years of manufacturing in New Zealand
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- New Zealand's lowest emissions woodburner
- 3.7kw Wetback option
- Cook top for boiling, baking and roasting
- Economical use of your firewood
- Massive heat storage with unique circular ceramic firebox
- Combining radiant and convection heating
- Approved by Councils throughout New Zealand
- Power cuts won't affect you
- Timeless Design
- Save on power, save on fuel. Economically friendly
- The Pyroclassic uses carbon neutral Biofuel - wood - a sustainable renewable source of energy
- Will heat a home up to 250sq metres
- Reduce condensation
- Consumer Magazine's top pick for woodburners (July 2006)
- A great range of colours available. Powder coated panels can be updated very easily. You could go for something funky or a more traditional colour (please see our colour charts for more details)

Standard Colours Available



Antique Steel



Matt Black



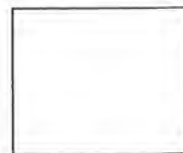
Slate Blue



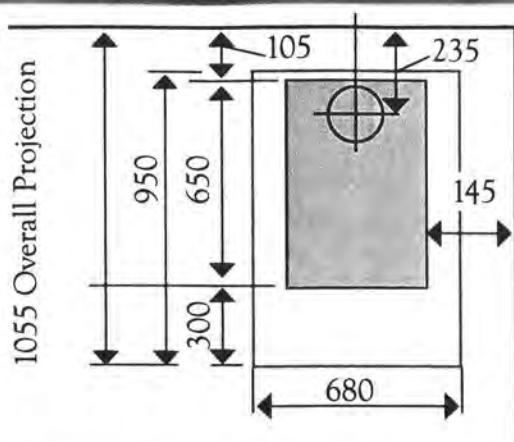
Wineberry



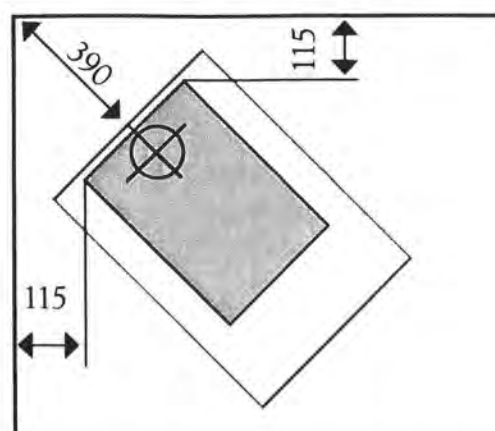
Rangoon Green



Your Choice



Parallel installation with protected walls

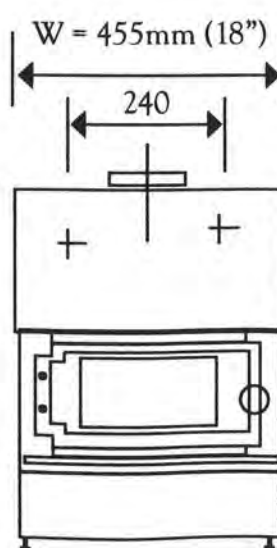
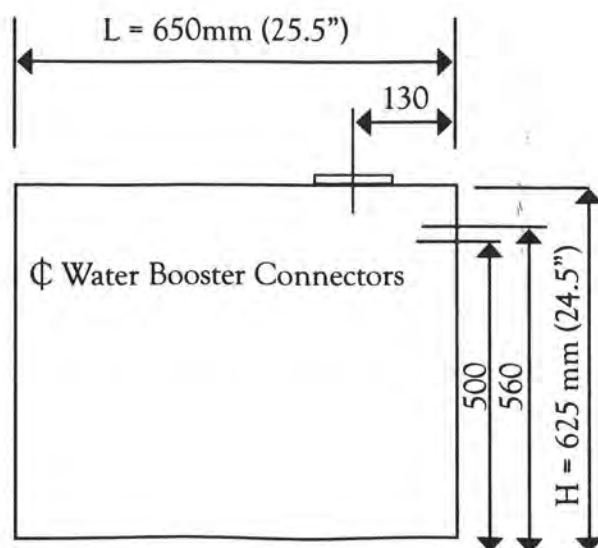


Corner installation with protected walls

Both diagrams show (in red) the Pyroclassic raised hearth 950 x 680

Specifications

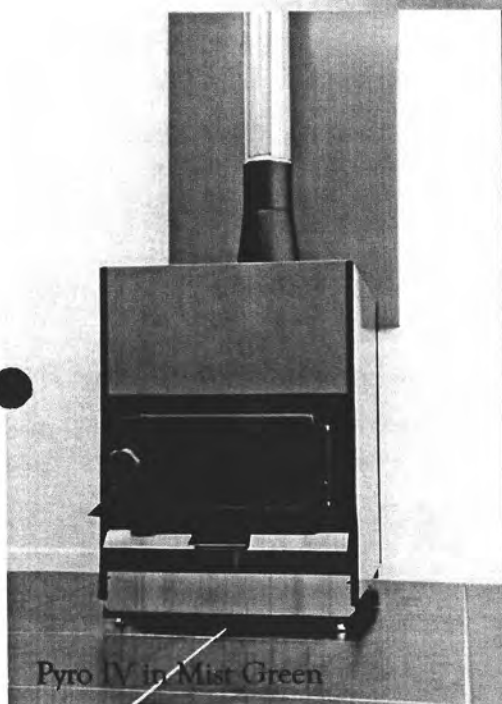
Dimensions:	650mm L x 455mm W x 625mm H
Weight:	Approx 140kg
Firebox volume:	Usable volume 20.8 litres
Temperature:	800°C to 1100°C (1500 - 2000°F)
Maximum heat output:	>15kW (>51250BTU/hr) incl. Flue
Useful heat output:	2 to 8kW (6800-27300 BTU/hr)
Fuel Consumption:	1.1kg/hr
Emission rate:	0.3g/kg (Dryback and Wetback)
Efficiency rate:	74% space heating (Dryback) 65.3% space heating 18% water heating (Wetback)
Primary & secondary air control:	Automatic
Start up control:	Manually adjustable
Cooktop area:	0.26m ²
Flue Diameter:	100mm standard (4")



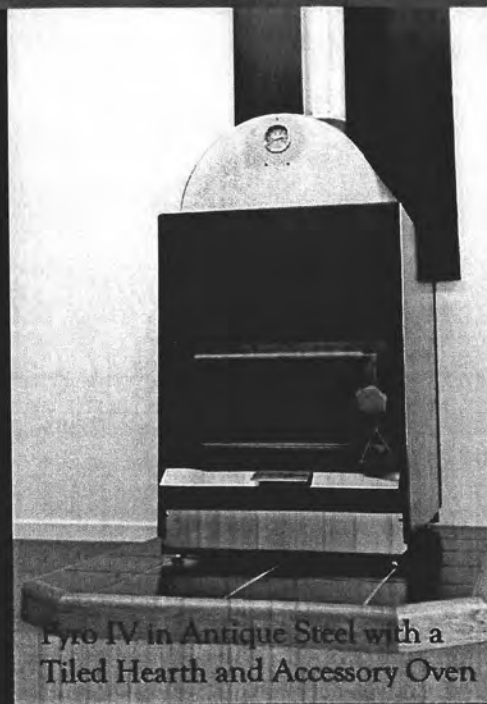
Warranty: The Ceramic Firebox in the Pyroclassic IV is warranted for 15 years against defective material or workmanship, provided that the fire is used according to the Manufacturer's operating instructions. This warranty does not cover damage or failure caused by tampering, carelessness, abuse or misuse. **NOTE:** The warranty only applies to the original owner and cannot be transferred.

PYRO IV CLASSIC

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8 St Andrews Rd,
Havelock North, 4130

Postal Address:

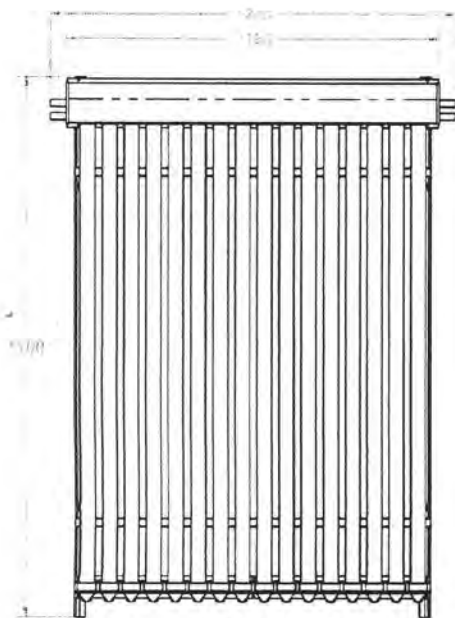
PO Box 28150
Havelock North 4157

Email: info@pyroclassic.co.nz

Available from:



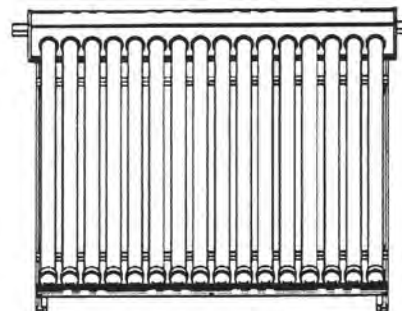
END VIEW



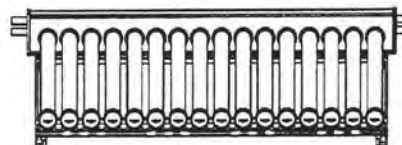
PLAN VIEW



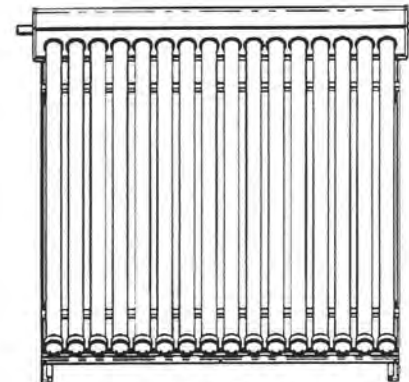
FRONT VIEW



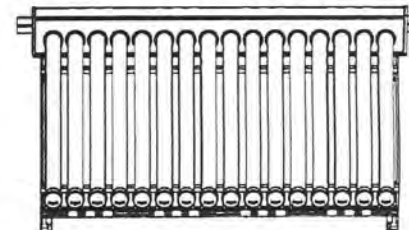
FRONT VIEW
30° ROOF



FRONT VIEW
10° ROOF



FRONT VIEW
40° ROOF



FRONT VIEW
20° ROOF

- NOTES:
1. SPACE COLLECTORS SEPARATE 2" MINIMUM TUBES ARE 10" ON CENTER WHEN CONNECTING IN SERIES WITH ONE 3/4" PITCH 2" MINIMUM TUBES WHEN USING A 1" FITTING IN BETWEEN. SPACE ADJUSTMENT.
 2. CONNECT THREE U-TUBE COLLECTORS IN SERIES MAXIMUM.
 3. A MINIMUM OF 5/8" TO 3/4" OF AIR SPACE BETWEEN U-TUBES IS RECOMMENDED FOR MAXIMUM LIFE AND EFFICIENT OPERATION.

Energy Efficient Homes

U-TUBE COLLECTOR - ELEVATIONS

SHEET
1 of 1

DO NOT SCALE
IF IN DOUBT ASK

TOLERANCE GUIDE
MACHINED FEATURES
1 DEC PLACE = .002
1 DEC PLACE = .01
2 DEC PLACE = .005

PRINT SCALE

A3

METRIC



CAD TYPE

Solid Works 2006

DATE

26 SEP 2007

REV

A

26 SEP 2007 - SFK

DRAWN

DRG No.

200-442

DATE

REVISION

BY

APP

DIGITAL SELF-HEATING HOME: Installation Instructions:

HEAT CORE AREA

The special heat core pipes are: 22mm OD thick, Oxygen proof Class S stiff pipes and 50M in length. While stiff they can easily be formed into curves as required.

IMPORTANT: All pipes **MUST** be rolled off the coil and **NOT** simply pulled off!
Failure to do this will result in twists and kinks. The whole pipe then **MUST** be replaced.

The heat core pipe must be installed in 150mm of sand with as much pipe in the center as much as possible, and where possible, with the **HOT SIDE OF THE PIPES FEEDING THE CENTER OF MASS**, keep similar spacing and no closer than 600mm to external walls. The system is hydro-dynamically balanced to use exactly 50M lengths, thus the whole length needs to be used with enough protruding to make connections at the control board.
Damaged pipe must be wholly replaced.

The pipes on the plan have been measured to fit; at least 1M must protrude up through the slab to connect to the distribution manifold.

Location of the manifold is optimised on the plan, to be confirmed with customer. If location needs to be moved alter the pipes as required, retaining the basic design principles.

Once laid, all Pipes must be sealed at the ends with tape, and run in a conduit for the first meter, as required. The pipes must be taped shut at both ends to stop detritus being allowed in. Anytime pipes run through concrete, pipes must be protected using conduit, taped at both ends, and extending at least 300mm beyond the concrete. Thin wall water pipe can be used for this, it must be a loose fit.

Remember maximize the spread of the pipes in the core and avoid plumbing, drains, slab thickenings etc.
Normally pipes in the core will be 600mm apart and 800mm at most external walls.

HEAT CORE:

[1] **FOOTINGS:** The footings are poured and the ICF is installed & filled with 20MPa concrete grout as per details supplied with the plans. It is important to get the footings' surface level prior to placing the ICF. It goes without saying that the surface of the ICF grout on completion be level and anchor bolts installed prior to placing concrete grout.

NOTE: If required, notch the top ICF on the inside to take the slab and only fill to this point. See detail. This is easily done using timber.

Allow ICF wall to cure for at least 48hrs (in summer), before carefully backfilling both sides. The fill inside the ICF walls must then be fully compacted in layers no thicker than 250mm, preferably less. This is required to ensure it doesn't settle under the slab and possibly shear off the pipes coming through the slab. The compacting should ensure you have ~100% compaction. See item 4 below.

[2] **THE FILL:** The fill stops and needs to be level with the 250mm point under the bottom of the slab. 150mm min of sand blinding and 100mm of EPS insulation (or as per plans) will go on top to make it level with the bottom of the slab.

[3] **SAND BLIND:** the first 25 mm of the sand blinding be placed and compacted on top of the compacted fill. It is imperative the sand is free from any object such as stones that could damage the pipe, even slightly. You can imagine the problem if this part begins to leak!

[4] **Install the heat pipes.** **NOTE:** NEVER pull the pipe off the roll, it **MUST** be unrolled. 23mm pipe can be quite stiff but it will easily bend to a 600mm turn if done with care.

NOTE:

See plans for details as they can vary.

a. Measure carefully to where the DSHH controller will be located, and the direction of the adjoining wall. Hammer supply Stake(s) These are not supplied and are best as 2 stakes with 2 horizontal wooden members for support. These must be sturdy as pipes have a natural torque and need strong support.

Pipes should stick out approximately 1M from the final floor level at the location where the pipes need to exit through the slab.

Normally this is located next to a wall where the future connection manifold will be attached.

The pipes will be attached to the stake(s) to keep them in place during the laying/placing of the slab.

Use the outline in the plans for guidance as to how to lay them on the sand.

You may need several stakes if you want to keep the different pipes in a line along the future wall above.

Protect pipes with conduit as it penetrates any concrete.

b. Start where the pipe will come down through the future slab, directly from the room with the solar equipment and future manifold, then work your way towards the center of the slab as described on the plans. Ensure the pipe will make it back

to the hole in the slab by pre-locating it there if possible. Work your way towards the outside wall but never closer than 600mm or as shown.

Do not add or subtract from the length of the pipe as this is a balanced system requiring 50m.

c. **BENDS:** peg the pipe to hold them in place be very careful not to damage the pipe in the process.

(Typically made from thin rebar bent like a "J"). A damaged pipe **MUST** be replaced & no joins are allowed in slab or concrete.
NOTE: Be very careful not to allow the pipe to kink at these locations, if they do the pipe must be replaced.

It will take at least 2 pins per 180degree turn to hold it in place.

Once placed, cover with sand to assist in hold it in place.

NOTE: Avoid damaging pipe when hammering in pegs as rebar or hammer can easily damage pipe

d. Ensure at least 1M of pipe will stick into the final room and that the **LOCATION** and **HOT** or **COLD** is permanently marked. (This imperative in the Slab pipes.)

See Extra conduit info below and install the end in the bottom of the sand blind, once main heat core pipes are in place

e. When the Heat core pipes and sensor conduit are in place, cover & nominally compact the balance of the sand blind with a flat plate packer to within 50mm of Ext ICF wall. Avoid ICF damage.

f. Cover the sand packed blind with Poly vapour barrier, and install the under-slab EPS insulation on top.
This should come level with the bottom of the slab-to-be on the ICF sub-walls.

EXTRA CONDUIT Required:

TEMPERATURE SENSOR: Place an extra empty flexible conduit from the distribution manifold & stake to the heat core as shown on the plan, allowing for the bend required. A thermal sensor that monitors the core temperature will be placed in this pipe at a later date. The minimum pipe size is 13mm, and can be any pipe that can make the bends, be sure to seal both ends and mark accordingly including approx length.

Also, You **MUST** indicate where the pipes go. Remember, these ID tags may be exposed for some time to rain and sun and possibly vandals. Permanent marker near the end of the pipe will usually be OK. Cool side in heat core pipes is the side that typically runs closest to the external walls.

NOTES OF CAUTION:

*CAUTION-1: Never kink, nick or restrict the pipe. If you do it must be replaced before finishing.

*CAUTION-2: Where the pipes go through the concrete or the slab, the heat pipes must be run through flexible protective pipe/conduit. This protective pipe will also go horizontal under the slab for at least 750mm therefore it must be at least flexible enough to make the turn. These must be taped at both ends to prevent foreign matter getting in. Make sure they are grouped together, hot pipes are grouped together, likewise the cooler return pipes.

For clarification: Cooler return pipes are typically located closest to the exterior walls, otherwise designate one end hot and the other cold and mark the pipes accordingly.

They should not be tight in the protective pipe.

*CAUTION-3: If pipes need to cross any walls, extra wide conduits must be installed in the walls to allow the pipes to go through, taped at each end.

*CAUTION-4: Never free-run pipes under foundations or thickenings: use wide conduit taped at each end to pass through these areas.

*CAUTION-5: Do not let pipes touch when they cross other pipes. Avoid where possible. Try to locate the pipes in the upper part of the conduit when taping relative to the ground. This will reduce the risk of sheering.

*CAUTION-6: When you must run groups of pipes (Near controller), try to group hot pipes and cool pipes together.

*CAUTION-7: Where toilet riser passes through the heat core it must be insulated with eps or similar waterproof insulation. These pipes will rob heat from the heat core when toilet is flushed. Most other pipes are OK as they typically carry warm as well as cool fluids, unlike the toilet. Insulation for toilet risers not included with system.

THE HEATED SLAB:

The special heated slab 15mm pipes are: Oxygen proof Class S stiff pipes and 50M in length. While stiff they can be easily but carefully, be formed into curves as required. **DO NOT KINK** else replacement is required!

IMPORTANT: All pipes **MUST** be rolled off the coil and **NOT** simply pulled off the coil! Failure to do this will result in twists and kinks that **MUST** be replaced in their entirety.

Unlike the core pipes the orientation of the pipe is important to the operation of the system. The pipes must be installed, with the **HOT SIDE OF THE PIPES FEEDING THE CENTER OF MASS**, keep similar spacing and no closer than shown to external walls. The hot end of each pipe **MUST BE SEALED & MARKED** as per below.

Note:

*The system is balanced for 50M lengths thus the whole length needs to be used with enough protruding to make connections at the control board. Damaged pipe must be replaced.

- *The pipes on the plan have been measured to fit; at least 1M must protrude up through the slab to connect to the distribution manifold.
- *Location of the manifold is optimised on the plan, to be confirmed with customer.
- *If location needs to be moved alter the pipes as required, retaining the basic design principles.
- *All pipes must be sealed at the ends to prevent interior contamination. They must also be run in a conduit for the first meter, as required.
- *Anytime pipes run through concrete, pipes must be protected using conduit, taped at both ends to stop dirt etc From getting in, and be sure to extend the conduit at least 300mm beyond the concrete up into the control area.

Remember optimize the spread of the pipes in the core and avoid plumbing, drains, slab thickenings etc. notice the coverage is not 100% and only areas of use are heated by these pipes. Warmer side goes towards bathrooms.

[1] SLAB: Prepare the slab as per normal. It is imperative the ends/edges of the slab are insulated. If the ICF was cut correctly to the bottom of the slab, this should not be a problem.

[2] MESH: Reinforcing mesh or rebar is installed on saddles as per normal. Be careful the minimum depths to the surface are maintained and where possible the pipes need to be min 25mm below the surface of the concrete. This may require a recheck of the saddle heights. Pipes can be attached to underside of reinforcing where required.

[3] INSTALL HEAT PIPES: These are 15mm layered oxygen-proof heat pipes, that are installed by cable-tying them to the mesh, oriented as shown on the plans. Try to run down the valley part of the mesh when able and tie to the adjacent mesh element running in parallel. Keep this in mind when laying the mesh. When in doubt, protect the pipe. Do not pull snap ties tight, just snug. Installing attached to the underside of the mesh is also allowed if required.

SLAB:

1. Avoid areas where the surface may be cut, nailed or drilled in the future. In particular, walls installed above can easily be nailed through the pipe and all efforts must be made to protect the pipes, including marking a no-nail zone on the slab above in locations of high risk such as wall. It needs to be marked on an as built plan. Where possible this design has attempted to avoid crossing under walls.

2. Draw an as-built to be copied to the EEH office for future reference.

3. REMINDER: Never uncoil the rolls of pipe -UNROLL THEM- pipes WILL twist and can/will be easily be damaged.

4. Where pipes must pass through conduit, it is best to unroll about 50% of the coil into a straight run of pipe, and while straight pull though the conduit as required.

5. CONDUIT: Like the heat core, whenever the pipes go though the surface of the concrete, they need to be protected with a larger conduit.

MARKING: mark with the words "HOT" or "COLD" side + the rough LOCATION. At least 1M needs to stick out of slab to the control panel, protected by a sealed conduit, which should be attached and held straight to the stake.

Note: Cold side has the most exposure to the exterior wall as a rule. Pipes as a group can exert considerable force.

6. Pour the slab and finish as per normal. If client expects to polish the concrete floor, the extra concrete expected to ground off in the process, needs to be added to the thickness when pouring.

CAUTION: Avoid putting pipes in any areas with stress release cuts, or where any penetration through the slab is expected i.e. Nailed walls, Water & Waste Pipes, Electricity, Phones etc.

Pressure test all lines before continuing on the next step. Min. test pressure is 600kPa for min 1HR overnight

EXTRA CONDUIT Required:

TEMPERATURE SENSOR: Place an extra empty flexible conduit from the distribution manifold down a stake to the location in the slab as shown, allowing for the bend required. A thermal sensor that monitors the slab temperature will be placed in this pipe at a later date. Normally the end of the sensor should be located away from direct influence of any nearby pipes, but where one side pipe might be warm and the other cool side. The minimum pipe size is 13mm, and can be any pipe that can make the bends, be sure to seal both ends and mark accordingly.

AS BUILT:

Make an AS BUILT plan of where the pipes are located; this is especially important in the slab where cuts and power nail: may damage the pipes.

ENERGY EFFICIENT HOMES (EEH)

~ The Does and Don'ts of an EEH shell ~

Mr Builder:

While every attempt has been made to retain normal building practices that are already familiar to your staff and contractors, most of the EEH elements are built into the design. There are some items that are **REQUIRED** which we insist are important and can lead to declassification unless completed correctly. These are not difficult but do require your careful attention to complete correctly:

FOUNDATION: Slab must be insulated at the bottom **AND** outside edges. A single piece of ICF makes perfect edge insulation prior to pouring as it grips the concrete when cured. 50mm slab rated EPS under slab is fine.

AIRTIGHT SEALING: The house is built on the assumption the inside has only nominal air migration and that any ancillary ventilation is accomplished by the owner. You can always vent a house that is sealed but you cannot easily stop air migration in a poorly sealed home.

~Thus windows are provided with double seals and it is important to ensure all windows and Ext doors are well sealed.

~Square Stop GIB at ALL inside corners where ceiling meet any wall. This means there is no need for trim at these locations, giving a modern clean look, client permitting. The use of trim at this location is at the client's discretion.

~Down Lighting: Most pot down lights and feature lights have open vents within the containment structure to let hot temperatures out to the attic, and or halogen lights have transformers that cannot be sealed in insulation:

*** DO NOT USE THESE DEVICES OR POTS ***

They allow expensive warm air directly into the attic at the most crucial location, even when the light is off, which is most of the time!

Light fixtures **MUST** provide an air seal between the living areas and the outside. And, due to the high levels of insulation, transformers should not be surrounded by insulation and insulation should **NEVER** be pulled apart at these locations. This defeats the whole purpose of an EEH home. Require lighting fixtures that have sealed pots. Large sealed pots can use low heat fluorescent light or super-bright LED's are a good options as they can also be dimmed. Avoid recessed halogen lights unless they meet the above restriction.

Downlights: LED lighting is a good alternative and prices are dropping quickly.

~Fireplaces: Either free standing or built in, **MUST** have airtight fireboxes and an adjacent fresh air supply, preferably located where the cool incoming fresh-air can be preheated by the fireplace and released into the house.

These are not subtle requirements; they are essential.
Call us if you have any questions or need guidance.

R Theaker

GM

Energy Efficient Homes

09-815-6664

info@eehnz.co.nz



REPORT NO. WW-0127

Page 1 of 3 pages

REFERENCE: Warm Windows
P.O Box 258-004
Greenmount
Auckland



Performance Tests on double glazed uPVC single panel tilt and slide opening door with accordance with NZS 4211: 1985

DATE OF TEST : 20 - 21 September 2006

SUMMARY:

The uPVC single panel tilt and slide opening door tested met the deflection requirements of the High Wind Zone and complied with the corresponding maximum strength requirements, at an Ultimate Wind Load of ± 1200 Pa.

The uPVC single panel tilt and slide opening door met the Level 2 Air leakage requirements.

The uPVC single panel tilt and slide opening door tested following the remedial action described below, complied with the High/Very High Wind Zone water leakage requirement.

The uPVC single panel tilt and slide opening door met the requirements of the Standard for straightness and squareness.

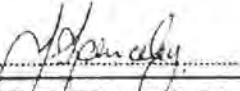
These ratings apply to this specific sample, according to clause 5.1 of NZS 4211:1985 and may be used to claim compliance within the stated limitations of clause 5.2 of the Standard.

DESCRIPTION

A single panel tilt and slide opening door with overall dimensions of 1910 mm width and 2010 mm height with a single door panel 763 mm wide and 1880 mm high sliding on the internal face of the fixed panel. The door panel was also able to be opened at the top for ventilation using the tilt function of the door operating mechanism. The external frame of the uPVC single panel tilt and slide opening door was inserted into the framed opening of the test enclosure from the internal face and fastened through spacers on all four sides. The perimeter gap between the timber framed opening and the uPVC outer frame was sealed with an insitu foam sealant, with the external face of the perimeter subsequently sealed with silicone.

The door and fixed panel were glazed with the client's 4-9-4 mm Insulated Glazing Unit into the integral glazing pockets of the door frame with backing gaskets in the external rebate of the sash frame and in the internal glazing beads. The door panel was fitted with a perimeter locking mechanism operated from a single handle at the centre of the stile with latching handles at the outer frame positions. The locking mechanism operated across the width of the bottom rail and up to a single at two positions on the stiles and across the top rail a third of the height of each of the sash stiles.

Tested by: 

Checked by: 

Division of National Aluminium Ltd - PO Box 98-444 South Auckland Mail Centre Tel: (09) 272-1720 Fax: (09) 272-1712

WINPRO Series
CASCADE Series



BETTER WINDOW *innovations*





CERTIFICATE

The TÜV CERT Certification Body
of TÜV Industrie Service GmbH
TÜV Rheinland Group

certifies in accordance with
TÜV CERT procedures that

Dalian Shide Group Co., Ltd.

Shide Industry Zone, Dalianwan Town, Ganjingzi District,
Liaoning Province, Dalian 116113, P. R. China

with the sites according to annex

has established and applies a quality management system for

**Design, Manufacturing and Sales of Rigid Polyvinyl Chloride
(PVC) Plastic (Plastic Profiles, Panels and Pipes)**

An audit was performed, Report No. 019501

Proof has been furnished that the requirements according to

DIN EN ISO 9001:2000

are fulfilled

The certificate is valid until **2008-03-31**

Certificate Registration No. 01 100 019501



TÜV Rheinland Group

A. Lindh

TÜV CERT Certification Body of
TÜV Industrie Service GmbH

Hong Kong: 2005-06-20
First certification 2000

www.tuv.com

Physical and Mechanical Property of PVC profile

Item		Index		
Hardness, HRR		>	88	
Tensile strength, Mpa		>	38	
Elongation at Break, %		>	110	
Bending elasticity modulus, Mpa		>	2000	
Low temperature drop weight impact test, fracture numbers		<	1	
Vicat softening point, ℃		>	83	
Status after heating		No bubbles, cracks		
Dimension change rate after heating, %		± 2.5		
Oxygen index, %		>	38	
High-low temperature dimension reciprocal change rate, %		± 0.2		
Charpy impact strength, KJ/m ²		>	23 ± 2℃	-10 ± 1℃
		A type	40	15
		B type	32	12
Weather resistance	Charpy impact strength,KJ/m ²	>	A type	28
		B type	22	
	color change, level	>	3	

Major performance index for PVC doors and windows

Items		Standard requirements					
Air pressure resistance	Level	I	II	III	IV	V	VI
	Pa	3500	3000	2500	2000	1500	1000
	Kg l/m ²	350	300	250	200	150	100
Rain permeability	Level	I	II	III	IV	V	VI
	Δ P,Pa	500	500	350	250	150	100
Air permeability	Level	I	II	III	IV	V	VI
	q _s m ² /m ² ·h	0.5	1.0	1.5	2.0	2.5	
Heat Insulation Properties	Level	I	II	III	IV	V	VI
	Heat transfer coefficient [w/m2.k]	2.0	3.0	4.0	5.0		
Lighting property	Level	I	II	III	IV	V	VI
	Tr	0.70	0.60	0.50	0.40	0.30	0.20
Noise insulation property	Level	I	II	III	IV	V	VI
	Rw(dB)	35	30	25			
Opening and closing force	The force for sliding-open window shall not be greater than 100N and not be greater than 80 N for hanged windows.						
Bending (warping)	Residual deformation that does not influence utilization is allowed under a force of 300N so long as the trial does not damage and the window maintains its function.						
Distortion	Under a force of 200N, the trial should not cause damage and residual deformations that do not influence utilization are allowed.						
Diagonal deformation							
Angular strength	Average value > 3000N						
	The minimum value shall not be lower than 70% of the average value						

Permissible allowance for mounting of doors and windows

Item			Permissible allowance (mm)	Inspection method		
Length difference for two diagonal lines of the frame			± 3.0	Inspect with 3m steel tape, measure the internal angle		
The perpendicularity at front and side of frames (including frame assembling material)			< 2000mm	Inspect with anchor line and horizontal ruler		
			> 2000mm		± 3.0	
The levelness of frames (including frame assembling material)			< 2000mm	Inspect with horizontal ruler		
			> 2000mm		Swing door (window)	± 3.0
					Slide door	± 2.5
The elevation of lower transverse frame			± 5.0	Inspect with steel plate ruler and compare with reference line		
Centre distance between outside and inside frames for double-layer doors and windows and frames (including frame assembling material)			± 4.0	Inspect with steel plate ruler		
Vertical distance from centre for doors and windows			± 5.0	Inspect with anchor line and steel plate ruler		
Hinged doors and windows	Overlapping width between the door and frame		± 2.5	Measure with instrument of precision up to 0.02mm		
	Transverse angle height difference for adjacent doors and windows within the same frame		± 2.0	Inspect with anchor line and steel plate ruler		
	The fitting distance C at hinge part of the frame		+2.0 -1.0	Inspect with wedge clearance gauge		
Sliding doors and windows	Overlapping width between the door with the frame		+1.0 -3.5	Measure with instrument of precision up to 0.02 mm		
	The vertical parallelism between the door or window with the frame or adjacent doors or frames within the same frame		± 2.0	Inspect with 1m steel plate ruler		

Quality requirement and inspection method for mounting of doors and windows

Item		Quality requirement	Inspection method
Door and window surface		Clean, leveled, smooth, no visible scratch, the profile is free from weld beads and there are no cracks	Observation
Hardware		Complete, appropriately positioned, secure mounting, flexible operation and meet its specific function requirements	Observation and ruler
Glass sealing strip		The contact of the sealing strip with the glass or glass groove should be level without the edge either curling or coming away from the groove	Observation
Sealing quality		When closed, the door or window shall not have a visible gap from the frame. The sealing strip at the sealing surface should be compressed.	Observation
Glass	Single-layer	The mounted glass shall not contact directly with the profile. The glass shall be leveled and securely mounted. The surface shall be clean and the filmed layer for single filmed glass shall face towards the interior.	Observation
	Double-layer	The mounted glass shall be leveled and securely mounted. The outside and inside surface shall be clean and not dust or mist is allowed between the two layers of glass. The double glass strip shall not warp. The single layer filmed layer shall be at the exterior and the filmed layer shall face towards the interior.	Observation
Hold-down strips		The hold-down strips with sealing strips shall contact closely and completely with the glass. The joints between the hold-down strip and the profile shall not have visible gaps. The joint gap shall be $\leq 1\text{mm}$.	Observation
Frame assembling material		It should be connected with the window frame closely without any loose attachment. The screw distance shall be $\leq 800\text{mm}$. The two ends of liner strengthening steel profile should be fixed securely with the opening. The clearance paste is used for sealing between the frame assembling materials and the frame.	Observation
Opening and closing device	Hinged doors and windows	The door/window shall contact closely when closing. The overlap shall be even. The closing and opening action shall be flexible. No sealing strip shall come off the groove. Opening and closing force: for flat hinge $\leq 80\text{N}$, 30N $\leq$ sliding and bearing hinge $\leq 80\text{N}$.	Observation and spring scale
	Sliding doors and windows	The door/window shall contact closely when closing. The overlap between the frame and the door or window shall comply with the design requirements. The opening and closing force shall $\leq 100\text{N}$.	Observation, depth ruler and spring scale
	Tilting window	The window shall contact closely when closing. The gap shall be even and closing and the opening action shall be flexible.	Observation
The connection between the frame with the wall		The frame shall be square and uniform in height. The installation position of fixtures shall be correct. The distance shall be $\leq 800\text{mm}$. The frame and the wall shall be connected together securely. Elastic pads shall be inserted sufficiently into the gap. The surface shall be sealed with clearance J3e paste and no crack is allowed.	Observation
Drainage hole		Unobstructed and correct positioning	Observation

INTEGRITY IS PARAMOUNT

Windows are more than a way to let light into your home. The integrity of our company and our products makes Cascade a valued window resource.

For many years, Cascade has designed, manufactured and supplied high-quality, energy efficient windows for homeowners and builders.

The window experts at Cascade bring smart, innovative design to each product. Special features and benefits inherent in each window result in beauty you can see.

LIFETIME LIMITED WARRANTY

You can rest assured knowing your windows are designed and manufactured to last, as long as you own your home. This commitment is backed by Cascade's lifetime limited warranty – a warranty that includes product and labor protection as well as limited transferability. For details, please see your Cascade Windows representative.

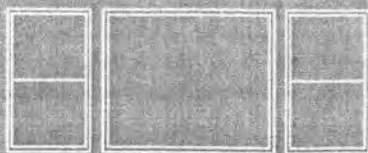
Cascade windows bring you year-round comfort and are the perfect fit for your new construction or remodeling project.

With the ability to combine styles and features from all of our product lines, you can maintain a consistent look with proven structural integrity. Our distinctive product lines offer options and styles to fit any budget.

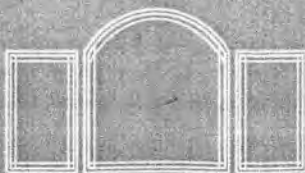
Let Cascade Windows bring beauty and technical innovation to your home.



Style Combinations



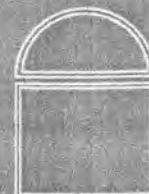
Single-Hung + Picture + Single-Hung



Picture + Shaped Picture + Picture



Picture



Accent + Picture



DESIGN INNOVATION

Cascade Windows engineers excel in developing intelligent design that brings exceptional value to our customers.

MAINFRAME Our window mainframes feature a wide 3 1/4" frame depth with fusion-welded corners. This gives you beautiful, distinctive shadow lines and improved window stability. When the application requires, Cascade offers a 2 1/4" mainframe.

CELCON® ROLLERS Our slider windows feature Celcon rollers mounted on stainless steel axles. They provide years of durable service without causing unsightly markings often associated with other materials.

Frames Built to Last

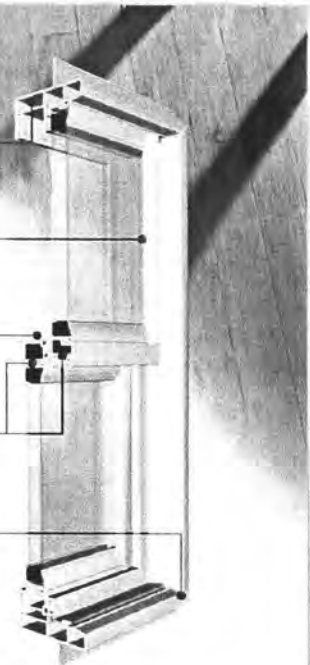
Construction
Heavy, multi-chambered frame

Stability
Set-back fixed glass

Protection
Double weather-stripping

Strength
Reinforced meeting rails

Integrity
Fusion-welded corners



REINFORCED MEETING RAILS

The meeting rails on many of our single-hung and slider windows are reinforced with steel. This steel reinforcement provides rigidity to enhance structural integrity and forms a secure and stable platform for locking hardware.

COMBINATION UNITS Cascade offers a wide selection of window combination units, bringing design flexibility, functionality and creativity to any window project.

Frame Styles



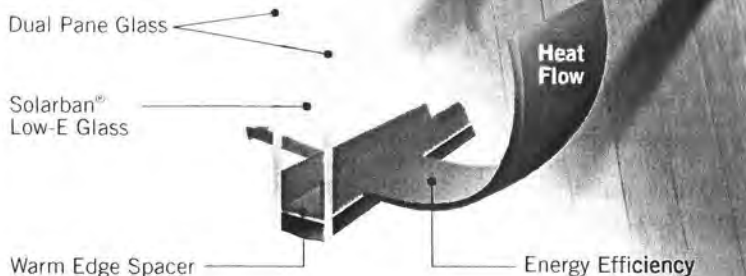


ENERGY EFFICIENT QUALITY

With rising energy costs and concern for the environment, it is important to choose energy efficient products. Many Cascade windows meet the Department of Energy's Energy Star® guidelines. We offer insulated glass panels with high performance, heat reflective coatings; warm edge spacers and dual weather stripping. Optimum efficiency is achieved by combining our vinyl mainframes with PPG's patented Solarban® glass and our warm edge spacer technology. These features further reduce energy costs while increasing the comfort of your home.

VINYL Cascade vinyl windows ensure consistency of quality in materials, lifespan, and maintenance. Our vinyl windows never need painting, saving you time and money. You will also appreciate a reduction in energy costs due to the energy saving performance of Cascade windows.

Superior Windows



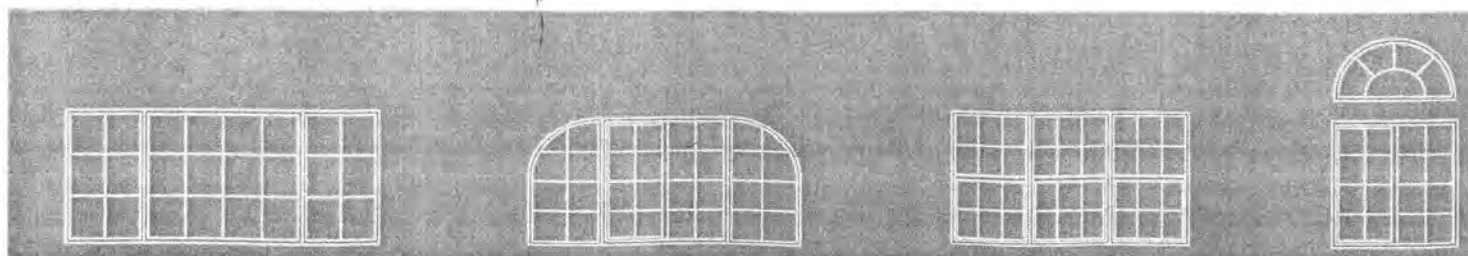
DUAL PANE GLASS Windows have improved dramatically since the days when only a single pane of glass stood between you and the elements. Dual pane windows are quieter and more energy efficient. Plus, our windows are sealed with formulated butylene sealant, ensuring lasting performance.

LOW-E GLASS Cascade windows deliver superior year-round performance. High performance glass coatings reflect outside heat in the summer and interior heat in

the winter, reducing your air conditioning and heating requirements. Additionally, Solarban® coated glass blocks many of the sun's damaging ultraviolet rays that can fade carpets, curtains, and furniture.

WARM EDGE SPACER Cascade's Warm Edge Spacer system conducts less heat through the window. This technology can significantly improve a home's overall energy efficiency.

Grid Combinations



CASCADE SERIES

OUR SIGNATURE LINE

The Cascade Series provides architects, homeowners and building professionals an effective combination of classic looks and enhanced structural integrity through innovative design and added features.

You will gain classic, traditional styling that is desired in custom homes and commercial projects. Superior structural integrity is coupled with low maintenance benefits.

DISTINCTIVE LOOKS The Cascade Series offers a distinctive appearance normally associated with wood windows. They feature a fixed sash, giving the window true visual balance.

DEPTH The fixed sash unit is set back from the outside of the frame, offering the depth and sight lines of traditional wood windows. The frames of the Cascade Series' picture, casement, and awning windows provide the same consistent look.

HARDWARE Cascade Series sliders and single-hung windows feature AutoLocking hardware. Cascade casement windows feature multi-point locks and smooth operating handles. The Cascade door features an upgraded heavy-duty screen and a secondary lock. Security is built into the Cascade Series.

Performance

+STRUCTURAL VALUES	Structural Rating	Test	Operation
C9100 Horizontal Sliders	HS-C35	72 x 60	XO
C9130 Horizontal Sliders (3-panel)	HS-C30 HS-LC25	120 x 60 120 x 72	XOX XOX
C9200 Single Hungs	H-LC30	48 x 96	X
9501 Picture Units	F-LC30 F-LC25	96 x 60 96 x 72	O O
9300 Casements	C-C50 C-C45	30 x 72 36 x 60	X X
9400 Awnings	AP-LC30 AP-LC25	48 x 36 48 x 48	X X
C9700 Patio Doors	SGD-R25 SGD-R15	72 x 82 96 x 96	XO XO
C9730 Patio Door (3-panel)	SGD-R20	142 x 82	OXO

U VALUES represent the rate of heat transfer through an object.

+U VALUES	Testing Data	SB60	SB60 + argon	SB70	SB70 + argon
C9100/C9130 Horizontal Sliders	U-Value SHCG**	0.35* 0.30	0.32* 0.30	0.35* 0.21	0.31* 0.21
C9200 Single Hungs	U-Value SHCG**	0.35* 0.30	0.32* 0.30	0.35* 0.21	0.31* 0.21
9501 Picture Units	U-Value SHCG**	0.31* 0.32	0.27* 0.32	0.31* 0.23	0.27* 0.23
+C9700/C9730 Patio Doors	U-Value SHCG**	0.33* 0.32	0.29* 0.32	0.33* 0.23	0.29* 0.23
9300 Casements	U-Value SHCG**	0.30* 0.26	0.28* 0.26	0.29* 0.19	0.26* 0.19
9400 Awnings	U-Value SHCG**	0.30* 0.26	0.27* 0.26	0.30* 0.19	0.27* 0.19

* Energy Star Rated ** (with no internal mounting)

* These values are subject to change without notice, based on testing and certification cycles
* Super Spacer standard on C9700 Patio Doors

Super Spacer

WINPRO SERIES

HIGH STYLE. HIGH VALUE

The WinPro Series is designed to give homeowners and building professionals a remarkable combination of sleek looks, reliable performance and serious value.

Intelligent design and energy efficiency results in a smart and affordable window with a maximized viewing area. The WinPro Series offers great flexibility in design and options while maintaining excellent structural and thermal qualities.

DISTINCTIVE LOOKS The WinPro Series offers a clean, contemporary window design with a variety of grid options and configurations.

CLEAN, SOLID LINES

WinPro windows have no unsightly accessory grooves, offering clean lines and maximum viewing area.

SET BACK INSULATED GLASS

The glass units in our WinPro Series windows are set back from the exterior of the frame, presenting a balanced, framed appearance and increasing the stability of larger units.

COLOR MATCHED HARDWARE

All operable WinPro windows feature color-matched hardware to maintain a unified appearance. The WinPro patio door includes a contemporary-designed, rounded Euro-handle.

Performance

+STRUCTURAL VALUES	Structural Rating	Test	Operation
9100/9130 Horizontal Sliders	HS-C30 HS-R20	120 x 60 120 x 72	XOX XOX
9200 Single Hungs	H-LC30	48 x 96	X
9011 Picture Units	F-C35	96x60	O
9700 Patio Doors	SGD-R25 SGD-R15	72 x 82 96 x 96	XO XO
9730 Patio Doors (3-panel)	SGD-R20	142 x 82	OXO

U VALUES represent the rate of heat transfer through an object.

+U VALUES	Testing Data	SB60	SB60 + argon	Clear	SB70	SB70 + argon
9100 Sliders	U-Value SHCG**	0.34* 0.32	0.31* 0.32	0.49 0.64	0.34* 0.23	0.30* 0.23
9200 Single Hungs	U-Value SHCG**	0.34* 0.32	0.31* 0.32	0.48 0.64	0.34* 0.23	0.30* 0.23
9011 Picture Units	U-Value SHCG**	0.32* 0.35	0.28* 0.35	0.47 0.70	0.31* 0.25	0.27* 0.25
+9700/9730 Patio Doors	U-Value SHCG**	0.33* 0.32	0.29* 0.32	0.47 0.63	0.33* 0.23	0.29* 0.23

* Energy Star Rated ** (with no internal mounting)

* These values are subject to change without notice, based on testing and certification cycles
* Super Spacer standard on 9700 Patio Doors

Super Spacer



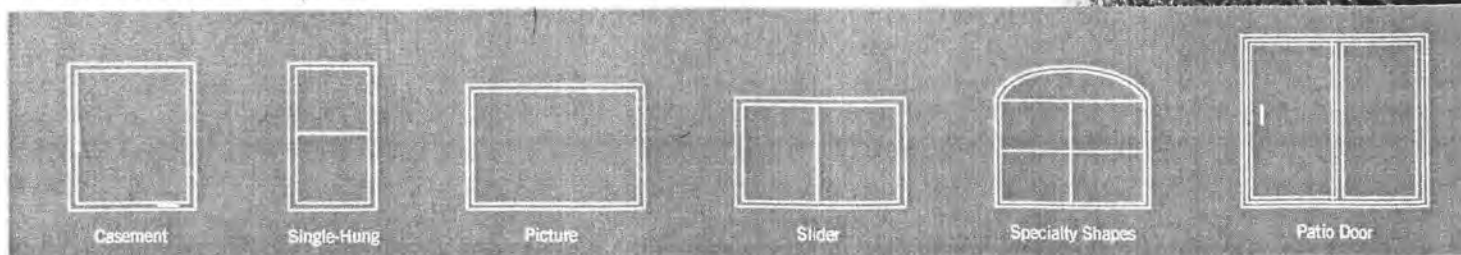
CUSTOM, STYLISH & VERSATILE

From Colonial to Craftsman, Post-Modern to French Country, Cascade Windows offers style combinations and grid patterns that will be just right for your home. Our versatile product lines allow you to combine styles and features to fit all your window needs.

Grid selection can greatly enhance the appearance of your new windows. At Cascade Windows, we offer an almost unlimited variety of internal grid styles and options. Choose from pencil, slimline or euro varieties. Grid colors available include white, almond, clay, bronze, brass, silver and pewter. The following page shows several available patterns. Of course, our technical services department is always ready to assist you in selecting the perfect window design for your home, simply contact your Cascade Windows representative for assistance.



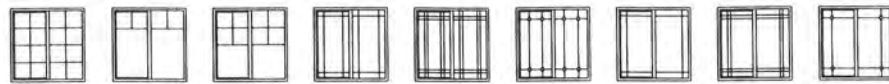
Basic Window Styles





GRIDS, COMBINATIONS & OPTIONS

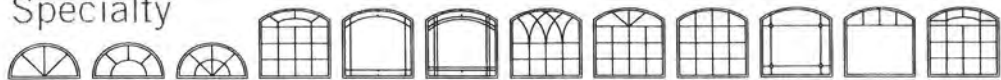
Slider



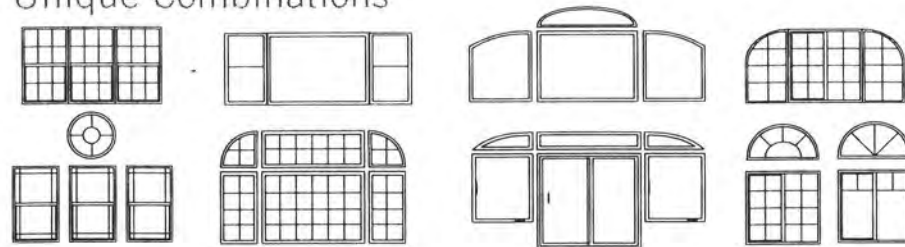
Single-Hung



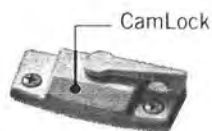
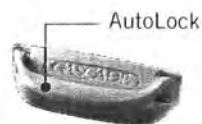
Specialty



Unique Combinations



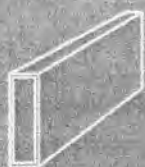
Handle & Lock Options



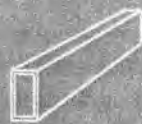
Color Options



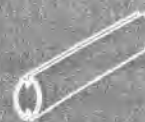
Grid Types



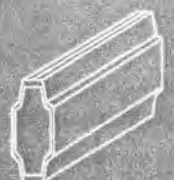
Standard 5/16" Wide Grid



Slimline 5/16" Wide Grid



Pencil Grid



Euro 1" Wide Grid



800.442.8544
www.cascadewindows.com

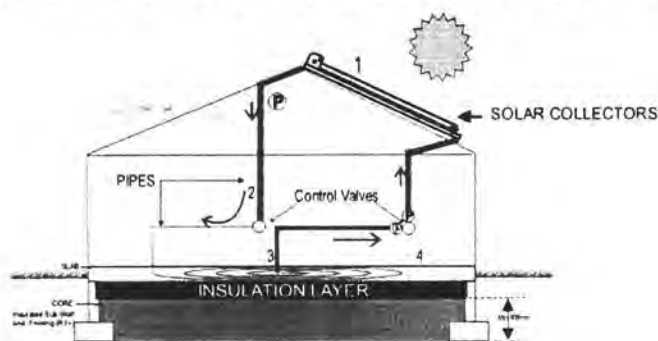


Glass Technology
Since 1883

THE 3 PHASES of the DIGITAL SELF HEATING HOME

In Simple Terms how does it all work?

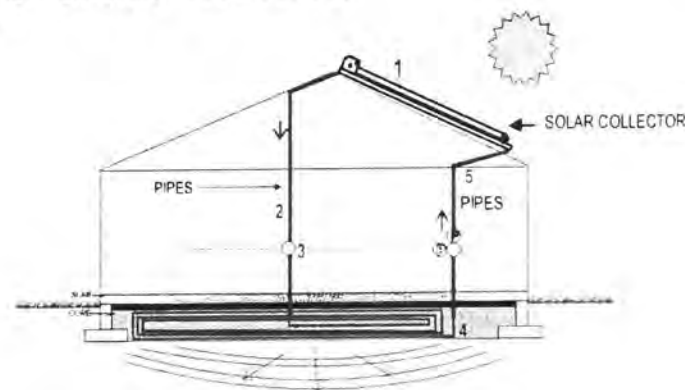
1 HEAT THE HOME USING DIRECT SOLAR ENERGY



1. The sun heats up the collector tubes which heats the water
2. The controller checks the house temperature.
3. The valves open and the small pump sends the heat to the slab to heat the floor.
4. The water circulates in the slab until the controller decides its warm enough and shuts down.

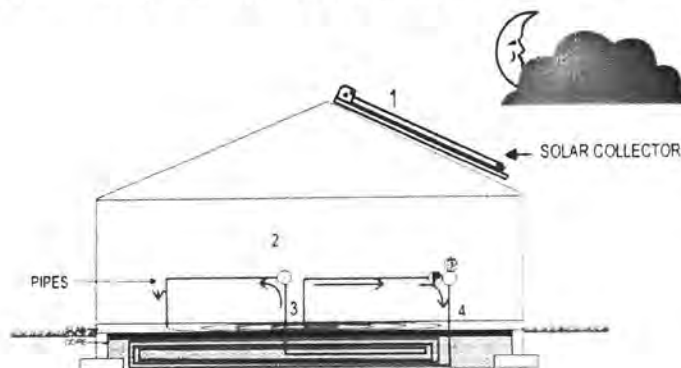
All heat NOT needed for immediate use is stored in the Core. It will take a full summer season of sunlight to charge up the core. Once heated the slab will stay at temperature for days with no input of heated fluid.

2 STORING THE HEAT



1. The sun heats up the collector tubes which heats the water inside the pipes.
2. The controller checks the house temperature and sends any excess heat to storage
3. The valves open and the pump sends the heat to the Core
4. The water circulates through the Core releasing its heat
5. The cooled fluid enters the collector to be reheated.

3 HEAT THE HOME USING STORED ENERGY



1. When there is sun to heat the solar collectors, and,
2. The controller recognizes heat is required in the home,
3. The valves correct are opened open and the pump sends the heat from the Core to the Slab.
4. The water circulates through the slab and the cool fluid enters the core to be reheated

Energy Efficient Homes

www.eehnz.com

FOR CLARITY, THE LOCATION OF THE DIGITAL SOLAR CONTROLLER IS OMITTED.
THIS IS ALSO THE THERMOSTAT
The active portion of the final system will consist of ONE pump and two control valves.

Energy Efficient Homes

DSHH Underfloor Heating General Questions:

Q How does DSHH Underfloor Heating work?

1. See diagram on preceding page: For this to work the house MUST be a thermally efficient home and be EEH approved for energy efficient design, to work properly.
2. Large evacuated "U" tube solar collectors collect huge quantities of heat during sunny days, especially over the summer. These types of solar collectors will also work in sub-zero temperatures.
3. The heat is targeted by a digital controller at the 1. hot water cylinder, 2. the slab floor and 3. a Solar heat containment storage area under the slab. Thus: if not required to heat the hot water (Opt) or house, the excess heat is dumped into a huge in-ground thermal mass, in the heat core storage area. The heat core is located in the ground itself, and comprises an insulated wall 1M high, and insulated Slab. This encompasses the "whole-house" foundation under the insulated slab.
4. Eventually this heat containment area becomes saturated with heat at the top and through conduction, permeates downwards filling the heat containment area and below. This limited speed of conduction is what makes the system long lasting. A long time to thermally charge up and a long time to extract the heat.
5. As required in winter, warm water is automatically extracted from the collectors **or** heat core as required and circulated through a series of pipes laid in the concrete slab (floors) of the rooms. These pipes form a continuous loop and act to create a large warm surface that will warm the room to a comfortable **background** temperature. In summer all heat generated is dumped into the heat core, dramatically rising its temperature, and providing for long term storage.
6. Concrete slab floor temperature is limited to only a few degrees above thermostat set point temperature, with the floor temperature nominally limited to "Warm". The concrete slab is also thermal mass and releases the heat slowly over long periods of time.
7. Even in winter the "U" Tube evacuated tube solar collector system generates significant heat on cold sunny days. A Solar hot water system can be integrated into the package as can a Wetback or mini boiler for backup.
8. 1:1 coverage is calibrated: Each m² of home to be warmed, requires ~1m³ of standard earth, hardfill, hard pan or rock for thermal storage in most of the N Island and slightly more in the South Island.
9. Expectations: In optimal locations in the North Island, excluding the plateau, design is for a standard whole-house background temp of 18c for most of the winter, and 18c for 75% of the winter in Southland and the plateau areas. These figures will vary based on house design, earth, thermal mass, temperature set point, as well as summer and winter sunshine hours. The system will inject solar heat even in winter under freezing conditions outside.

Q Can the DSHH underfloor heating be installed in any new building?

For optimal service it can be installed in any 'EEH' approved thermally efficient design with a slab floor. Note it takes a full summer to get a nominal full heat charge in the thermal heat-core, it can take 2-4 years to fully 'charge' the heat core.

Q What about a backup or Wetback?

The DSHH has an option to integrate a wetback or some other boiler. Like the Solar heat, the Digital controller will first heat the Hot Water Cylinder, then the house, then dump excess heat into the core to a maximum of 80c residual.

Q Will DSHH underfloor heating affect timber flooring?

The DSHH Under-slab heating will not affect wood, tile or laminate flooring due to the low slab temperature (Max 25-28c typical) which is less than summer heat temperatures, however; be careful with natural wood flooring where you must ensure the moisture content is low in the timber during installation to prevent shrinkage. Also be aware, timber flooring acts as a partial insulator, reducing the effectiveness of the warm slab.

Energy Efficient Homes

Q Will the DSHH underfloor heating work through a carpet?

Yes but not very well for the same reason as above. The carpet will act as an insulator; try to avoid thick carpets and underlays in areas you want the heat to permeate. Obviously the system's efficiency improves without the insulating effects of a carpet system; this can be mitigated in some areas such as bedrooms where less heating is preferred, or carpeting is localised.

Q Will the room be warm enough?

The DSHH system is design from the beginning to be a background heat, to stop the house from dropping below world standard recommendations of 16.5c, where mould and mildew spores start to fester. Provided that the room meets the minimum EEH insulation requirements, plus the system is designed and installed correctly, and reasonable care is given to ensuring continued thermal efficiencies in the home, it will operate as per the 'expectations' above. Remember this is not a rapid heat, but is designed to provide a continuous background heat over long periods. The engineering is designed to provide ~18c for most of the winter. You may want some locations warmer in winter or cooler in summer, thus it is a good idea to have some sort of supplementary heat/cooling.

Q Can the DSHH underfloor heating be installed in timber floors?

Not advised, but yes it can by using heat spreader plates under the floor. NOTE: It is not very efficient due to the insulating factors of the timber and is not fully tested at this point, nor recommended.

Q Will the DSHH floor get hot?

No, generally underfloor heating has a low return temperature and is designed and limited to few degrees above the thermostat set-point temperature: typically max 25-28c. This eliminates stress in the concrete and reduces the time it takes to get up to temperature from cold. The DSHH heating system is designed as a background heat. Areas can optionally be manually zone controlled.

Q Can I use an underfloor heating system as a cooling system?

We don't recommend it as cool air tends to stratify close to the floor, unlike heat which tends to rise and mix. Install a quality DC Inverter Heat Pump for your best cooling, in fact we recommend one for backup or zoned heating requirements.

BENEFITS OF THE EEH DSHH UNDERFLOOR HEATING

There are a number of features and benefits that occur from almost free underfloor Solar Heating.

✓ **Space & Economics**

No huge ongoing and ever increasing expenses for energy in heating for as long as you live in the home and the system operates normally. Every square metre of your home can be fully utilized, and no ducts.

✓ **Eco-Friendly, Carbon Neutral**

Virtually Zero carbon emissions during the operation of this system after the first year. As this reduces the need for expensive oil imports, it becomes better than carbon neutral.

✓ **Hygiene & Health**

There are huge positive health implications. For example: No dust is generated or circulated. The heating will help asthma sufferers as it reduces dust mites at floor level and can virtually eliminate toxic mould and mildew. The NZ government mandates that if you keep the house above 16.5c, mould and mildew is unlikely to grow in normal living areas in your home. No mould, no invisible allergenic spores, & warm home = improved health..

✓ **Comfort & Intrinsic Happiness**

It is pure luxury in winter to come home to a warm home. The DSHH provides comfortable background levels.

✓ **Cost effective & Savings**

Once installed, the DSHH will typically provide a heating energy saving, from 50% to 100% over your typical NZ heating costs. The improvement when compared to bog-standard, poorly insulated existing NZ home can be in the hundreds of percent. Actual results will vary and can be optimised.

✓ **Super Quiet**

Compared to forced air or radiator systems, there is no noise, no annoying air noises or ticking as pipes expand in floor voids. The pump is typically a 47watt unit that is virtually silent when running.

Energy Efficient Homes

✓ 2nd Floor

The DSHH is designed to heat one floor which is the equivalent of the SqM of the heat-store area. A 2nd floor will benefit from the DSHH system through conduction and convection. We can also increase the size of the heat core and install a floating concrete floor above to achieve the best results. Remember the core is matched to the house footprint size, location, and circumstances of your build thus expect performance losses accordingly.

✓ Backup Heat

Integrated Wetback or other boiler heat source is simple, and only requires a few extra components as long as the pipes are in place. A DC Inverter heat pump is also a good investment as it provides summer Air Conditioning as well as back up heat in winter. Note: A heat pump should be sized according to heat loss not just as per house SqM: thus the actual size/cost of a heat pump required is much lower in an EEH home.

✓ Ease of control

The DSHH is fully automated for day to day running. Set and forget with periodical checks to ensure all is well.

OPTIONS:

1. Solar Hot Water: This can be a stand alone system or a fully integrated system.

- a. Stand Alone: The hot water system is sized for your home and family as well as location in the country. A minimum 280L Solar hot water cylinder is included as well as extra solar collectors. EEH offers this as a kit or installed in most locations.
- b. Fully integrated Solar Hot Water: This features the same system as 1 above, however the extra solar collectors are integrated into the DSHH package.
 - i. The Hot water cylinder is heated first.
 - ii. The slab is heated (if required) next, and
 - iii. All excess heat is dumped into the core.

The upside is the stand alone system will exceed the requirements to heat a cylinder on a hot summers day effectively wasting potential heat once the cylinder reached maximum temp, thus this excess heat when fully integrated can be captured into the core. The downside is a large family can use all the hot water all the time reducing the mount of heat that goes into the core. This is partially offset by integrating the whole solar array into one feed.

Packaged cost with extra collectors and HWC ~\$5k + gst + installation for family of 4

2. Wetback integration: If you are considering a Fireplace, to be energy efficient it must be an airtight unit, either as a stand alone of fireplace insert. This will have a door to allow control of oxygen to the fire. It makes sense to include a wetback option to heat water. The DSHH system will treat the wetback generated heat exactly like solar and distribute it as required to the slab or core. If you have the Solar hot water option, it will heat the hot water first.

The Wetback system includes an overheat diverter pump & dump with fan cooler, to prevent pipes from becoming overheated.

Cost to add to the DSHH system is ~\$1500 + gst, + wetback

3. Zoned Heating: This is the ability to add temperature control to areas of interest. For instance a living area might get additional heat while bedrooms are generally cooler. This is designed into the system; however an automated system with thermostats in selected areas is possible and would need to be engineered into the design. POA.

www.eehnz.co.nz
www.eehnz.com
info@eehnz.co.nz
Info@eehnz.com

SKYPE: Captronnz

Tel: 09-815-6664

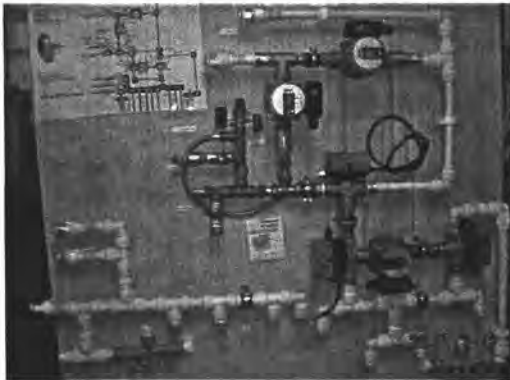
Energy Efficient Homes

The controller

Large LCD display, controls Solar system, hot water system, optionally combines Wetback heat and thermal overload protection.

The indoor Unit monitors 7 temperature parameters, switches on backup heating elements or Hot water heat pump up to 8kW output.

The Control System



The pre-mounted Control system

Patent Pending 571724



DEPARTMENT
OF CORRECTIONS

CIE Wanganui Precast,
Pauri Rd.,
Wanganui.
6/7/07



Corrections Inmate Employment
North Is West Coast
Regional Office

Pauri Road
Kaitoke
PO Box 209
Wanganui
Tel +64-6-348 8800
Fax +64-6-348 8801

Producer Statement – Water Tanks.

Issued by CIE Wanganui Precast, Department of Corrections, Wanganui prison,
Wanganui.

To: Water Smart, Paraparaumu.

IN RESPECT OF : Water Tanks

I, John Hackshaw, a duly authorised agent of CIE believe on reasonable grounds that
the Water Tanks we manufacture are suitable for the containment of potable water,
and are fit for this purpose.

On behalf of CIE Wanganui Precast, Wanganui Prison.

John Hackshaw.
Production Manager.
CIE Wanganui Precast.



Kāpiti Coast District Council

Private Bag 60 601
Paraparaumu 5254
New Zealand

Tel (04) 296 4700
or 0800 486 486

Fax (04) 296 4830 ■
kapiti.council@kapiticoast.govt.nz ■
www.kapiticoast.govt.nz ■

BC 100171

22 November 2010

To: Chris & Leonie Beggs,
PO Box 1698,
Paraparaumu Beach 5252

Dear Mr & Mrs Beggs,

With reference to BC 100171, for construction of a new dwelling at 8 Ngarara Road, Waikanae, a development contribution of \$11,170.14 is able to be charged because you are constructing a second dwelling on the site. A copy of the invoice is attached.

We apologise for sending you a statement prior to you receiving the invoice. You should have received an invoice accompanied by a letter explaining the charges. The accounts staff member who is responsible for issuing statements was on leave at the time and this statement was sent to you in error.

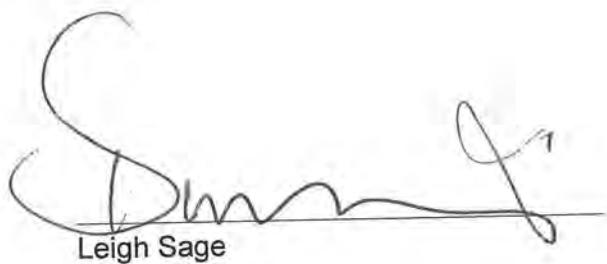
We understand that you intend to demolish the existing house upon completion of the new dwelling. When the demolition is completed you would be entitled to a refund of the development contributions imposed.

Therefore may we suggest you enter into a bank bond with Council to cover the fees. The bond would be cancelled upon Council receiving written evidence that the demolition has been completed.

We attach our bond template for your information

For your information : If the development contribution is not paid,—

- (a) the Council may, under section 208(b) of the Local Government Act 2002, withhold the code compliance certificate that would be issued under section 95 of the Building Act 2004:
- (b) the building consent authority, under section 94(4) of the Building Act 2004, must refuse to issue a code compliance certificate for the building work until it has received—
 - (i) evidence that the development contribution has been paid or made by the owner to the Council; or
 - (ii) a copy of written evidence that the existing dwelling on the site has been demolished:
- (c) the Council may, under section 208(d) of the Local Government Act 2002, register the development contribution under the Statutory Land Charges Registration Act 1928 as a charge on the title of the land in respect of which the development contribution was required.



Leigh Sage

Building Control Manager

On behalf of: KAPITI COAST DISTRICT COUNCIL

Date: 22/11/10

Russell Brook

From: Jill Burke (CS)
Sent: Tuesday, 16 August 2011 11:59 a.m.
To: Russell Brook
Subject: BC100171

Hi Russell,

As discussed could you please arrange for an inspection of 8 Ngarara Road, Waikanae, to confirm that the old house has been removed and there is now only one dwelling on site.

regards



Jill Burke (CS)
Customer Service Officer
Te Āpiha Awhina Kiritaki



Kāpiti Coast District Council
www.kapiticoast.govt.nz



This building has been
removed.

Russell Brook
19/8/11



SPECIFICATION

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

Proposed House

(project name)

8 Ngarara Road

Waikanae

(project address)

Mr & Mrs C. Beggs

(owners name)

Job Number: 09059

Date: Feb 2010

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1220 PROJECT

1. GENERAL

This general section describes the project including:

- A description of the work
- Site description, features and restrictions

1.1 READ ALL SECTIONS TOGETHER

Read all general sections together with all other sections.

Description of the work

1.2 SCOPE OF THE WORK

Construction of a new house as per ADa Project no.09059 pages 1 -35

Site features

1.3 SITE

The site consists of: Residential section of 2302sqm
as shown on drawing no. ADa 09059 page 03

1.4 LEGAL DESCRIPTION

The site of the works, the street address and the legal description are shown on the drawings.

1.5 EXISTING BUILDINGS

Existing buildings consist of: Existing cottage to be relocated
Refer to drawing(s) no(s): ADa 09059 page 03

1.6 EXISTING SERVICES

The following are the network utility services:

Electrical:	On site
Telecommunication:	On site
Water:	On site
Gas:	NA
Stormwater:	On site
Foul water:	On site

The services are also shown on drawing(s) no(s) ADa 09059 page 03.

Archaeological discovery

1.7 ANTIQUITIES AND ITEMS OF VALUE

Report the finding of any fossils, antiquities and other items of value, to the Contract Administrator. All to remain undisturbed until approval is given for removal.

Pre-1900, items or evidence of human activity on the site, come under the Historic Places Trust Act 1993. If such items or evidence is discovered work must stop immediately and the Contract Administrator must be notified immediately. The site maybe classified as an Archaeological Site under the Act, and the Contract Administrator or Owner must contact the NZ Historic Places Trust for authority to proceed.

Post-1900 items remain the property of the owner, pre-1900 items may remain the property of the owner or the Crown subject to what is found.

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, 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 Saturday, Sunday, public holiday or 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:	The person defined as "owner" in the New Zealand Building Code.
Principal:	The person defined as "principal" in the conditions of contract.
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. It includes the architect, engineer, designer, project manager or other person so appointed. 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:

AAMA	American Architectural Manufacturers Association
AS	Australian Standard
AS/NZS	Joint Australian/New Zealand Standard
ASTM	American Society for Testing and Materials
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
MPNZA	Master Painters New Zealand Association Inc
NZBC	New Zealand Building Code
NZS	New Zealand Standard
NZS/AS	Joint New Zealand/Australian Standard
NUO	Network Utility Operator
TA	Territorial Authority
TNZ	Transit New Zealand

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

This general section relates to other documents referred to in this specification.

1.1 REFERENCED DOCUMENTS

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

Reference is also made to various Standards produced by Standards New Zealand (NZS, AS/NZS, NZS/AS), Transit New Zealand specifications (TNZ) to 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, with the resolution of any variance being confirmed by the Contract administrator in writing and then notified to the Building Consent Authority for consent prior to any work proceeding.

1.2 DOCUMENTS REFERRED TO

Documents referred to in the GENERAL sections are:

NZBC F4/AS1	Safety from falling, 2.0 Construction site barriers
NZBC F5/AS1	Construction and demolition hazards, 1.0 Work-site barriers
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 1992	
Historic Places Trust Act 1993	
Resource Management Act 1991	
Smoke Free Environments Act 1990	
OSH	Approved code of practice for the safe erection and use of scaffolding
OSH	Guidelines for the provision of facilities and general safety in the construction industry

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 Building Consent Authority 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.

- The resolution of matters concerning building code compliance to be referred to the contract administrator for a direction in writing and then to the Building Consent Authority 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 DOCUMENTATION

The work shall be carried out to the true intent of the Contract Documents with any further details which may be issued from time to time for the purpose of more fully explaining those already shown. The drawings and this specification shall be accepted and considered sufficient for the general description of the works and the Contractor shall not depart from them without written consent. Should any discrepancy be found between the drawings and specification then the Designer should be consulted for a ruling.

1.4 CONTRACT OBSERVATION

The role of the consultants commissioned to design the work does not include administering the contract and/or observing the construction or completing the project. The contract documents prepared are sufficient for the construction of the project by a competent contractor. Consequently the consultants will not be liable (in contract tort or otherwise) for any claim, damage, liability, loss or expense incurred or arising in any way in relation to the contractor not carrying out and/or completing the work as described in the contract documents.

1.5 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.

1.6 KEY PERSONNEL

Provide names and contact detail of key personnel. Provide names, registrations numbers (where appropriate) and contact detail of key personnel that are required by the Building Consent Authority as part of the application for the Code Compliance Certificate.

Include the following as applicable:

- Registered drainlayer
- Registered plumber
- Registered electrician
- Roofer
- Block layer
- External plasterer

- External window manufacturer
- Waterproof membrane applicator

1.7 PRODUCER STATEMENTS

When producer statements verifying construction are required, provide copies to both the Building Consent Authority and the contract administrator. Provide producer statements in the form required by the Building Consent Authority.

Compliance information

1.8 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
- 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.

Substitutions

1.9 ACCEPTABLE PRODUCT/MATERIAL SUPPLIERS

Where a product or material supplier is named on the plans, 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.

1.10 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.

1.11 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.

1.12 NOTIFICATION OF SUBSTITUTIONS

Notify proposed substitution of specified products. Notification to include but not be limited to:

- Product identification
- Manufacturer's name, address, telephone and facsimile numbers, website and email address
- Detailed comparison between the properties and characteristics of the specified product and the proposed substitution
- Statement of NZBC compliance, including durability
- Details of manufacturer warranties

plus an assessment of

- Any changes required to the programme including any extension of time required
- Any consequential effects of the proposed substitution
- Allowance for time and cost for re-design and documentation (if applicable)

- Allowance for time and cost for obtaining an amendment to the Building Consent (if applicable)
- Any change in cost associated with the proposed substitution

and if requested

- All current manufacturer's literature on the product
- Accreditations and appraisals available
- Reference standards
- Product limitations
- Samples
- List of existing installations in the vicinity of the project

1.13 ACCEPTANCE OF SUBSTITUTIONS

The Contract administrator must advise of acceptance of substitutions in writing.

Amendment to issued Building Consent

1.14 GENERAL

The Contractor is reminded that Variations, other than for minor changes, and particularly where changes involve structural components, weathering envelope, waterproofing systems, plumbing, sanitary drainage, accessibility, egress and the like, will require an application for amendment to the building consent to be lodged with the Building Consent Authority, and an Amendment to the Building Consent must be approved before the work is carried out.

Similarly where it is proposed to substitute product or methods from those detailed in the documents, these will, particularly in those situations described above, also require an application for Amendment to the Building Consent.

Where variations or changes are required, either at the request of the client, or where prevailing building conditions or site conditions necessitate a change to the work from that documented, the Contractor shall seek a ruling from the Building Consent Authority, in writing, to clarify if a Variation to the Consent is required.

If required it shall be the Contractor's responsibility to prepare all necessary documentation and pay associated fees to obtain the required Amendment to the Building Consent. Such costs will be reimbursable by the client as a part of the approved variation cost.

1.15 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 Building Consent Authority 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.

1.16 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 Building Consent Authority 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.

Manufacturer's documents

1.17 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.

1.18 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.

1.19 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.

1.20 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.

Shop drawings

1.21 PROVIDE SHOP DRAWINGS FOR REVIEW

Unless addressed elsewhere in this specification provide shop drawings for review by the contract administrator. Do not proceed with manufacture of the items until the Contract administrator gives a direction to proceed.

As built drawings

1.22 PROVIDE AS BUILT DRAWINGS

Unless addressed elsewhere in this specification provide as built drawings required as built drawings including those required by the Building Consent Authority.

Operation and maintenance

1.23 PROVIDE OPERATION AND MAINTENANCE INSTRUCTIONS

Unless addressed elsewhere in this specification provide operation and maintenance documentation necessary for the principal to operate and maintain the works. Provide documentation no later than the date of practical completion or the date on which the principal takes occupation of the works. This documentation is to include: -

- A complete list of subcontractors' names, addresses and telephone numbers noting which portions of the contract each provided
- A complete list of equipment and appliances including serial numbers, manufacturer's names and sources of supply
- Copies of all manufacturer's product literature containing maintenance requirements/instructions
- Final As-Built drawings
- Originals of all warranties and guarantees properly executed.

Submit in final form in a hard cover loose-leaf binder, with contents index, contractor's name, date of practical completion and titled on the binding edge "Operation and maintenance instructions for (project name)".

1237 WARRANTIES

1. GENERAL

This general section refers to the requirements for warranties as listed, either in this work section or in specific work sections. It includes: -

- Warranties for parts of the work required by the Principal in a required form
- Installer/applicator warranties for parts of the work in the installer/applicator's standard form
- Manufacturer/supplier warranties provided with products, appliances and the like in the suppliers standard form
- Guarantees provided by contractors in the contractor's standard form

Warranties

1.1 PROVIDE WARRANTIES

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

Failure to provide the warranty does not reduce liability under the terms of the warranty called for in that specified section of work.

Where installer/applicator warranties are included in a branded section of this specification they shall be provided in lieu of the warranties that are otherwise required.

Where installer/applicator warranties are available they may be provided in lieu of the warranties that are otherwise required provided these warranties are subject to similar conditions and periods as those listed in the SCHEDULE OF WARRANTIES.

- Conform to the WARRANTY AGREEMENT form included in the specification/conditions of contract.
- Commence warranties from the date of practical completion of the contract works (unless otherwise stated).
- Maintain their effectiveness for the times stated.
- Provide executed warranties prior to practical completion.

1.2 WEATHERTIGHTNESS AND WATERTIGHTNESS WARRANTY

A warranty is required from the contractor for a minimum period of 2 years, covering the weathertightness of the complete building envelope and the watertightness of all liquid supply and disposal systems and fittings. This general warranty is in addition to any specific warranties required.

1.3 SCHEDULE OF WARRANTIES

The following is a summary of the warranties and warranty periods called for in work sections.

2 years	Weathertightness and watertightness
20 years	Sheet tanking
5 years	Profiled metal cladding
5 years	Profiled metal roofing
5 years	Synthetic rubber sheet roofing
5 years	uPVC windows and doors
10 years	Sealants
2 years	Wall tiling
2 years	Floor tiling
1 year	Carpeting
2 years	Painting
2 years	Hot and cold water system
2 years	Solar water heating system
5 years	Underfloor heating
1 year	Electrical general

Refer also to:

- WARRANTIES – INSTALLER/APPLICATOR for other installer/applicator warranties.
- WARRANTIES – MANUFACTURER/SUPPLIER for other materials and product warranties.

1.4

WARRANTIES – INSTALLER/APPLICATOR

Where installer/applicator warranties are offered covering execution and materials of proprietary products or complete installations, provide such warranties to the contract administrator. These warranties may be provided in lieu of the warranties that are otherwise required provided that these warranties are subject to similar conditions and periods as list in the SCHEDULE OF WARRANTIES.

Where installer/applicator warranties are included in a branded section of this specification, they shall be provided in lieu of the warranties that are otherwise required.

Provide warranties in favour of the principal. The terms and conditions of such warranties in no case negate the minimum remedies available under common law as if no warranty had been offered. Failure to provide the warranty does not reduce liability for execution and materials for that part of the work.

- Conform to the installer/applicator standard form. Where the installer/applicator does not have a standard form, use the WARRANTY AGREEMENT included in the contract documents.
- Commence the warranties from the date normally applicable for the work.
- Maintain their effectiveness for the times stated.
- Provide warranties no later than the date of the Contractor's Completion Statement.

1.5

WARRANTIES – MANUFACTURER/SUPPLIER

Where warranties are offered covering materials, equipment, appliances or proprietary products, provide all such warranties to the contract administrator.

Provide warranties in favour of the principal. The terms and conditions of such warranties in no case negate the minimum remedies available under common law as if no warranty had been offered. Failure to provide the warranty does not reduce liability for execution and materials for that part of the work.

- Conform to the manufacturer/suppliers standard form.
- Commence the warranties from the date normally applicable.
- Maintain their effectiveness for the times stated.
- Provide warranties no later than the date of the Contractor's Completion Statement.

Guarantees - Contractor

1.6

CBANZ GUARANTEE

Provide a Certified Builders HomeFirst Builders Guarantee. Complete the guarantee application. Before commencing the contract works, execute with the signatures of the owner and the Certified Builder, and forward to CBA Guarantee Ltd along with a copy of the Building Consent, payment schedule and the fee payable.

1240 ESTABLISHMENT

1. GENERAL

This general section relates to site establishment including: -

- Notices and approvals
- Inspections
- Site preparation
- Signage
- Temporary construction

Notices and approvals

1.1 STATUTORY OBLIGATIONS

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

1.2 BUILDING CONSENT AUTHORITY AND NETWORK UTILITY APPROVALS

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

1.3 NOTIFY NETWORK UTILITY OPERATORS

Notify all network utility operators of proposed works before commencing site operations. Ascertain location of services or confirm that none exist in the vicinity of the works. Take all necessary precautions to avoid damage to existing services.

Site preparation

1.4 SITE AND SOIL SURVEYS

Carry out all investigations necessary and peruse all information available to determine ground conditions and likely ground performance both on the site and adjacent to it. Also refer to the territorial authority project information memorandum (PIM).

1.5 GROUND CONDITIONS

Refer to the soils investigation report included with this specification.

Signage

1.6 SITE SIGN

Provide and erect a standard contractors core flute style sign displaying:

- Contractor's name and contact details.

Temporary construction

1.7 TEMPORARY ROADS

Provide as necessary all temporary roads, tracks, crossings and hard standing required for the efficient execution of the works and maintain to approval.

1.8 TEMPORARY BUILDINGS

Provide as necessary temporary sheds, sanitary accommodation and other temporary buildings required for storage, management of the works, for the use of workers while on site and as required by Acts and Regulations.

1.9 FENCING

Provide temporary fencing as necessary to protect the public and others, for the proper execution of the works and to meet the requirements of territorial or other authority and OSH.

1250 TEMPORARY WORKS & SERVICES

1. GENERAL

This general section relates to temporary works and services required for the construction of the contract works. It includes:

- Temporary works and services including temporary fencing
- Scaffolding and shoring
- General care and protection

Temporary works

1.1 COMPLY WITH NEW ZEALAND BUILDING CODE

Refer to New Zealand Building Code clauses and approved document paragraphs for the criteria and/or methods that must be used in this section to establish compliance with the code.

1.2 COSTS RELATING TO TEMPORARY WORKS

Pay all rates/fees in respect of temporary works.

1.3 MAINTENANCE OF TEMPORARY WORKS

Maintain, alter, adapt and move temporary works and services as necessary. Clear away when no longer required and make good.

1.4 SAFEGUARD THE SITE, THE WORKS AND MATERIALS

Take all precautions to prevent unauthorised access, including access outside working hours, to the site, the works and adjoining property. Safeguard the site, the works, materials and plant from damage and theft.

1.5 SITE FENCING – NON PUBLIC AREAS

Provide and maintain a 1 metre high site fence to non public areas. Construct using:

- warratah stakes at 1.5 metre centres fitted with safety caps
- plastic safety mesh

1.6 PROVIDE SEDIMENT AND SILT RUN OFF PROTECTION

Provide appropriate measures to prevent or minimise sediment generation and silt run off. Comply with territorial and other authority requirements relating to carrying out earthworks.

Prevent silt run off by:

- exposing only as much ground as required at any time
- providing run off channels, contour drains or earth bunds to divert clean water away from the site on to stable sealed or grassed ground
- capture silt by the use of silt fences, vegetation buffer strips, sediment ponds or earth bunds.

Provide sediment control by:

- earth bunds constructed across the slope to control and detain run off
- silt fences constructed using filter fabric stretched between posts at a maximum of 1 metre spacing.

Pump water from trenches and other areas of the site using methods to prevent sediment entering any drain or watercourse. Filter dirty water before discharging into drainage system.

1.7 PROVIDE CONCRETE WASHWATER RUN OFF PROTECTION

Provide appropriate measures to prevent cement/concrete washwater or slurry run off to; drains or waterways, landscaped areas new or remaining and adjoining public or private properties. Comply with territorial and other authority requirements relating to cement/concrete washwater.

Control run off from:

- Cement/concrete based material production, placing and finishing.

- Hosing down and cleaning of, tools and equipment, fresh material, and spilt or surplus material, pumps and mixers etc.
- Wet cutting or grinding.
- Slab watering etc.
- Water cleaning of new concrete elements, fresh used formwork etc.

Small project with relatively large exposed ground areas - prevent run off by:

- directing small amounts of washwater onto the area of ground closest to the work.
- for larger amounts provide run off channels, and small soak pits
- very small amounts of washwater with no aggregate and only a small amount of sand may be spread over existing lawns.

Spilt or surplus material:

- if possible allow to set and either use or dispose of as hardfill.
- pre-made concrete items, either use or dispose of as hardfill.

Pump washwater away from drains, waterways and adjoining property.

Temporary services

- 1.8 **WATER**
Provide clean, fresh water for the works and make arrangements for distributing about the site.
- 1.9 **ELECTRICITY**
Nominate the person to install and be responsible for the complete temporary electrical installation. The name and designation of the person responsible is to be displayed prominently and close to the main switch or circuit breaker.
- Inspect and overhaul the installation at such intervals as are prescribed by the network utility operator but not exceeding three monthly intervals.
- 1.10 **TELEPHONE**
Provide on site temporary telephone facilities.
- 1.11 **FACSIMILE**
Provide on site temporary facsimile facilities.
- 1.12 **COMPUTER**
Provide on-site temporary computer facilities complete with an email and internet connection capable of sending, receiving and printing site communications.

Scaffolding and shoring

- 1.13 **GENERAL SCAFFOLDING**
Provide as necessary general scaffolding for the efficient execution of the works. Placement, erection and structure to be by certified suppliers/erectors and approved by the Labour Department OSH inspectors before being used. Comply with the OSH publication: "Approved code of practice for the safe erection and use of scaffolding."

Care and protection

- 1.14 **PROTECT EXISTING BUILDINGS**
Protect existing buildings and other designated features which are to remain in position during the execution of the works.
- 1.15 **PROTECT EXISTING TREES**
Protect existing trees, fences, gates, walls, gardens and other designated site features which are to remain in position during the execution of the works.
- Construct a temporary fence at the outer edge of the drip line of trees to be protected. Comply with territorial authority requirements.

- 1.16 **EXISTING SITE SERVICES**
Make good all damage to existing roads, footpaths, grounds, sewers or other services, caused in carrying out the contract works.
- 1.17 **CONSTRUCTION KEYING AND SECURITY**
Provide locksets with temporary keying, or install with the cylinders removed.
- 1.18 **TEMPORARY STORAGE**
Provide temporary storage areas and protective covers and screens. Fillet stack and protect all framing and structural members from moisture and contamination. Completely protect finishing materials from the weather and damage and store in accordance with the manufacturer's requirements. Protect fabricated elements from the weather and damage, and store in accordance with suppliers' requirements.
- 1.19 **PERIODIC SITE CLEANING**
Carry out periodic site cleaning during the contract period. Place waste material in appropriate storage pending removal from the site.
- 1.20 **PERIODIC RUBBISH REMOVAL**
Maintain on site appropriate means for the storage and removal of construction waste material. Where required or appropriate provide for the separate storage of recyclable waste and other materials requiring special disposal. Keep food waste separate from construction waste.

1270 CONSTRUCTION

1. GENERAL

This GENERAL section relates to common requirements for construction issues including: -

- Quality assurance
- Noise and nuisance
- Set out
- Common execution requirements
- Common materials requirements
- Supply of spare materials
- Common requirements for samples and tests
- Final presentation and cleaning
- Commissioning

Quality control and assurance

1.1 QUALITY ASSURANCE

Carry out and record regular checks of material quality and accuracy, including:

- Concrete quality and finish.
- Dimensional accuracy of structural column locations (following completion of foundations).
- All perimeter columns and frames for plumb.
- Levels of all floors relative to the site datum.
- Framing timber moisture content.

Where any material, quality or dimension falls outside specified or required tolerances, obtain written direction from the contract administrator. Where building consent approval is affected, confirm remedial action with the Building Consent Authority.

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

Noise and nuisance

1.2 LIMIT CONSTRUCTION NOISE

Minimise the effects of noise generation by including in the planning of the work such factors as placing of plant, programming the sequence of operations and other management functions. Limit construction noise to comply with the requirements of NZS 6803, the requirements of the Resource Management Act sections 326, 327 and 328 and the Health and Safety in Employment Regulations clause 11.

1.3 ACCEPTABLE NOISE LEVELS

Refer to NZS 6803 Tables 2 and 3 for the upper limits of construction work noise in residential and industrial areas over the various time periods, particularly 0730 to 1800 hours. Note also the allowed adjustments and exemptions in Section 6. Do not exceed these limits.

1.4 PROVIDE INFORMATION TO NEIGHBOURS

Provide information to neighbours of any noise generation from the site liable to constitute a problem. Explain to them the means being used to minimise excessive noise and establish with them the timings most suitable for the noise generating work to be carried on.

Discuss with any complainant the measures being used to minimise noise. Where possible modify these measures to accommodate particular circumstances. Finally, determine the sound level at the location under discussion using methods and observation reporting as laid down in NZS 6803. If the noise level is above the upper limits of tables 2 and 3, cease the noise generating operation and remedy the problem.

- 1.5 **INCONVENIENCE TO OTHERS**
When the works are to be carried out in or around occupied premises, ascertain the nature and times of occupation and use. Carry out the works in a manner to minimise inconvenience, nuisance and danger to occupants and users.

- 1.6 **DIRT AND DROPPINGS**
Remove dirt and droppings deposited on public or private thoroughfares from vehicles servicing the site to the satisfaction of the appropriate authorities and the contract administrator.

- 1.7 **DAMAGE AND NUISANCE**
Take all precautions to prevent damage and nuisance from water, fire, smoke, dust, rubbish and all other causes resulting from the construction works.

Set-out and tolerances

- 1.8 **SURVEY INFORMATION**
Locate and verify survey marks and datum points required to set out the works. Record and maintain their position. Re-establish and replace disturbed or obliterated marks.

- 1.9 **SET-OUT AND DATUM**
Set out the work to conform with the drawings. Establish a permanent site datum to confirm the proposed building ground floor level and its relationship to all other existing and new building levels.

- 1.10 **SET-OUT BY LICENSED CADASTRAL SURVEYOR**
Before commencing construction provide the contract administrator with a certificate prepared by a licensed cadastral surveyor that the set-out is complete and that the building is accurately placed on the site.

During construction provide the contract administrator with a certificate, prepared by the same licensed cadastral surveyor confirming the set-out of the foundations and grid lines. Necessary adjustments are to be determined and agreed to by the contract administrator before proceeding further.

- 1.11 **CONFIRM HEIGHT IN RELATION TO BOUNDARY**
Provide a certificate prepared by a licensed cadastral surveyor that the building has been constructed within the allowed height in relation to boundary. Provide the certificate to the local authority. Provide a copy of the certificate to the contract administrator.

- 1.12 **USE OF SET-OUT INSTRUMENTS**
Permit without charge, the use of instruments already on site for checking, setting out and levels.

- 1.13 **CHECK DIMENSIONS**
Check all dimensions both on drawings and site, particularly the correlation between components and work in place. Take all dimensions on drawings to be between structural elements before linings or finishes, unless clearly stated otherwise.

- 1.14 **TOLERANCES**
All work to be level, plumb, and true to line and face. Unless otherwise specified in specific work sections of this specification, tolerances for structural work shall comply with the following:

Concrete construction:

To NZS 3109 Concrete construction
Clause 3.9 Tolerances for reinforcement
Table 5.1 Tolerance for precast components
Table 5.2 Tolerance for in situ construction

Masonry construction:

To NZS 3114 Concrete surface finishes
To NZS 4210 Masonry construction: Materials and workmanship
Clause 2.6.5 Tolerances
Table 2.2 Maximum tolerances

Structural steelwork:	To NZS 3404 (1997) Steel structures standard Section 14.4 Tolerances (after fabrication) Section 15.3 Tolerances (erection)
Timber framing:	To NZS 3604 Timber framed buildings Clause 2.2 Tolerances Table 2.1 Timber framing tolerances

Refer to work sections for tolerance requirements for finishes

Execution

- 1.15 **EXAMINE PREVIOUS WORK**
Before commencing any part of the work carefully examine the previous work on which it may depend. Report in writing to the contract administrator defects that may affect the quality of the proposed work and obtain instructions. Commencing work on any part means that previous work is accepted as being satisfactory for work of the required standard.
- 1.16 **WORKER QUALIFICATIONS**
All work to be level, plumb, and true to line and face. Employ only experienced workers familiar with the materials and techniques specified.
- 1.17 **MINIMISE DELAYS DUE TO WEATHER**
Use appropriate techniques and methods to prevent damage and minimise delays due to weather.
- Materials**
- 1.18 **NEW PRODUCTS AND MATERIALS**
Materials and products to be new unless stated otherwise, of the specified, and complying with all cited documents.
- 1.19 **COMPATIBILITY OF MATERIALS AND FINISHES**
Ensure all parts of a construction or finish are compatible and their individual use approved by the manufacturers and suppliers of other parts of the system. Source all parts of a system from a single manufacturer or supplier.
- 1.20 **STORING PRODUCTS AND MATERIALS**
Take delivery of and store products, materials and components in accordance with codes of practice and the product manufacturer's or supplier's stated requirements. Maintain the proper condition of any protective packaging, wrappings or supports during delivery, unloading and storage.
- 1.21 **HANDLING PRODUCTS AND MATERIALS**
Handle products, materials and components in accordance with codes of practice and the manufacturer's or supplier's stated guidelines. Avoid distortion and any contact with potentially damaging surfaces or conditions.
- 1.22 **SUBSTRATE CONDITIONS**
Ensure substrate conditions are within the manufacturer's or supplier's stated guidelines both before and during the installation of any material, product or system. Obtain written instructions on the necessary action to rectify unsatisfactory conditions.
- 1.23 **INSTALLING PRODUCTS AND MATERIALS**
Install in accordance with the manufacturer's or supplier's technical literature. Ensure that all installers are familiar with the required substrate conditions and the manufacturer's or supplier's specified preparation, fixing and finishing techniques.
- 1.24 **COMPLY WITH STANDARDS**
Comply with the relevant and/or cited Standard for any material or component. Obtain certificates of compliance when requested by the contract administrator.

1.25 **CONDITION OF MATERIALS AND COMPONENTS**
To be in perfect condition when incorporated into the work.

1.26 **INCOMPATIBLE MATERIALS AND METALS**
Separate incompatible materials and metals with separation layers, sleeves or gaskets of plastic film, bituminous felt or mastic or paint coatings, installed so that none are visible on exposed surfaces.

Samples and tests

1.27 **SAMPLES AND PROTOTYPES**
Where specified in the work sections, submit samples, prepare sample panels, and construct prototypes for review as to appearance, form and conformance with the drawings and specifications. Submit all information required to assist the review process, including technical data, manufacturer's literature, independent appraisals and producer statements.

Timing for the provision and review of samples, sample panels and prototypes to be included in the contract programme. Allow a minimum of 10 working days for each review. Proceed only after instructions to proceed have been issued in writing by the contract administrator.

In situ work may be incorporated in the finished work if so confirmed, otherwise allow to remove completely and replace.

1.28 **CONTROL STANDARD**
Obtain the contract administrator's confirmation of material, component and work samples which then become the quality control standard. Remove from the site any rejected samples. Retain confirmed samples with care on site for comparison throughout the contract. Remove from the site when no longer required.

Spares

1.29 **SPARES**
Collect, protect and store safely all spare materials required under the contract. Give the contract administrator an inventory of all spares.

Final presentation and cleaning

1.30 **REMOVE TEMPORARY PROTECTION**
Remove all temporary markings, coverings, labels and protective wrappings unless instructed otherwise.

1.31 **REPLACE DAMAGED MATERIALS**
Replace all materials or component damaged during the works to the standard of and integral with the original.

1.32 **COMPLETE ALL SERVICES**
Ensure all services are complete and operational, with all temporary labelling removed, required labelling fixed and service instructions provided.

1.33 **CLEANING BY CONTRACTOR**
Clear the contract works of all construction materials, waste, dirt and debris. Clean the contract works including:

- Wipe all surfaces to remove construction dust
- Clean out service ducts and accessible concealed spaces
- Clean out all gutters and rainwater heads
- Wipe dust from both sides of glass. Take particular care when removing paint or cementitious materials to not damage the glass.
- Remove adhesive residue left by labels and other temporary protection/markings
- Clean out the interior of all cabinetry

- Wash down external concrete including driveways and concrete masonry. Take care when waterblasting to not cause damage to the surface or allow water to enter the building.
- Remove rubbish and building material from the area immediately adjacent to the contract works

1.34

CLEANING BY COMMERCIAL CLEANER

Use a commercial cleaning firm to clean the whole of the interior of the building, including all appliances, equipment, fittings, surfaces and finishes to leave it without any blemish. Cleaning to include:

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

Commissioning

1.35

MOVING PARTS

Adjust, ease and lubricate all doors, windows, drawers, hardware, appliances, controls and all moving parts to give easy and efficient operation.

1.36

SECURITY AT COMPLETION

Remove any temporary lock cylinders and complete final keying prior to handing over keys to the principal on completion of the works. Leave the works secure with all accesses locked. Account for all keys/cards/codes and hand to the principal along with an itemised schedule, retaining a duplicate schedule signed by the principal as a receipt.

2210 PREPARATION AND GROUNDWORK

1. GENERAL

This section relates to the clearance, excavation and backfilling of the site area in preparation for:

- footings and floor slabs
- backfilling behind basement retaining walls

1.1 DOCUMENTS

Documents referred to in this section are:

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

1.2 SITE SAFETY

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

1.3 ARCHAEOLOGICAL DISCOVERY

If fossils, antiquities and other items of value are found refer to the general section CONSTRUCTION for actions to be taken with archaeological discovery.

2. PRODUCTS

2.1 EXCAVATED CLEAN FILL

Clean, free of contamination, mineral soil from other formations in the excavation which may be selected and approved as suitable for filling by having grading and moisture content properties that will allow recompaction to 95% of maximum density.

2.2 HARD FILL

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

2.3 GRANULAR FILL

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

2.4 DRESSING COURSE

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

2.5 FREE-DRAINING AGGREGATE

Scoria or crushed gravel graded 50 to 14 clean.

3. EXECUTION

3.1 WASHOUT BAY FOR TRUCK

Provide a designated area for trucks to be washed down to avoid mud and dirt being carried off site.

3.2 EXCAVATION GENERALLY

Carry out excavation, using plant suitable for the purpose, to the guidelines set by the OSH publication: Approved code of practice for safety in excavation and shafts for foundations.

3.3 BURNING OF MATERIALS

Burning of materials is not permitted on site.

3.4 PROTECT EXISTING WORK

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

- 3.5 **PROTECT TREES**
Protect from damage trees, shrubs, natural site features and existing landscaped areas nominated on the drawings as being retained. Ensure existing levels are undisturbed beneath the dripline of retained trees.
- 3.6 **EROSION CONTROL**
Ensure measures are in place to contain silt dislodged as a result of water infiltration and to prevent it being carried off site with stormwater.
- 3.7 **SURFACE PREPARATION**
Comply with NZS 3604, section 3.5, Site preparation. Remove all turf, vegetation, trees, topsoil, stumps, uncontrolled fill and rubbish from the area to be built on.
- 3.8 **UNDERGROUND ELEMENTS AND SERVICES**
Break out and remove old foundations, slabs, drainage pipes, manholes, tanks, cables and redundant services. Report for instructions when any unexpected voids, made-up ground or services are encountered. Seal off the ends of drains or remove to territorial authority approval.
- 3.9 **STOCKPILE TOPSOIL**
Stockpile excavated topsoil on site where directed. Keep separate from other excavated materials. Spread and level where directed before completion of the works.
- 3.10 **SHORING AND UNDERPINNING**
Carry out shoring and underpinning shown on the drawings and as necessary to prevent subsidence of adjoining public or private property and to ensure the safety of the public and site personnel. Maintain protection throughout the progress of the works, or until foundations and subgrade structures have been completed and the stability of adjoining public and private property secured.
- 3.11 **GENERAL EXCAVATION**
Trim ground to required profiles, batters, falls and levels. Remove loose material. Protect cut faces from collapse. Keep excavations free from water.
- 3.12 **FOUNDATION EXCAVATION**
Take foundation excavations to depths shown. Keep trenches plumb and straight, bottoms level and free of soft spots, stepped as detailed and clean and free of water.
- 3.13 **INADEQUATE BEARING**
If bearing is not to NZS 3604, 3.1.2 and 3.1.3, then excavate further and backfill with material as follows. Confirm any changes with the territorial authority.

Below slabs on grade:	Hardfill compacted in 150mm layers
Below footings:	10 MPa concrete
Service trenches:	Hardfill compacted in 150mm layers

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

3.14 **STANDARD OF COMPACTION**
Place fill in layers of not more than 150mm and compact to achieve 95% of maximum dry density. For granular fill material, the fill shall be compacted to 80% of saturated dry density.

3.15 **GRANULAR BASE FOR SLABS**
To conform to NZS 3604, section 7.5.3, Granular base. Consolidate with a vibrating roller. Blind the surface with 20mm of coarse sand or sand/cement and roll ready to receive a damp-proof membrane.

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

- 3.17 **RETAINING WALLS**
Backfill behind retaining walls with free draining granular material and compact in 200mm layers. Ensure any tanking membranes, drain coil and damp-proofing are not damaged.
- 3.18 **SURPLUS MATERIAL**
Remove surplus and excavated material from the site.

3120 CONCRETE

1. GENERAL

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

1.1 DOCUMENTS

Documents referred to in this section are:

AS 1366.3	Rigid cellular plastics for thermal insulation - Rigid cellular polystyrene - Moulded (RC/PS - M)
NZS 3101.1	Concrete structures standard
NZS 3104	Specification for concrete production
NZS 3109	Concrete construction
NZS 3114	Specification for concrete surface finishes
NZS 3604	Timber framed buildings
AS/NZS 4671	Steel reinforcing materials

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

2. PRODUCTS

2.1 NORMAL CONCRETE

Normal concrete 17.5 MPa grade, maximum aggregate size 19mm ready-mixed to NZS 3104. Provide delivery dockets listing mix and despatch details.

2.2 PRESCRIBED MIX CONCRETE

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

2.3 SITE CONCRETE

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

2.4 REINFORCEMENT

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

2.5 TYING WIRE

Mild drawn steel wire not less than 1.2mm diameter.

2.6 SPACERS AND CHAIRS

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

2.7 DAMP-PROOF MEMBRANE

0.25mm minimum polyethylene to NZS 3604, clause 7.5.4, Damp-proof membrane.

2.8 CELLULAR POLYSTYRENE INSULATION

Proprietary expanded polystyrene (EPS) foam board to AS 1366.3.

3. EXECUTION

3.1 HANDLE AND STORE

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

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

3.2 FALSEWORK AND FORMWORK

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

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

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

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

3.3 INSTALL DAMP-PROOF MEMBRANE

Apply polythene membrane to prepared basecourse with 150mm laps between sheets. Tape seal laps and penetrations with 50mm wide pressure sensitive plastic tape. Refer to drawings for perimeter details.

3.4 INSTALL CELLULAR POLYSTYRENE INSULATION

Install EPS insulation system to manufacturer's requirements.

3.5 CUT AND BEND REINFORCEMENT

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

3.6 ADJUSTMENTS

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

3.7 TOLERANCES, BENDING

To NZS 3109: clause 3.9, Tolerances for reinforcement.

3.8 SECURE REINFORCEMENT

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

3.9 LAPPED SPLICES

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

3.10 REINFORCEMENT COVER

Minimum cover to all reinforcing bars, stirrups, ties and spirals, as shown on the drawings. Where cover is not shown on drawings provide minimum cover to NZS 3101 part 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: clause 3.9, Tolerances for reinforcement.

3.11 CASTING IN

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

Do not use grounds exceeding 100mm in length. Location and form of conduits to be approved in writing by the owner. 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.

3.12 CONSTRUCTION JOINTS

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

3.13 PRE-PLACEMENT INSPECTION

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

3.14 SURFACE FINISHES

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

3.15 EXPOSED CONCRETE

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

3.16 CONCRETE SURFACE TOLERANCES

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

3.17 PUMPING CONCRETE

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

3.18 COMPACTION

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

3.19 RESIDENTIAL FLOOR SLABS

Construct to NZS 3604: clauses 4.8 Concrete and 7.5, Concrete slab-on-ground floors in timber buildings. Lay to true and straight surfaces, screeded, floated and steel (manual or power) trowelled finish. Tolerance on flatness: maximum 3mm gradual deviation over a 3 metre straight-edge, to NZS 3109: clause 104, Surface tolerances.

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: $\frac{1}{3}$ slab depth or 30mm minimum.

Spacing of sawcuts

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

- 3.21 **SURFACE DEFECTS**
Make good surface defects immediately after forms are stripped. Make good hollows or bony areas with 1:2 mortar or plaster, finished to the same tolerances as the parent concrete. Fill any tie rod holes with 1:2 mortar.
- 3.22 **CURING OF CONCRETE**
Keep damp for not less than seven days. Ensure curing of slabs commences as soon as possible after final finishing, by the use of continuous water sprays, or ponding. Alternately, apply a curing membrane. Ensure any membrane used will not affect subsequent applied finishes.
- 3.23 **STRIKE FORMWORK**
Strike formwork without damaging or overloading structure. Do not remove formwork before the following minimum periods:
- | | |
|----------|--|
| 4 days: | Slabs in beam and slab construction (leave props under slab spans over 2 metres) |
| 10 days: | Props from under slab spans over 2 metres |
| 18 days: | Beams, soffits and slab spans over 5 metres |
- 3.24 **CLEAN OUT**
Clean out saw cuts. Fill with cement grout where the floor will be covered with carpet or vinyl.
- 3.25 **REMOVE**
Remove all unused materials and all concrete and reinforcing debris from the site.

3322 ICF INSULATING BLOCKWORK

1. GENERAL

This section relates to the supply, erection, reinforcement and concrete filling of hollow ICF (expanded polystyrene) blockwork.

Related work

Documents

1.1 DOCUMENTS REFERRED TO

Documents referred to in this section are:

NZS 3104	Specification for concrete production
NZS 3109	Concrete construction
AS/NZS 4671	Steel reinforcing materials

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

Performance

1.2 CONCRETE TESTS

Retain mix design information for plant mixed concrete for inspection. Keep an accurate record of the in-place location of all batches. Carry out tests in accordance with NZS 3104, section 2.15 Control tests and their evaluation.

2. PRODUCTS

Materials

2.1 MANUFACTURER

Refer to SELECTIONS/drawings for manufacturer.

2.2 BLOCKS

Blocks injection moulded from fire retardant polystyrene beads. Final density between 23 and 26 kg per cubic metre.

PVC bridges, bonded into each external skin of polystyrene.

2.3 REINFORCEMENT

Deformed and plain steel bars to AS/NZS 4671.

2.4 CONCRETE INFILL

Normal concrete infill with a minimum compressive strength of 20 MPa at 28 days, to NZS 3104 and a slump of between 100 and 120mm. Maximum aggregate size 14mm. Supply concrete from a ready mix concrete plant with Certificate of Audit.

Equipment

2.5 PROP SYSTEM

As recommended and supplied by the manufacturer, for use during erection and the subsequent filling of block cores.

3. EXECUTION

Conditions

3.1 ALL WORK

All work by a firm approved by the manufacturers and/or distributors of the ICF blocks.

3.2 EXECUTION

Carry out all work using persons skilled in the methods and recommendations laid down by the ICF block manufacturer and in accordance with the manufacturer's technical information on the use of equipment and construction techniques.

Keep a current copy of the ICF block manufacturer's technical manual on site and bring to the attention of all workers during the construction process.

3.3 STORAGE

ICF blocks are vulnerable to damage. Take care to protect blocks during delivery, storage and installation, with particular attention taken to preventing damage to corners and rebates.

3.4 SOLVENTS

Do not allow solvent products to come into contact with ICF blocks.

3.5 CUTTING

Carefully follow the recommendations and requirements set out in the manufacturer's technical manual. Generally cut blocks using a small panel saw or sharp Stanley knife, with a keyhole saw used for reveals and cut outs.

3.6 ACCURACY

All walls true to line, level and plumb and within the following tolerances:

Deviation from plan location: 20mm

Deviation from vertical within a storey: 10mm per 3 metres

Relative displacement between load bearing walls in adjacent stories intended to be in vertical alignment: 5mm

Deviation from line to plan

- Any length up to 10 metres: 5mm

- Any length over 10 metres: 10mm

Deviation from horizontal

- Any length up to 10 metres: 5mm

- Any length over 10 metres: 10mm

Application

3.7 PROPPING

Install a propping system to hold the blocks in place during filling. Bolt props to the floor prior to laying of blocks, and install at all wall corners, and every 2 metres along each wall. Adjust for straightness and plumb. Install soft iron wire ties every fourth course, through the polystyrene, around the PVC bridge and back out around the prop.

3.8 ALL BLOCKS

Accurately bed all blocks into the blocks below and to butt accurately against each other, ensuring true wall dimensions are achieved. Do not place webs of blocks over the vertical flue of the block below.

Horizontal joints may be glued with polystyrene contact adhesive on each face, when required to assist stability against wind or construction loads.

Stay all walls against wind and construction loads.

3.9 PLACE REINFORCING

Place and tie reinforcing as detailed and in accordance with NZS 3109. Cut, bend and place reinforcement as shown on the drawings, with cover maintained by the use of plastic or concrete spaces.

Bars lapped only where detailed, with lapping kept to a minimum and staggered wherever practicable.

3.10 BUILT IN ITEMS

Build in all bolts, straps and fixings as detailed and as required. Construct chases, holes, cut-outs and recesses only as and where detailed. Any cast in fixings to have the

surrounding polystyrene removed to provide a minimum of 30mm concrete cover around the fixing.

3.11 CONSTRUCTION JOINTS

Locate construction joints in accordance with NZS 3109. Immediately before placing concrete, wet the construction joint area and apply a 10mm thick layer of cement slurry to the joint; slurry being either a cement/water paste, or a 1:1 mix of cement and sand. Work the slurry well into the construction joint before placing the concrete.

3.12 INSPECTION

Provide notification that the work is ready for inspection prior to grouting. Do not proceed with grouting until written approval has been received that walls have been constructed and reinforced in accordance with the design documentation.

3.13 CONCRETING

To NZS 3109. Ensure that all cells are clear and clean and all reinforcement is in place. Consolidate infill concrete by rodding with a 16mm square end reinforcing rod, or by using a small poker vibrator. Height and extent of lifts and sectional lifts to be strictly in accordance with the ICF block manufacturer's technical manual.

Finishing

Completion

3.14 WIRE TIES AND PROPS

Once the concrete infill has cured, cut off all wire ties level with the polystyrene surface. Carefully dismantle and remove the prop system.

3.15 CLEANING

Both during laying and on completion, clean down all exposed block surfaces to remove adhesive or concrete splashes.

3.16 MAKE GOOD

Make good any damaged corners or faces using acrylic cement plaster.

3.17 LEAVE

Leave work to the standard required by following procedures.

3.18 REMOVE

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

3410 STRUCTURAL STEELWORK

1. GENERAL

This section relates to the fabrication, erection and specialist coating of structural steelwork of a general nature.

1.1 DOCUMENTS

Documents referred to in this section are:

NZBC F5/AS1	Construction and demolition hazards
AS/NZS 1111	ISO metric hexagon commercial bolts and screws
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 pretreatment of surfaces - Method selection guide - Abrasive blast cleaning
AS 1627.9	Metal finishing - Preparation and pretreatment of surfaces - Method selection guide - Pictorial surface preparation standards for painting steel surfaces
AS/NZS 2312	Guide to the protection of iron and steel against atmospheric corrosion
NZS 3404 (1997)	Steel Structures Standard
AS 3828	Guidelines for the erection of building steelwork
AS/NZS 4680	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles
HERA	Report R4-99 "HERA specification for the fabrication, erection and surface treatment of structural steelwork".

1.2 QUALIFICATIONS

Welders to be qualified, experienced competent workers, familiar with the materials and the techniques specified.

1.3 SHOP DRAWINGS

Supply 1 set of shop and erection drawings to the owner for review prior to fabrication.

1.4 SHOP DRAWINGS REVIEW

Shop drawings review indicates the design concept has been reviewed without the need for further modification. This does not relieve the contractor of any responsibility for the correctness of the shop drawings, site dimensions, or for ensuring the work is performed in compliance with the drawings and specifications.

1.5 VERIFY DETAILS AND DIMENSIONS

Refer to drawings to ensure all required details and fixings are provided for in the structural steelwork. Verify dimensions against site measurements prior to fabrication.

1.6 TEST WELDING

Non-destructive weld examination with method, extent and standards of acceptance to AS/NZS 1554.1, Section 7 and Table D1 of NZS 3404 part 1.

2. PRODUCTS

2.1 STRUCTURAL STEEL

All steel Grade 300, except RHS sections Grade 350, unless noted otherwise on the drawings. Test and stress relieve for brittle fracture when required by NZS 3404.1, section 17, Testing of structures or elements.

2.2 WELDING

Electrodes to comply with and be selected for the grade of steel being welded as required by AS/NZS 1554.1. Welding wire as required by the wire manufacturer for the materials to be joined and the welding position. Welding flux: dry and used from sealed containers. Material for arc stud welding to comply with AS/NZS 1554.1.

- 2.3 **BOLTS, NUTS AND WASHERS**
To AS/NZS 1111 and AS/NZS 1252. Hot-dip galvanize all bolts, nuts and washers forming a permanent part of any structure subject to a protective coating, to AS/NZS 4680.
3. **EXECUTION**
- 3.1 **SURFACE FINISH**
Grind off all burrs and sharp arrises.
- 3.2 **TOLERANCES**
Discard material showing visual defects affecting its structural integrity. Structural elements to comply with NZS 3404.1, section 14.4, Tolerances (straightness, full contact splices, length and struts not prepared for full contact). Comply with the required tolerances laid down for holding down bolts, columns, beams and other members in HERA Report R4-99, sections 2.5, 4.5 and 5.6.
- 3.3 **CUTTING**
To NZS 3404.1, clause 14.3.3, Cutting and HERA Report R4-99, sections 1.5 and 4.6.
Hand cut only where machine cutting is not possible.
- 3.4 **CONSTRUCT**
Construct the steel structure as detailed and to NZS 3404.1, section 14, Fabrication and section 15, Erection.
- 3.5 **WELDING**
To NZS 3404.1, clause 14.3.4 Welding and AS/NZS 1554.1. Comply with AS/NZS 1554.1 for guidance on welding inspection and quality control.
- 3.6 **WELDING NEAR TOUCHING STEELWORK**
Shop weld together touching or near-touching steelwork all round with 5mm (one pass) continuous fillet welds unless denoted otherwise on the drawings.
- 3.7 **HOLING**
To NZS 3404.1, clause 14.3.5 Holing, for sizes, alignment, finishing and punching of holes.
- 3.8 **BOLTING**
Bolting to comply with NZS 3404, clause 14.3.6, Bolting.
- 3.9 **THREADS EXCLUDED FROM SHEAR PLANE**
Select length of bolts such that the threaded portion does not occur within the shear plane between joined parts.
- 3.10 **START ERECTION**
Start erection only when the holding down bolts and anchorages have achieved sufficient strength. Carry out the erection of the structural steel to the requirements of AS 3828. Comply with NZBC F5 and NZS 3404.1, section 15, Erection. Provide temporary bracing as required to achieve stability during erection.
- 3.11 **INSPECTION**
Inspect all stages of fabrication and construction of the structure to NZS 3404.1, sections 14, Fabrication and 15 Erection.
- 3.12 **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.
- 3.13 **ABRASIVE BLASTING**
Remove oil and grease by the use of solvents. Abrasive blast clean to a Sa2^{1/2} finish to AS 1627.4. Clean to bright metal, but avoid producing a polished surface. Select grit

type and equipment such that the cleaned surface profile between peaks and valleys does not exceed one third of the dry film thickness. Check that no burrs or sharp arrises remain which may prevent the full coating thickness being attained.

3.14 PRIMING GENERALLY

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

3.15 UNPAINTED SURFACES

Do not paint:

- faying face of high strength friction grip bolted joints
- areas for site welding, keeping 75mm clear all round
- surfaces being embedded in concrete.

Where steel is only partly encased then extend priming 25mm maximum into the concrete encasement area.

3.16 PATCH PRIMING

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

3.17 COATING SYSTEMS

Apply all coatings in accordance with the coating manufacturer's requirements. Apply coatings to steel within 4 hours of cleaning and before condensation or light rusting can occur. Ensure steel is dry and atmospheric conditions warm and dry, with an air temperature of greater than 12°C and relative humidity less than 85%.

3.18 TOUCH-UP

Touch up primer. Apply protective coatings as specified.

3813F CHH WOODPRODUCTS NZ - LVL STRUCTURAL FRAMING

1. GENERAL

This section relates to the supply and installation of Carter Holt Harvey engineered wood products including:

- Hyjoist®

1.1 RELATED WORK

Refer to PREFABRICATED TIMBER STRUCTURAL FRAMING for supply of trusses and frames.

Documents

1.2 DOCUMENTS REFERRED TO

Documents referred to in this section are:

NZBC B1	Structure
AS/NZS 2269	Plywood - Structural - Specifications
NZS 3604	Timber framed buildings
AS/NZS 4357	Structural laminated veneer lumber

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

CHH **Woodproducts NZ** documents relating to work in this section are:

Hyjoist®	Design and Installation Guide
designIT®	Software including installation details and design certificate

Copies of the above literature are available from CHH **Woodproducts NZ**

Web: www.chhfuturebuild.com in the New Zealand section

Email: futurebuild@chhwoodproducts.co.nz

Telephone: 0800 808 131 Technical Helpline

Requirements

1.4 NO SUBSTITUTIONS

Substitutions are not permitted to any specified Carter Holt Harvey engineered wood products or associated components or accessories. The structural properties of other manufactures LVL products may not be comparable.

1.5 QUALIFICATIONS

Carry out the installation of the structural LVL work with experienced and competent tradesmen familiar with the materials and techniques specified.

1.6 CO-ORDINATION

Refer to all drawings to ensure details and fixings required are provided for in the structural LVL work.

2. PRODUCTS

Materials - laminated veneer lumber

2.1 HYJOIST

Structural composite "I" beam floor joists and rafters comprised of a structural plywood web to AS/NZS 2269 with continuous LVL flanges to AS/NZS 4357.

Components

- 2.2 **JOIST HANGERS**
CHH **Woodproducts NZ** Top mount hanger, full depth face mount hanger and partial depth face mount hanger. Nails and screws to CHH **Woodproducts NZ** technical literature requirements.
- 2.3 **WEB STIFFENERS**
CHH **Woodproducts NZ** Web stiffeners in conjunction with partial height joist hangers and fixed to CHH **Woodproducts NZ** technical literature requirements.
- 2.4 **STEEL STRAPS**
Mild steel galvanized steel straps to suit application, 27mm x 0.6mm, 25mm x 0.8mm and 25mm x 1.0mm.
3. **EXECUTION**
- Conditions**
- 3.1 **DELIVER AND HANDLE**
Deliver and handle members so no structural damage occurs, corners and edges are not damaged, or surfaces marked or stained.
- 3.2 **HANDLING**
Handle LVL with nylon straps or similar to prevent damage.
- 3.3 **STORE**
Stack on level bearers, 150mm minimum clear of the ground. Store under cover to keep dry prior to installation.
- 3.4 **DEFECTS**
Discard material showing visual defects affecting its structural integrity.
- 3.5 **ERECTION GENERALLY**
Carry out the erection of LVL and associated support framing for houses and similar structures to the requirements of NZS 3604. Comply with NZBC B1/VM1, 6.0 Timber. Refer to CHH **Woodproducts NZ** guidelines for the installation of LVL structural framing. Reseal cut ends, holes, notches and the like of treated LVL with a brush on solvent based preservative. Prop long length beams and lintels at the mid span until the moisture content has reached a suitable level for the application of internal linings.
- Application - Hyjoist**
- 3.6 **ERECTION**
Lift, place and fix Hyjoist without overstressing or deformation. Use temporary supports as needed without causing damage. Fix Hyjoist to NZS 3604 and to CHH **Woodproducts NZ** requirements. Ensure all Hyjoist is correctly located, plumb and true to line and face.
- 3.7 **WEB HOLE LOCATIONS IN HYJOIST**
Circular holes, square holes and rectangular holes to be located in Hyjoist floor joists as per limitations in the Hyjoist Design and Installation Guide, or designIT. Do not cut web area as specified. Do not cut, notch or bore through flanges.
- 3.8 **HYJOIST RAFTERS AND OVERHANGS**
To CHH **Woodproducts NZ** Hyjoist Design and Installation Guide, or designIT, for details of rafter tie down, restraint at supports, lateral restraint for Hyjoist rafters, ridge support detail, fascia connection detail and overhang details. For sloping soffit with Hyjoist rafters birdsmouthed at supports, cut notch to provide 45mm minimum bearing. Flange must not overhang support. Do not cut beyond flange.
- 3.9 **HYJOIST BEARING AND SUPPORT DETAILS**
To Hyjoist Design and Installation Guide, or designIT, for details of bearing and support, nailing down to supports, installation of joist hangers, web stiffeners, web stiffeners for double joists, for joists oblique to bearer, concentrated loads from jamb studs or posts and limited notching at end supports.

- 3.10 JOIST HANGERS FOR HYJOIST JOISTS
To table, Joist Hanger Specification in CHH **Woodproducts NZ**, Hyjoist Design and Installation Guide, or designIT.

Completion

- 3.11 REPLACE
Replace or repair damaged elements.
- 3.12 REMOVE
Remove debris, unused materials and elements from the site.
- 3.13 LEAVE
Leave work to the standard required by following procedures.

3820 CARPENTRY

1. GENERAL

This section relates to the supply and erection of light timber framing, floors, flooring underlays for ceramic tiling and insulation.

1.1 DOCUMENTS

Documents referred to in this section are:

AS/NZS 1328.1	Glued laminated structural timber - Performance requirements and minimum production requirements
AS/NZS 1748	Mechanically stress-graded timber
AS/NZS 1860.1	Particleboard flooring - Specifications
AS/NZS 2269.0	Plywood - Structural - Specification
AS/NZS 2904	Damp-proof courses and flashings
AS/NZS 2918	Domestic solid fuel burning appliances - Installation
NZS 3602	Timber and wood-based products for use in building
NZS 3603	Timber structures standard
NZS 3604	Timber framed buildings
NZS 3631	New Zealand national timber grading rules
NZS 3640	Chemical preservation of round and sawn timber
AS/NZS 4347	Damp-proof courses and flashings - Methods of test
BRANZ BU 453	Fasteners selection

1.2 SAMPLES

Provide samples of the following for review prior to ordering:

- Boarding for exterior decks
- Timber strip flooring.

1.3 DIMENSIONS

All timber sizes except for battens are actual minimum dried sizes.

2. PRODUCTS

2.1 TIMBER FRAMING, TREATED

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

2.2 PLYWOOD

Structural plywood to AS/NZS 2269.0 for bracing and sarking.

2.3 HARDWOOD SPACED BOARDING FOR EXTERIOR DECKS

Plantation-grown hardwood. Dressed four sides and with arrises removed.

2.4 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.

2.5 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.

2.6 NAIL PLATES

Comply with 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. Plates to the plate manufacturer's design for the particular locations as shown on the drawings.

2.7 CONNECTORS

Comply with 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. Connectors and structural brackets to the connector manufacturer's design for particular locations shown on drawings.

- 2.8 **CORROSION RISKS**
Use stainless steel fixings, connectors, etc in all zones, with the timber treatments CuAz (Preservative code 58) and ACQ (Preservative code 90).
- 2.9 **DPC**
Refer to WRAPS UNDERLAYS AND DPC section
3. **EXECUTION**
- 3.1 **EXECUTION GENERALLY**
To NZS 3603 and NZS 3604 except as varied in this specification. Execution to include those methods, practices and processes contained in the unit standards for the National Certificate in Carpentry and the National Certificate in Joinery (cabinetry, exterior joinery, stairs).
- 3.2 **SEPARATION**
Separate all timber framing timbers from concrete, masonry and brick by: -
- a full length bituminous damp-proof membrane overlapping timber by at least 6mm; or
- a 12mm minimum free draining air space
- 3.3 **ATTENDANCE**
Provide and fix blocks, nogs, openings and other items as required by other trades.
- 3.4 **MOISTURE CONTENT**
Maximum allowable equilibrium moisture content (EMC) for non air-conditioned or centrally heated buildings for framing to which linings are attached.
Framing at erection: 24% maximum
Framing at enclosure: 20% maximum
Framing at lining: 16% maximum
Timber strip flooring: 10% at time of laying
- 3.5 **SET-OUT**
Set out framing in accordance with the requirements of NZS 3604 and as required to support sheet linings and claddings.
- 3.6 **FRAMING WALLS**
Frame to required loading and bracing complete with lintels, sills and nogs, all fabricated and fastened to NZS 3604, section 8, Walls.
- 3.7 **FRAMING ROOFS**
Frame to required loading and bracing complete with valley boards, ridge boards and purlins. Design and fit roof trusses complete with anchorage. All fabricated and fastened to NZS 3604, section 9, Posts and 10, Roof framing.
- 3.8 **FRAMING CEILINGS**
Frame to required loading and bracing complete with runners and battens set out to support ceiling lining. All fabricated and fastened to NZS 3604, section 13, Ceilings. Trim for openings in ceilings and hatches to NZS 3604 section 13.3, Openings in ceilings. Provide blocking for water tanks located in the ceiling space to NZS 3604, section 13.4, Water tanks in roof space.
- 3.9 **INSTALLING WALL WRAPS, UNDERLAYS**
Refer to WRAPS UNDERLAYS AND DPC section
- 3.10 **LAYING PLYWOOD SARKING**
Lay and countersink screw fix to the plywood manufacturer's requirements and to NZS 3604, section 7.2.3, Wood-based sheet flooring.
- 3.11 **LAYING TIMBER SPACED BOARDING FOR EXTERIOR DECKS**
Confirm whether the grooved side of the boards are face up or face down. Avoid excessively short or long lengths, drill for all fixings, stagger end joints and space boards a maximum of 2mm apart in general conditions, or maximum 3mm apart if boards are

likely to swell after fixing. Fix using annular grooved galvanized jolt head nails, heads driven flush with the board surface.

3.12 DPC TO LOSP TREATED TIMBER
Refer to WRAPS UNDERLAYS AND DPC section

3.13 DPC TO TIMBER
Refer to WRAPS UNDERLAYS AND DPC section

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

4131M PROTECTO WALL AND PRO-DRAIN 8 TANKING

1. GENERAL

This section relates to the application of **Marshall Waterproofing Ltd** products:

- **ProtectoWall®** SBS modified rubberised asphalt waterproofing membrane tanking system
- to below ground concrete, masonry and polystyrene structures as a self adhesive DPM
- using **Pro-Drain 8** as the protection board to create a neutral pressure zone between the foundation wall and subsoil.

Documents

1.1 DOCUMENTS REFERRED TO

Documents referred to in this section are:

- | | |
|-------------|---|
| NZBC E2/AS1 | External moisture, 12.0 Basements |
| NZS 3114 | Specification for concrete surface finishes |

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

1.2 MANUFACTURER'S DOCUMENTS

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

- Specification for **Protecto Wall**
- Brochure for **Protecto Wall**
- BRANZ Appraisal 517 - **ProtectoWall®**

Copies of the above literature are available from:

- | | |
|------------|-----------------------------------|
| Company: | Marshall Waterproofing Ltd |
| Web: | www.mwnz.com |
| Email: | info@mwnz.com |
| Telephone: | 0800 776 9727 |

Warranties

1.3 WARRANTY - MANUFACTURER/SUPPLIER

Provide a material manufacturer/supplier warranty:

- | | |
|-----------|--------------------------|
| 50 years: | For ProtectoWall® |
| 15 years: | For Pro-Drain 8 |

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

Refer to the general section WARRANTIES for additional requirements.

1.4 WARRANTY - INSTALLER/APPLICATOR

Provide an installer/applicator warranty:

- | | |
|-----------|---|
| 15 years: | For installation of Marshall Waterproofing Ltd membrane tanking system |
|-----------|---|

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

Refer to the general section WARRANTIES for additional requirements.

Requirements

1.5 QUALIFICATIONS

Work to be carried out by certified installers and tradespeople experienced, competent and familiar with the **Marshall Waterproofing Ltd** materials and techniques specified.

- 1.6 **NO SUBSTITUTIONS**
Substitutions are not permitted to any specified **Marshall Waterproofing Ltd** system, components and associated products listed in this section.
- 1.7 **SAFETY PRECAUTIONS**
Take extra precautions when using **Protecto Wrap 100 Primer** and **JS 160H Mastic** in areas where there is insufficient ventilation. Do not breathe in fumes. Avoid contact with skin, wear eye/face protection. Refer to Material Safety Data Sheets on **Marshall Waterproofing Ltd** website at www.mwnz.com.
- Performance**
- 1.8 **INSTALLATION**
Installation of the **ProtectoWall®** membrane must be completed by **Marshall Waterproofing Ltd** trained and certified installers.
- 1.9 **SPECIAL DETAILS**
Where a standard detail does not exist, or if a standard detail cannot be applied, an approved alternative must be obtained from Marshall Waterproofing Ltd before proceeding with the installation.
- 1.10 **PRESSURE RATING**
Obtain a written assurance from **Marshall Waterproofing Ltd** that the waterproofing system, comprising membrane and jointing methods, is capable of sustaining the designated water pressure head. Refer to SELECTIONS for the designated water pressure head.
- 1.11 **QUALITY ASSURANCE**
Maintain quality necessary to assure that work is performed in accordance with this specification and the qualifying requirements of Marshall Waterproofing Ltd.
- 1.12 **ONGOING MAINTENANCE REQUIREMENTS**
Marshall Waterproofing Ltd recommend as normal maintenance, the building owner or facility manager contract the certified installer to inspect annually to ensure weather tightness and durability of:
- the top edge of the membrane sheet
 - the sheet protection at that top edge
 - the subsoil drainage is not blocked and is free draining to an approved outlet
2. **PRODUCTS**
- Materials**
- 2.1 **WATERPROOFING MEMBRANE**
ProtectoWall®, a self adhering sheet waterproofing membrane system consisting of a tough fabric reinforcement laminated between two layers of SBS (styrene-butadiene-styrene) modified rubberised asphalt. The total thickness is 1.5mm and supplied in rolls 762mm wide x 15.24m long and 900mm wide x 15.24m long.
- Accessories**
- 2.2 **PRIMER - GENERAL**
Protecto Wrap 100 Primer, a solvent based high-tack SBS rubber based primer. Supplied in 4 and 20 litre cans and applied with either a brush or roller. Do not use on polystyrene. Clean up with mineral turpentine.
- 2.3 **PRIMER - POLYSTYRENE**
Protecto Wrap 6000 Primer, water based primer for use on polystyrene. Available in 4 litre bottles. Shake bottle before use. Clean up with water.
- 2.4 **DETAIL TAPE**
Protecto Wrap Detail Tape, a conformable sheet membrane to detail all external and internal corners, around any pipes or protrusions and footings. Can be formed and

stretched into any shape but also has an incredible ability to bond to itself. Supplied in 150mm wide x 15 metre long rolls and is 1mm thick.

- 2.5 **MASTIC**
JS 160H Mastic, a rubberised adhesive, semi liquid membrane used to seal all terminations and joints and around all penetrations in the membrane and all mechanical fastenings. Supplied in 310 mille litre tubes and 4 litre cans.

- 2.6 **DRAINAGE/PROTECTION BOARD**
Pro-drain 8, a black dimpled sheet manufactured from High Density Polyethylene (HDPE), 0.6mm thick with a dimple height of 8mm. Available in 2.1m x 1.2m (2.52m²) sheets or 8.4m x 1.2m (10.08m²) rolls. Used to protect DPM from backfill material.

- 2.7 **ADHESIVE**
Protecto Tak, a light blue spray on primer/adhesive used to prepare the surface for the application for the **Pro-drain 8**.

3. **EXECUTION**

Conditions

- 3.1 **COMPLY**
Comply with the requirements and instructions of **Marshall Waterproofing Ltd** for **ProtectoWall®** and **Pro-Drain 8** and to BRANZ Appraisal 517 - ProtectoWall®.
- 3.2 **LAYOUT**
If not detailed on the drawings, confirm the layout to suit site conditions and Marshall Waterproofing Ltd specifications. Pre-plan the work to keep the number of membrane laps to an absolute minimum.
- 3.3 **STORAGE**
Take delivery of rolls undamaged and include for site handling facilities where required. Store membranes and accessory materials under conditions that ensure no deterioration or damage, at temperatures between 10°C and 32°C. Do not store in direct sunlight. Do not remove membranes from their cartons until ready to use and replace membranes in their cartons for storage.
- 3.4 **WEATHER CONDITIONS**
Install **ProtectoWall®** membrane only in fair weather with air temperature above 7°C.
- 3.5 **DE-WATERING**
Maintain water level at not less than 300mm below the level of the base concrete during the progress of the tanking work.
- 3.6 **DRAINAGE**
Install to NZBC E2/AS1, perforated pipe drainage to remove water from foundations to Marshall Waterproofing Ltd specifications.
- 3.7 **CHECK SUBSTRATE**
Check that the substrate will allow work of the required standard. Complete any remedial work identified before commencing any work. Substrate to comply with performance requirements of the NZBC E2/AS1.
- 3.8 **CURING OF NEW CONCRETE**
Allow concrete and masonry to dry to **Marshall Waterproofing Ltd** requirements before applying membrane. Minimum curing of new concrete: 7 days. This is not applicable for site lean concrete.

Application - preparation

- 3.9 **SUBSTRATE CONDITION**
Ensure that the substrate is in a suitable condition to allow work of the required standard. Ensure all surfaces are smooth, clean, dry and free from dust and dirt with no projections

of sharp materials that will cause damage to the membrane or allow water to track behind the membrane. On concrete masonry check that masonry mortar joints are flush with the front face of the substrate.

Ensure form oils or release agents and curing compounds are completely removed.

3.10 SUBSTRATE PREPARATION

Wire brush to remove projections. Remove all debris, leaving the surface dust-free, oil-free and clean, with nothing that could diminish the adhesion of primers. Fill tie holes flush and smooth with mortar. Grind off steps or sharp protrusions caused by formwork joints.

3.11 TURN UPS

Where tanking is turned up against hardened concrete, ensure the surface is smooth and free of all sharp projections. Fill internal corners with a fillet of modified cement mortar, epoxy mortar or bituminous putty.

3.12 TURN DOWNS

Where tanking is turned over an external corner, first grind the corner to produce a smooth 5mm radius or chamfer.

3.13 CLEAN SURFACES

Clean surfaces with a broom or oil free compressed air to remove dust, loose particles and material that could affect bonding.

3.14 DRESS OFF HARDFILL SURFACE

Dress off surface of hardfill with a 15mm layer of fine, clean sand roll-compacted to a smooth surface. Ensure concrete surface is a smooth steel trowel U3 surface to NZS 3114. Grind off any steps or sharp protrusions.

3.15 REMOVE BACK FORMS

Remove back forms to ensure no vapour pressure develops beneath the membrane.

Application - substrate

3.16 POLYSTYRENE SURFACES

Polystyrene surfaces to be clean, dry and free of irregularities or loose material. Block fill must be completed before **Protecto Wall** installation. Only use water based **Protecto Wrap 6000 Primer** on polystyrene.

3.17 CONTROL/EXPANSION JOINTS

Ensure joints have a closed cell PF backer rod pressed into the joint and sealed with a neutral cure sealant. When sealant is dry prime a minimum of 500mm either side of the joint and apply **Protecto Wrap Detail Tape** evenly down the length of the control/expansion joint. Leave the release film on the installed **Detail Tape** as this will act as a slip layer. Starting at the top of the wall centre a length of **ProtectoWall®** over the control/expansion joint and press firmly onto the substrate. Use a broom or roller to press membrane onto the surface to maximise adhesion.

3.18 PRIMING

Prime area to receive membrane with selected **Protecto Wrap primer**. Primers have a coverage rate of approximately 5 square metres per litre. Leave the primers to flash off or cure for approx 15-20 minutes before installing the membranes. Ensure the area you are priming is clean and free of all dust. Do not install membranes over wet primer. The primer must not pull away from the substrate when touched. Only prime as much area as can be covered in 3 hours. After 3 hours re-prime the area. Ensure all appropriate safety equipment is worn.

3.19 DETAILING

After priming and before installing the **ProtectoWall®** membrane, all protrusions, corners and wall-to-footing junctions to be detailed with **Protecto Wrap Detail Tape**. When joining **Detail Tape** allow for a 100mm overlap. Do not remove the protective plastic film from the face of the **Detail Tape** until you are ready to lay the membrane.

Application - ProtectoWall®

- 3.20 **APPLY MEMBRANE**
Apply **ProtectoWall®** membrane waterproofing 300mm higher than the intended finished ground level. Ensure exposed membrane is protected from sunlight and UV radiation.
- 3.21 **INSTALL MEMBRANE**
Mark the waterproofing height with a chalk line. Select a starting point for the membrane installation and mark a vertical line. Prime surfaces and allow to cure. Apply **Protecto Wrap Detail Tape** as required. Measure and cut the **ProtectoWall®** membrane.
- Start the installation from the top of the wall. In some situations the membrane can be installed horizontally. Take care to ensure the joint is lapped with the upper sheet over the lower sheet.
- 3.22 **PEEL BACKING PAPER**
Peel 150mm of backing paper from the start of the sheet, align with the marks and smooth firmly onto the wall. Continue to remove the backing paper while smoothing the **ProtectoWall®** firmly onto the wall.
- Ensure plastic film is removed from the **Detail Tape** as you install the membrane. Leave the **Detail Tape** release film on over control joints. Install the **ProtectoWall®** down the wall and onto the footing. Ensure the waterproofing finishes at least 200mm below the F.F.L and joins onto the DPM from under the footing or floor.
- 3.23 **POSITION MEMBRANE**
Position the next length of membrane at the top of the wall allowing a 50mm over lap onto the already installed membrane. Install the **ProtectoWall®** down the wall as before. Lift the overlapping edge of the membrane and peel off the perforated film on the edge of the previously installed sheet. Smooth the membrane overlap back into place and roll the lapped joint firmly using a hard rubber roller.
- Roll the entire wall with a hard rubber roller to ensure maximum contact of the membrane to the wall surface. Pay particular attention to the lap joints.
- Peel off the protective film and apply a bead of **JS160H Mastic** along the top edge of the membrane and to the edge of all lap joints. Trowel smooth into the membrane edge.
- Fold the floor/footing DPM up approx 500mm on to the **ProtectoWall®**. Use **Protecto Wrap Detail Tape** and **Tak Primer** to seal the slab/footing DPM onto the **ProtectoWall®**.
- 3.24 **SHEET JOINTS**
Care must be taken to ensure sheet edge overlaps are a minimum of 50mm. Sheet end laps must be a minimum of 100mm.
- 3.25 **MECHANICAL FIXING**
Ensure **ProtectoWall®** is mechanically fastened along the top edge of the membrane at 300mm spacings in very cold conditions and when wall height exceeds 2.4m. Apply a bead of **JS 160H Mastic** around all fasteners and cover with **Detail Tape**. Roll patch to maximise adhesion.
- 3.26 **REPAIRS**
When air becomes trapped behind the membrane at any stage of the installation, puncture and press firmly to expel the air. Place a bead of **JS 160H Mastic** liquid membrane over the punctured area and trowel smooth. Cover with **Detail Tape** and roll firmly.
- 3.27 **MAINTENANCE**
Regular inspections are required to ensure the membrane top edge seal and protection, backfilling cap and wall drainage are all functioning correctly. The slope of the backfill cap must be maintained at all times.

Application - Pro-drain 8

3.28

GENERAL

To NZBC E2/AS1 and Marshall Waterproofing Ltd specifications. Membrane protection, wall drainage and backfilling must be completed as soon as possible after the waterproofing has been completed. Ensure the membrane is protected against damage by the placement of **Pro-Drain 8** protection board between the membrane and the granular backfill.

Ensure the tanking is clear of any debris or material that may puncture the waterproofing surface. Make sure sufficient and safe working space has been provided.

3.29

POSITION PRO-DRAIN 8

Ensure **Pro-Drain 8** is installed with raised dimples against the tanking surface. Install either horizontally or vertically with the sheets or rolls overlapped by two dimples to form a continuous protection layer.

The **ProtectoWall®** has a release film on its outer face. This is removed prior to the installation of the **Pro-Drain 8** to expose a highly adhesive surface.

Position the **Pro-Drain 8** against the **ProtectoWall®** tanking and press firmly onto the adhesive surface. This should be sufficient to hold the **Pro-Drain 8** until the backfilling can be completed.

Where sheet jointing overlaps are required, a neutral cure adhesive is applied at intervals to the dimple hollows of the first sheet. The overlapping two rows of the second sheet are then pressed firmly into the matching dimples. This will hold the sheet overlaps together and ensure no debris can reach the waterproofing.

3.30

INSTALL PRO-DRAIN 8

Spray **Protecto Wrap Tak Primer** at regular intervals onto the **Pro-Drain 8** raised dimples. Remove the backing paper from small squares of **Protecto Wrap Detail Tape** and adhere to the sprayed dimples. Remove the release film from the **Detail Tape** and spray the tape with **Tak Primer**. Position the **Pro-Drain 8** against the wall and press firmly into place.

3.31

SHEET JOINTING OVERLAPS

Where sheet jointing overlaps are required, a neutral cure adhesive is applied at intervals to the dimple hollows of the first sheet. The overlapping two rows of the second sheet are then pressed firmly into the matching dimples. This will hold the sheet overlaps together and ensure no debris can puncture the waterproofing.

3.32

SEAL TOP SHEET

Ensure that no debris enters the drainage cavity between the **Pro-Drain 8** and the waterproofing. Any foreign material that enters this space has the potential to damage the integrity of the tanking.

3.33

PRIME TOP OF PRO-DRAIN 8

Spray a band of **Protecto Tak Primer** along the top of the **Pro-Drain 8** sheet and onto the waterproofing. (**Tak Primer** is compatible with **Protecto Wrap** tanking however it is advisable to check the compatibility of the primer with other tanking products).

3.34

APPLY TAPE

Apply a length of **Protecto Tape** along the top edge junction of the **Pro-Drain 8** and the tanking. Press and mould firmly into place.

Apply **Protecto Wrap JS160H** mastic to any tape joins and along the top edge of the tape. The tape is not UV stable and must be covered within 6 weeks of installation by either coating in plaster or painting with waterbased paint. If required **Protecto Tape** can be continued from the top of the **Pro-Drain 8** to finish up behind the cladding. The tape is Branz appraised as a plasterble flashing tape.

Completion

- 3.35 **SECTIONAL COMPLETION**
As sections of the tanking are completed, arrange for inspection of the work before covering with protective sheets, walls, slabs or backfill.
- 3.36 **ACCEPTANCE**
- Arrange for an inspection of the completed work.
- Protect the membrane until completion of the contract works.
- 3.37 **CLEAN UP**
Clean up as the work proceeds.
- 3.38 **LEAVE**
Leave this work in a sound condition, free of any defect.
- 3.39 **REMOVE**
Remove debris, unused materials and elements from the site.

4161T THERMAKRAFT WRAPS, UNDERLAYS AND DPC - RESIDENTIAL

1. GENERAL

This section relates to the application of **Thermakraft Industries (NZ) Ltd**, DPC, DPM, underfloor foil insulation, wall wraps and roofing underlays:
- for use in residential applications

1.1 ABBREVIATIONS AND DEFINITIONS

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

The following abbreviations apply specifically to this section:

NZMRM New Zealand Metal Roofing Manufacturers Inc.

Documents

1.2 DOCUMENTS REFERRED TO

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

NZBC E2/AS1	External moisture
AS 1530	Methods for fire tests on building materials, components and structures
NZS 2295	Pliable, permeable building underlays
AS/NZS 2904	Damp-proof courses and flashings
NZS 3604	Timber framed buildings
NZS 4200	Pliable building membranes and underlays
AS/NZS 4347	Damp-proof courses and flashings - Methods of test
AS/NZS 4534	Zinc and zinc/aluminium-alloy coatings on steel wire
NZMRM	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.

1.3 MANUFACTURER/SUPPLIER DOCUMENTS

Thermakraft documents relating to work in this section are:

Thermakraft product manual and technical data sheets.

BRANZ Appraisal 329 - **Supercourse 500** Damp-Proof Course and Concealed Flashing

BRANZ Appraisal 614 - **Aluband™/Aluminium** Window Sealing System

Copies of the above literature are available from:

Web: www.thermakraft.co.nz

Telephone: 0800 806 595

1.4 MANUFACTURER'S WARRANTY

Warrant this work under normal environmental and use conditions against failure of materials and execution. **Thermakraft Industries Ltd** warrant performance of products if design and installation complies with relevant technical literature, NZBC, and recognised industry Codes of Practice.

1.5 INTERPRETATION

Wall wraps used in this specification has the same meaning as building wraps in NZS 3604 and NZBC E2/AS1.

Requirements

1.6 NO SUBSTITUTIONS

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

- 1.7 **INSTALLATION SKILL LEVELS**
Installers to be experienced in the installation of **Thermakraft** products and familiar with **Thermakraft** Industries technical literature and the related documents listed in this design i.e. NZMRM NZ Metal Roof and Wall Cladding - Code of Practice.
2. **PRODUCTS**
- Materials**
- DPM**
- 2.1 **DAMP PROOF MEMBRANE - MEDIUM DUTY**
Thermathene Black™, a minimum of 250 microns polyethylene film, which compiles to NZS 3604 specification for Damp-Proof Membrane, to NZBC Clause E2/AS1. Refer to SELECTIONS for type of jointing tape.
- DPC**
- 2.2 **EMBOSSSED POLYETHYLENE**
Supercourse 500, hi-impact polyethylene film to AS/NZS2904 and embossed on both sides. Thickness 500 microns minimum, manufactured for use as a damp-proof course and concealed flashings around doors and windows and to BRANZ Appraisal 329.
- Roofing underlay**
- 2.3 **BITUMINOUS SELF-SUPPORTING ROOFING UNDERLAY**
Thermakraft 215™, bituminous self-supporting roofing underlay to NZS 2295.
- Accessories**
- 2.4 **WINDOW DOOR SEALING SYSTEM**
Thermakraft Aluband™/Aluminium system consists of polymeric faced bituminous window sealing tape, **Thermakraft Aluband™** Corner Moulding™ piece, used in conjunction with the **Thermakraft Aluband™** Hand Tool to ensure good adhesion and a tight fit into corners. See **Thermakraft** Data Sheet 312 for installation details and BRANZ Appraisal 614.
- 2.5 **AIR SEAL BACKING ROD**
P.E.F. Thermakraft WindowWorm, a cylindrical flexible closed cell polyethylene material available in various diameters used in conjunction with sealants. Refer to SELECTIONS for sizes.
- 2.6 **STUD STRAPS - POLYETHYLENE**
Thermastrap 201 & 203, 19mm wide polyethylene straps.
- 2.7 **WIRE NETTING**
75mm galvanized hexagonal wire netting to AS/NZS 4534.
- 2.8 **AUSMESH**
Ausmesh 300, 2mm x 150 x 300mm galvanized or PVC coated safety mesh to AS/NZS 4389.
- 2.9 **GUTTER AND UNDER FLASHINGS**
Thermakraft 215™, bituminous breather type building paper cut to width for use under valley, apron flashing and internal gutters.
- Soffit liner cut to width from **Thermakraft 210™** bituminous breather type building paper. Refer to SELECTIONS.
- 2.10 **TAPE**
Thermakraft tapes to compliment the underlay. Pressure sensitive aluminium foil tapes for joining foil insulation and vapour barriers. **Thermakraft Aluband™ / Aluminium Window Flashing** tape can be used to repair damaged bituminous building papers.

3. EXECUTION

Conditions

3.1 GENERAL REQUIREMENTS

Design application and installation of **Thermakraft** Building products to NZBC E2/AS1, BRANZ Appraisals, **Thermakraft** Technical Literature and Industry Codes of Practice.

3.2 STORAGE

Store building underlays and accessory materials, under conditions that ensure no deterioration or damage. Store rolls in an upright position on a smooth floor and protected from sunlight, UV radiation and moisture.

3.3 INSPECTION

Before starting work, check that the building construction phase will allow work of the required standard. Carry out remedial work identified before laying underlay.

Application - DPC/ DPM

3.4 DPC TO LOSP TREATED TIMBER

Lay Supercourse 500 under LOSP or CCA treated bottom plate of all timber framed walls on concrete, in a single layer with 50mm overlaps at joints to provide a waterproof barrier.

3.5 DPC TO TIMBER / STEEL

Lay Supercourse 500 under the bottom plate of all timber framed walls on concrete, in a single layer with 50mm overlaps at joints to provide a waterproof barrier.

3.6 DPM TO CONCRETE FLOOR

Lay DPM under concrete floor substrate over sand binding, in a single layer with 150mm overlaps at joints to provide a waterproof barrier. Refer to SELECTIONS for type.

Application - Roofing underlay

3.7 WIRE NETTING

Lay 75mm galvanized wire netting at right angles across the purlins and drawn taut before fixing. Tie edges of netting together with galvanized wire clips.

3.8 BUILDING PAPER ROOF UNDERLAY

Lay horizontally across the rafter/trusses starting at the gutter line with succeeding sheets in true alignment and lapping 150mm. Scribe around and fit neatly to all penetrations. Avoid prolong exposure by installing the roof immediately. Installation to comply with NZBC E2/AS1 clause 8.1.5.1.

3.9 GUTTER AND UNDER FLASHINGS

Lay **Thermakraft 215™** bituminous breather type building paper cut to width by manufacturer for use as an underlay to valley, apron flashings, and internal gutters. Lap under flashings with adjoining underlays. Fix **Thermakraft 210™** bituminous breather type building paper soffit liner from top plate down 150mm past ribbon plate.

Completion

3.10 CLEAN UP

Clean up as the work proceeds.

3.11 LEAVE

Leave work to the standard required by following procedures.

3.12 REMOVE

Remove debris, unused materials and elements from the site.

4171HR JAMES HARDIE RIGID AIR BARRIERS

1. GENERAL

This section relates to the supply and fixing of James Hardie rigid air barrier products;
- **HomeRAB™ PreClad™ Lining**

Documents

1.1 DOCUMENTS REFERRED TO

Documents referred to in this section are:

NZBC E2/AS1	External moisture
AS/NZS 1170	Structural design actions
AS/NZS 2908.2	Cellulose-cement products - Flat sheet
NZS 3602	Timber and wood-based products for use in building
NZS 3604	Timber framed buildings

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

1.2 MANUFACTURER'S DOCUMENTS

James Hardie HomeRAB™ PreClad™ Lining Installation Manual
BRANZ Appraisal 611 - HomeRAB™ PreClad™ Lining

Copies of the above literature are available at:

Web: www.jameshardie.co.nz
Telephone: Ask James Hardie™ on 0800 808 868.

Warranties

1.3 WARRANTY - MANUFACTURER/SUPPLIER

Provide a material manufacturer/supplier warranty:

15 years:	For HomeRAB™ PreClad™ Lining and RAB™ Board (refer to James Hardie™ product warranty)
15 years:	For accessories supplied by James Hardie (refer to James Hardie™ product warranty)
From:	Date of purchase

- Provide this warranty on the manufacturer's standard form.

Refer to the general section WARRANTIES for additional requirements.

Requirements

1.4 NO SUBSTITUTIONS

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

Performance

1.5 PERFORMANCE, WIND

The design wind pressures are to NZS 3604, up to and including Very High Wind Zone. James Hardie **HomeRAB™ PreClad™ Lining** Installation Manual is suitable for these conditions.

1.6 SPECIFIC DESIGN, WIND

The design wind pressures are to AS/NZS 1170.2, for specific design wind zone (beyond Very High Wind Zone). Only James Hardie **RAB™ Board** Installation Manual is suitable for these conditions.

2. PRODUCTS

Materials

- 2.1 HOMERAB PRECLAD LINING
James Hardie **HomeRAB™ PreClad™ Lining**, 3.5mm thick, manufactured from treated cellulose fibre, Portland cement, sand and water, cured by high pressure autoclaving manufactured to AS/NZS 2908.2 and, face and edge sealed. Suitable for residential buildings within the scope of NZS 3604.

Components

- 2.2 FASTENER TYPE
Fasteners to minimum durability requirements of the NZBC. Refer to NZS 3604, section 4 Durability, for requirements for fixing's material to be used in relation to the exposure conditions.

Exposure conditions & nail selection prescribed by NZS 3604, section 4, table 4.3 Steel items such as nails and screws used for framing and cladding.

Zone	Fixings Material
Sea Spray Zones*	Grade 316 Stainless
Zone 1 (outside sea spray zone), Zones 2 - 4 & Geothermal hot spots	Hot-dipped galvanized or 316 stainless
Bracing - All zones	Grade 316 Stainless

* Zone 1 areas where local knowledge dictates that increased durability is required, appropriate selection shall be made.

Refer to NZBC E2/AS1, Table 20, Material selection, and Table 21, Compatibility of materials in contact, for selection of suitable fixing materials and their compatibility with other materials.

- 2.3 STAINLESS STEEL NAILS
HomeRAB™ PreClad™ Lining
Sifco 32 x 3.05mm coil nails head size 9mm diameter CR3DSS. Paslode 32 x 3.06mm ring shank head size 9mm diameter, D40240. Loose nails 32 x 3.06mm head 9mm diameter.
- 2.4 VERTICAL JOINTERS
HomeRAB™ PreClad™ jointer.

Accessories

- 2.5 SEALING STRIP
Inseal® 3259, 1.5mm thick x 50mm wide black compressible medium density closed cell foam tape for vertical joints.

Inseal® 3259, 1.5mm thick x 80mm wide black compressible medium density closed cell foam tape for corner joints.
- 2.6 JOINT SEALING TAPE
Aluband or Protecto joint sealing tape. Refer to James Hardie's technical literature for selection and use requirements.
- 2.7 WINDOW FLASHING TAPE
Aluband window flashing tape or Protecto sill tape. Refer to James Hardie's installation manual for selection and installation requirements.
- 2.8 HORIZONTAL FLASHING
HomeRAB™ PreClad™ horizontal flashing.

3. EXECUTION

Conditions

- 3.1 **STORAGE**
Take delivery of products dry and undamaged on pallets, and keep on pallet. Protect edges and corners from damage and covered to keep dry until fixed.
- 3.2 **HANDLING**
Avoid distortion and contact with potentially damaging surfaces. Do not drag sheets across each other, or across other materials. Protect edges, corner and surface finish from damage.
- 3.3 **SUBSTRATE**
Do not commence work until the substrate is of the standard required for the specified finish; plumb, level and in true alignment. Moisture content of timber framing must not exceed the requirements specified by NZS 3602 to minimise shrinkage and movement after sheets are fixed.
- 3.4 **FRAMING**
Provided in accordance with NZS 3604 or to specific engineering design requirements. Stud spacing and nog spacing must not exceed 600mm or 1,200mm respectively. Minimum 45mm wide stud required where vertical jointing on studs.

Application - generally

- 3.5 **PENETRATIONS AND FLASHINGS**
Confirm that exterior wall openings have been prepared ready for the installation of all window and door frames and other penetrations through the cladding. Required preparatory work includes the following:
- Openings formed in accordance with the HomeRAB™ PreClad™ Lining installation manual.
 - Materials lapped in a way that water tracks down to the exterior face of the Rigid Air Barrier.
 - Underlay to openings finished and dressed off ready for the installation of window and door frames and other penetrations

Install Rigid Air Barriers

- 3.6 **SHEET LAYOUT**
Refer to the HomeRAB™ PreClad™ Lining or RAB™ Board installation manual for sheet layouts to suit general installations and where used to achieve structural bracing. For HomeRAB™ PreClad™ Lining non-bracing applications vertical joints can be off stud using a uPVC jointer.
- 3.7 **VERTICAL JOINTS**
Join sheets to the HomeRAB™ PreClad™ Lining Board installation manual.
- 3.8 **HORIZONTAL JOINTS**
Join sheets to the HomeRAB™ PreClad™ Lining Board installation manual.
- 3.9 **EXTERNAL AND INTERNAL CORNERS**
Form in accordance with the HomeRAB™ PreClad™ Lining Board installation manual using a 75mm minimum wide sealing tape.
- 3.10 **FIXING SHEETS**
Fix in accordance with the HomeRAB™ PreClad™ Lining Board installation manual for either general or bracing applications. Sheets can either be gun nailed or hand nailed using the nails specified. Gun nailing is recommended to reduce installation time.
- 3.11 **SEALANTS**
Application and use of sealants to manufacturer's instructions.
- 3.12 **PENETRATIONS**
Form in accordance with the HomeRAB™ PreClad™ Lining Board installation manual.

- 3.13 **OPENINGS**
Form in accordance with the HomeRAB™ PreClad™ Lining Board installation manual. Exposed timber framing around window, door, meter box and other penetrations must be covered with a 150mm wide minimum flashing tape or sealing tape. Flashing tapes must be lapped over the HomeRAB™ PreClad™ Lining or RAB™ Board by 50mm minimum.
- 3.14 **FLASHINGS AND JUNCTIONS**
Form in accordance with the HomeRAB™ PreClad™ Lining Board installation manual. Install flashing tape over any flashings and at all junctions with other materials or building elements.
- 3.15 **AT SOFFITS**
Form in accordance with the HomeRAB™ PreClad™ Lining Board installation manual.
- 3.16 **BASE CLEARANCES**
Form in accordance with the HomeRAB™ PreClad™ Lining Board installation manual. Lining is required to extend below the bottom plate by 15mm minimum to form a drip edge and must finish a minimum 100mm clear of finished ground. Where base of sheets are cut to suit site requirements seal the bottom edge using Dulux® Acraprime 501/1 primer or Dulux® Primacryl primer.
- Completion**
- 3.17 **REPLACE**
Replace all damaged or marked elements.
- 3.18 **LEAVE**
Leave work to the standard required for following procedures.
- 3.19 **REMOVE**
Remove debris, unused materials and elements from the site.

4231HF JAMES HARDIE FACADE CLADDING

1. GENERAL

This section relates to the supply and fixing of James Hardie fibre cement Titan® Facade Panel rainscreen.

Documents

1.1 DOCUMENTS REFERRED TO

Documents referred to in this section are:

NZBC E2/AS1	External moisture
AS/NZS 1170.2	Structural design actions - Wind actions
AS/NZS 2908.2	Cellulose-cement products - Flat sheet
NZS 3602	Timber and wood-based products for use in building
NZS 3604	Timber framed buildings
AS/NZS 4284	Testing of building facades

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

1.2 MANUFACTURER'S DOCUMENTS

James Hardie documents relating to work in this section are:

Titan® Facade Panel/ExoTec® Facade Panel Rainscreen technical specification
Titan® Facade Panel/CLD® Structural Cavity Batten technical specification
HardiFlex® Sheet technical specification
Eaves and Soffit Linings installation manual
BRANZ Appraisal 467 - Titan® & Exotec® Façade Panel Rainscreen

Copies of the above literature are available

Web: www.jameshardie.co.nz

Telephone: Ask James Hardie™ on 0800 808 868.

Warranties

1.3 WARRANTY - MANUFACTURER/SUPPLIER

Provide a material manufacturer/supplier warranty:

15 years:	For James Hardie™ Titan® Facade Panel rainscreen.. (refer to James Hardie™ product warranty)
15 year:	For accessories supplied by James Hardie (refer to James Hardie™ product warranty)
From:	Date of purchase

- Provide this warranty on the manufacturer's standard form.

Refer to the general section WARRANTIES for additional requirements.

Requirements

1.4 NO SUBSTITUTIONS

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

1.5 MAINTENANCE REQUIREMENTS

Provide relevant James Hardie maintenance requirements at completion of the work.

Performance

- 1.6 **PERFORMANCE, WIND**
The design wind pressures are to AS/NZS 1170.2. James Hardie Technical Specification are suitable for these conditions. Refer to technical specification to check the wind pressure limits.
Up to;

2.5kPa ULS Titan® Facade Panel on CLD® Structural Cavity Batten.

2. PRODUCTS

Materials

- 2.1 **RIGID AIR BARRIERS**
Refer to section JAMES HARDIE RIGID AIR BARRIERS.
- 2.2 **BUILDING WRAP**
Refer to section WRAPS, UNDERLAYS AND DPC.
- 2.3 **CLD STRUCTURAL CAVITY BATTENS**
James Hardie CLD® Structural Cavity Batten, 2450mm long, 70mm wide and 19mm thick manufactured from treated cellulose fibre, Portland cement, sand and water. Cured by high pressure autoclaving and manufactured to AS/NZS 2908.2. James Hardie CLD® Structural Cavity Battens are suitable to carry the load of Titan® Facade Panel cladding. James Hardie Titan® Facade Panel and CLD® Structural Cavity Batten installed as per the James Hardie technical specification have been tested in a NATA accredited testing laboratory and complies with requirements of NZBC Sections B1, B2 and E2. The battens have both faces and all edges presealed.
- 2.4 **EXTERIOR CAVITY VERMIN-PROOFING**
Perforated uPVC, with upstands.
- 2.5 **TITAN FACADE PANEL**
James Hardie Titan® Facade Panel, medium density autoclaved sheet, 1190mm wide x 9mm thick manufactured from treated cellulose fibre, Portland cement, sand and water. Cured by high pressure autoclaving and manufactured to AS/NZS 2908.2. BRANZ appraised, tested to AS/NZS 4284 for weathertightness. Both faces and all edges presealed.
- 2.6 **SOFFIT LINING**
James Hardie 4.5mm Hardisoffit® soffit lining manufactured from treated cellulose fibre, Portland cement, sand and water and cured by high pressure autoclaving manufactured to AS/NZS 2908.2.

Components

- 2.7 **FASTENER TYPE**
Fasteners to minimum durability requirements of the NZBC. Refer to NZS 3604, Section 4 Durability, for requirements for fixing's material to be used in relation to the exposure conditions.

Exposure conditions & nail selection prescribed by NZS 3604, Section 4, Table 4.3 Steel items such as nails and screws used for framing and cladding.

Zone	Fixings Material
Sea Spray Zones*	Grade 316 Stainless
Zone 1 (outside sea spray zone), Zones 2 - 4 & Geothermal hot spots	Hot-dipped galvanized or 316 stainless
Bracing - All zones	Grade 316 Stainless

* Zone 1 areas where local knowledge dictates that increased durability is required, appropriate selection shall be made

Refer to NZBC E2/AS1, Table 20, Material selection, and Table 21, Compatibility of materials in contact, for selection of suitable fixing materials and their compatibility with other materials.

- 2.8 **NAIL / SCREWS, CLD® STRUCTURAL CAVITY BATTEN FIXING**
Hot-dip galvanized 65mm x 2.8mm RounDrive ring shank nail for fixing to timber framing.
50mm x 9-10g countersunk head steel screw (Class 3 or 4) for fixing to steel framing
- 2.9 **NAIL/SCREWS, TITAN FACADE PANEL FIXING TO CLD® BATTEN**
Titan® Facade Panel fixing to CLD® Structural Cavity Batten.
Stainless Steel C-25 'T' Head brad nail for wind pressure up to 1.5kPa.
For wind pressures up to 2.5kPa (select one of the following):
25mm x 2.5mm annular threaded fibre cement nail.
25mm x 8-15g or pan / wafer head exposed screw (Class 3/ 4)
25mm x 10g countersunk screw (Class 3/ 4 or stainless steel)
- 2.10 **GALVANIZED NAILS**
Hot-dip galvanized HardiFlex® nails for Titan® Facade Panel fixing
60mm x 3.15mm diameter for cavity construction.
- 2.11 **STAINLESS STEEL NAILS**
316 stainless steel HardiFlex® nails for Titan® Facade Panel fixing.
60mm x 3.15mm diameter for cavity construction.
- 2.12 **HORIZONTAL T SOCKET JOINTER**
Aluminium T socket manufactured from grade 5005 aluminium alloy.
- 2.13 **SOFFIT JOINTERS AND CAPPING MOULDS**
Extruded uPVC jointer, 2 way jointer, capping and scotia mould.

Accessories

- 2.14 **SEALING STRIPS**
Inseal® 3259, 1.5mm thick x 50mm wide black compressible medium density closed cell foam tape.

Butyl rubber black membrane with a 6mm x 9mm Inseal 3109 adhered along each edge of one face with pressure sensitive acrylic adhesive. 50mm wide for vertical joints and 80mm wide for corners.

Polypropylene / Polyethylene flashing for internal and external corners used with CLD® structural cavity batten.
- 2.15 **ADHESIVE FOR CLD® STRUCTURAL CAVITY BATTEN**
Adhesive to be applied continuous 6mm thick bead(s) to the face of CLD® Structural Cavity Batten to adhere the Titan® Facade Panel.
- 2.16 **SEALANT**
Silaflex MS sealant or similar. Refer to the sheet manufacturer's technical literature for selection and use requirements.

3. EXECUTION

Conditions

- 3.1 **STORAGE**
Take delivery of products dry and undamaged on pallets, and keep on pallet. Protect edges and corners from damage and covered to keep dry until fixed.
- 3.2 **HANDLING**
Avoid distortion and contact with potentially damaging surfaces. Do not drag sheets across each other, or across other materials. Protect edges, corner and surface finish from damage.

3.3 SUBSTRATE

Do not commence work until the substrate is of the standard required for the specified finish; plumb, level and in true alignment. Moisture content of timber framing must not exceed the requirements specified by NZS 3602 to minimise shrinkage and movement after sheets are fixed.

For facade panel confirm that 75mm framing for vertical joints and 125mm nogs for horizontal joints have been correctly installed when using timber cavity battens.

3.4 SEAL CUT ENDS, CLD® STRUCTURAL CAVITY BATTEN

Site cut batten ends to be between 20 - 45 degrees and sealed with Dulux AcraPrime 501/1 sealer prior to installation with the butt joint deflecting moisture to the exterior.

3.5 SEAL EDGES

Seal site cut sheet edges prior to installation. Seal sheet edges around window and door openings, meter boxes and at other penetrations.

Application - generally

3.6 RIGID AIR BARRIER

Refer to JAMES HARDIE RIGID AIR BARRIERS.

3.7 INSTALL DRAINED CAVITY WITH CLD® STRUCTURAL CAVITY BATTEN

James Hardie uPVC vent strip to be fixed between the CLD® Structural Cavity Battens at the Titan® Facade Panel joints, install the vent strip as per Titan® Facade Panel and CLD® Structural Cavity Batten technical specification details.

3.8 PENETRATIONS AND FLASHINGS

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

- Building wrap appropriately incorporated with penetration and junction flashings.
- Materials lapped in a way that water tracks down to the exterior face of the building wrap.
- Wall cladding underlay/building wrap to openings finished and dressed off ready for the installation of window and door frames and other penetrations
- Claddings neatly finished off to all sides of openings
- Installation of flashings (those required to be installed prior to installation of penetrating elements).

Install Titan® Facade Panels

3.9 RIGID AIR BARRIER

Refer to JAMES HARDIE RIGID AIR BARRIERS.

3.10 RAINSCREEN HORIZONTAL JOINT

Glue Aluminium 'T' Socket to the top of the back face of the lower panel. Do not allow fixings through the upper sheet to penetrate through the aluminium socket.

3.11 CLD® STRUCTURAL CAVITY BATTEN

Fix battens to all studs using 65mm x 2.8mm RounDrive ring shank nails for timber framing. For steel framing, fix battens over 10mm HDP thermal break using 50mm x 9-10g countersunk head steel screw (Class 3 or 4) at fixing centres as per James Hardie Titan® Facade Panel and CLD® Structural Cavity Batten technical specification, Table 2: Batten Fixing. Fasteners to be driven at a minimum distance of 50mm from the batten ends. Refer to James Hardie Titan® Facade Panel and CLD® Structural Cavity Batten technical specification, Table 4 for durability requirements of fixings.

3.12 TITAN® FACADE PANEL RAINSCREEN

Fix Titan® Facade Panels through Timber Battens.

Stud centres	Fixing type	Fixings to perimeter studs/nogs (maximum)	Fixings to intermediate stud (maximum)
600mm	60mm x 3.15mm ø HardiFlex® nail	200mm	200mm
600mm	65mm x 10g screw	200mm	300mm
400mm	60mm x 3.15mm ø HardiFlex® nail	150mm	150mm
400mm	65mm x 10g screw	200mm	200mm

- 3.13 **TITAN® FACADE PANEL OVER CLD® STRUCTURAL CAVITY BATTEN**
Apply continuous 6mm thick bead(s) of adhesive to the face of CLD® Structural Cavity Batten to adhere the Titan® Facade Panels with selected fixings at maximum centres as per Table 3 and details to James Hardie Titan® Facade Panel and CLD® Structural Cavity Batten technical specification.

- 3.14 **FIXING GENERALLY**
All panel edges must be supported. The screws must be driven perfectly tight against the panels so that there is no movement between the panels and framing. Use a hand screw driver to finally tighten all screws. The minimum edge distance as per technical specification must be maintained when fixing screws or nails through the rainscreen panels. When countersunk screws are used the screw head must be set between 1.5mm minimum to 2.0mm maximum below the panel surface.

Use James Hardie countersinking drill bit to drill holes in the panel. The drill speed must be set between 400 and 560 rpm.

- 3.15 **FINISHING SITE CUT EDGES**
Any penetrations as well as site cut sheet edges must be sealed with an appropriate sealer that is compatible with the finishing coat.

- 3.16 **FINISHING SEALANTS**
Apply and use of sealants to manufacturer's instructions. Check with sealant manufacturer prior to coating over sealants.

- 3.17 **FINISHING SCREW FILLER**
Fill all countersunk screw holes with an epoxy filler. The countersunk holes must be clean and dry before they are filled. Ensure that the screws are perfectly tight and there is no movement between the panel and framing before the holes are filled. Use Nuplex Fairing Cream or a similar product for this purpose. Refer to the epoxy manufacturer recommendation before use.

- 3.18 **FINISHING GENERAL**
Refer to PAINTING for protective coating system. Panels must be coated within 90 days of installation.

Soffits

- 3.19 **INSTALL SOFFIT SHEETS**
Cut sheets dry and ensure all edges and joints are fully supported. Nail and insert uPVC fasteners to James Hardie requirements. Fit complete with jointers and capping moulds. Refer to Eaves and Soffit Linings installation manual.

Completion

- 3.20 **REPLACE**
Replace all damaged or marked elements.
- 3.21 **LEAVE**
Leave work to the standard required for following procedures.
- 3.22 **REMOVE**
Remove debris, unused materials and elements from the site.

4231HW JAMES HARDIE WEATHERBOARD CLADDING

1. GENERAL

This section relates to the supply and fixing of the following fibre cement products:
- James Hardie Linea™ Weatherboard cladding

Documents

1.1 DOCUMENTS REFERRED TO

Documents referred to in this section are:

NZBC E2/AS1	External moisture
NZBC E2/VM1	Weathertightness
AS/NZS 1170.2	Structural design actions - Wind actions
AS/NZS 2908.2	Cellulose-cement products - Flat sheet
NZS 3602	Timber and wood-based products for use in building
NZS 3604	Timber framed buildings

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

1.2 MANUFACTURER'S DOCUMENTS

James Hardie documents relating to work in this section are:

Linea™ Weatherboard technical specification
BRANZ Appraisal 447 - Linea™ Weatherboard - Cavity Construction

Copies of the above literature are available at
Web: www.jameshardie.co.nz
Telephone: Ask James Hardie™ on 0800 808 868

The BRANZ appraisal is available at www.branz.co.nz.

Warranties

1.3 WARRANTY - MANUFACTURER/SUPPLIER

Provide a material manufacturer/supplier warranty:

25 years:	For Linea™ Weatherboard product (refer to James Hardie™ product warranty)
15 year:	For accessories supplied by James Hardie (refer to James Hardie™ product warranty)
From:	Date of purchase

- Provide this warranty on the manufacturer's standard form.

Refer to the general section WARRANTIES for additional requirements.

1.4 WARRANTY - MANUFACTURER/SUPPLIER

Provide a material manufacturer/supplier warranty:

15 years:	For James Hardie™ Linea Weatherboard . (refer to James Hardie™ product warranty)
15 year:	For accessories supplied by James Hardie (refer to James Hardie™ product warranty)
From:	Date of purchase

- Provide this warranty on the manufacturer's standard form.

Refer to the general section WARRANTIES for additional requirements.

Requirements

- 1.5 NO SUBSTITUTIONS
Substitutions are not permitted to any specified system, or associated components and products.

- 1.6 MAINTENANCE REQUIREMENTS
Provide relevant James Hardie maintenance requirements at completion of the work.

Performance

- 1.7 PERFORMANCE, WIND
The design wind pressures are to NZS 3604, up to and including Very High Wind Zone. James Hardie Technical Specifications are suitable for these conditions.

2. PRODUCTS

Materials

- 2.1 RIGID AIR BARRIERS
Refer to section JAMES HARDIE RIGID AIR BARRIERS.
- 2.2 EXTERIOR CAVITY BATTENS
Radiata pine battens, minimum 45mm wide x 18mm thick, H3.1 treated, height to match timber framing studs. To NZS 3602, Table 1, reference 1D.10, Requirements for wood-based building components to achieve a 50-year durability performance.
- 2.3 EXTERIOR CAVITY VERMIN-PROOFING
Perforated uPVC, with upstands.
- 2.4 LINEA™ WEATHERBOARDS
James Hardie Linea™ Weatherboards, 16mm thick, pre-primed, manufactured from a reduced density cellulose fibre cement formulation and cured by high pressure autoclaving, manufactured to AS/NZS 2908.2, tested to NZBC E2/VM1 for weathertightness and complying with the NZBC.

Components

- 2.5 FASTENER TYPE
Fasteners to minimum durability requirements of the NZBC. Refer to NZS 3604, section 4 **Durability**, for requirements for fixing's material to be used in relation to the exposure conditions.

Exposure conditions & nail selection prescribed by NZS 3604, section 4, table 4.3 Steel items such as nails and screws used for framing and cladding.

Zone	Fixings Material
Sea Spray Zones*	Grade 316 Stainless
Zone 1 (outside sea spray zone), Zones 2 - 4 & Geothermal hot spots	Hot-dipped galvanized or 316 stainless
Bracing - All zones	Grade 316 Stainless

* Zone 1 areas where local knowledge dictates that increased durability is required, appropriate selection shall be made

Refer to NZBC E2/AS1, Table 20, **Material selection**, and Table 21, **Compatibility of materials in contact**, for selection of suitable fixing materials and their compatibility with other materials.

- 2.6 STAINLESS STEEL NAILS
75mm x 3.15mm diameter jolt head 316 grade
- 2.7 SOFFIT JOINTERS AND CAPPING MOULDS
Extruded uPVC jointer, 2 way jointer, capping and scotia mould.

Accessories

- 2.8 **SEALANT**
Silaflex AT-Facade sealant or similar. Refer to James Hardie technical specifications for application requirements.

3. EXECUTION

Conditions

- 3.1 **STORAGE**
Take delivery of products dry and undamaged on pallets, and keep on pallet. Protect edges and corners from damage and covered to keep dry until fixed.
- 3.2 **HANDLING**
Avoid distortion and contact with potentially damaging surfaces. Carry weatherboards in vertical position. Do not drag weatherboards across each other, or across other materials. Protect edges, corner and surface finish from damage.

- 3.3 **SUBSTRATE**
Do not commence work until the substrate is of the standard required by James Hardie for the specified finish; plumb, level and in true alignment. Moisture content of timber framing must not exceed the requirements specified by NZS 3602 to minimise shrinkage and movement after sheets are fixed.

Application - particular installations

Application - generally

- 3.4 **RIGID AIR BARRIER**
Refer to JAMES HARDIE RIGID AIR BARRIERS.
- 3.5 **INSTALL CAVITY BATTENS**
Install 18mm minimum thick cavity battens to NZBC E2/AS1: 9.0 **Wall claddings**, where required. Fix vertical cavity battens to wall framing studs. The battens are fixed by the cladding fixings which will penetrate the wall framing studs under the building wrap. Seal the top of the cavity and install vermin-proofing at base. Do not use horizontal cavity battens. Use cavity spacers where fixing is required between cavity battens.
- 3.6 **PENETRATIONS AND FLASHINGS**
Confirm that exterior wall openings have been prepared ready for the installation of all window and door frames and other penetrations through the cladding. Required preparatory work includes the following:
- Building wrap appropriately incorporated with penetration and junction flashings.
 - Materials lapped in a way that water tracks down to the exterior face of the building wrap.
 - Wall cladding underlay/building wrap to openings finished and dressed off ready for the installation of window and door frames and other penetrations
 - Claddings neatly finished off to all sides of openings
 - Installation of flashings (those required to be installed prior to installation of penetrating elements).
- 3.7 **INSTALL LINEA™ WEATHERBOARDS**
Cut weatherboards to required lengths and fit joints off-stud using tongue and groove ends. Fit internal corners and weatherboards as per Linea™ Weatherboard technical specifications. Fit and fix external corners and joint soakers as required.
- 3.8 **INSTALL FLASHINGS**
Install flashings at all wall openings, penetrations, junctions, connections, window sills, heads and jambs to NZBC E2/AS1.

Completion

- 3.9 **REPLACE**
Replace all damaged or marked elements.
- 3.10 **LEAVE**
Leave work to the standard required for following procedures.
- 3.11 **REMOVE**
Remove debris, unused materials and elements from the site.

4241 PROFILED METAL CLADDING

1. GENERAL

This section relates to the supply and fixing of proprietary overlap rigid sheet profiled metal wall cladding complete with accessories.

Related work

1.1 RELATED SECTIONS

Refer to WRAPS UNDERLAYS AND DPC for wraps, underlays, foils and DPC.

1.2 ABBREVIATIONS

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

BMT Base metal thickness

MRM New Zealand Metal Roofing Manufacturers Inc

Documents

1.3 DOCUMENTS REFERRED TO

Documents referred to in this section are:

NZBC E2/AS1 External moisture

AS/NZS 1170.2 Structural design actions - Wind actions

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

AS 3566 Self-drilling screws for the building and construction industries

NZS 3602 Timber and wood-based products for use in building

NZS 3604 Timber framed buildings

MRM NZ Metal roof and wall cladding - Code of practice

BRANZ BU 465 Domestic flashing installation

BRANZ BU 467 Principles of flashing design

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.

Requirements

1.4 QUALIFICATIONS

Carry out the cladding work with experienced, competent installers familiar with the products being used.

Warranties

1.5 WARRANTY - INSTALLER/APPLICATOR

Warrant this work under normal environmental and use conditions against weatherproofing failure.

Period: 5 years from the date of completion of the roof

Form: Metal wall cladding installer's standard form

Include a copy of the cladding manufacturers' maintenance requirements with the warranty.

Refer to the general section WARRANTIES - INSTALLER/APPLICATOR for additional requirements.

1.6 WARRANTY - MANUFACTURER/SUPPLIER

Warrant this work under normal environmental and use conditions against materials failure.

15 years For failure of coating adhesion

15 years For weatherproofing by material penetration

Form: Cladding manufacturers standard form

Performance

- 1.7 **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 or AS/NZS 1170.2 and the wind loads on various wall areas as given by AS/NZS 1170.
- 1.8 **PERFORMANCE**
Install roofing material and associated flashings and accessories to form a weather tight and durable system.

2. PRODUCTS

Materials

- 2.1 **EXTERIOR CAVITY WALL BATTENS**
Radiata pine battens, minimum 20mm thickness, width and height to match timber framing studs. To NZS 3602, table 1, reference 1D.10, Requirements for wood-based building components to achieve a 50-year durability performance.
- 2.2 **EXTERIOR CAVITY VERMIN-PROOFING**
Perforated uPVC or aluminium trays with upstands. Upstand one side 10mm and the other 75mm. Length and width to suit cavity.
- 2.3 **PRE-FINISHED COATED STEEL**
Formability G550 steel sheet coated to AS 1397.
- 2.4 **FLASHINGS GENERALLY**
Material, grade and colour as detailed and scheduled. Ensure that materials used for flashings are compatible with the window frame materials and fixings and cladding materials and fixings.
- 2.5 **FLASHINGS**
Formable grade 0.55 BMT for pre-painted steel to the same standards as the profiled sheets, notched where across profile or provided with a soft edge.
- 2.6 **WALL AND PARAPET FLASHINGS**
Supplied by the cladding manufacturer to match or to suit the cladding.

Components

- 2.7 **FASTENERS GENERALLY**
Minimum Class 4 and durability not less than the roofing material being fixed. Screw fasteners to be head stamped identifying the manufacturer and class.
- 2.8 **FIXING CLIPS**
Galvanized steel (powder coated for aluminium) to suit the material and profile of the rigid sheet and location as required by the cladding manufacturer. Fix to steel with 16mm x 10 gauge galvanized wafer head self-drilling screws and to timber with 50mm long x 4.5mm galvanized spiral rolled flat head nails.
- 2.9 **FIXING SCREWS**
To AS 3566. To comply with AS 3566. Screws appropriate to the cladding material and the supporting structure, as required by the cladding manufacturer and with a durability no less than the material fixed.
- 2.10 **RIVETS**
Sealed aluminium, minimum diameter 4mm.

Accessories

- 2.11 **SEALANT**
Neutral curing MS silicone or MS polymer sealant as required by the cladding manufacturer and used as directed.
- 2.12 **CLOSURE STRIPS**
Non-bituminous compressible, profiled foam strips to fit the sheet profile.
- 2.13 **LAP SEALING TAPE**
Closed cell self adhesive nitrile tape.
3. **EXECUTION**
- Conditions**
- 3.1 **INSPECTION**
Inspect the wall framing and supporting structure to ensure that it is complete and fully braced ready for cladding.
- 3.2 **STORAGE**
Take delivery of and accept packs of cladding undamaged on delivery. Reject all damaged material. Store on a level firm base with packs well ventilated and completely protected from weather and damage. Do not allow moisture to build up between sheets. If sheet packs become wet, fillet or cross stack to allow air movement between sheets.
- 3.3 **HANDLING**
Avoid distortion and contact with damaging substances, including cement. Do not drag sheets across each other and other materials. Protect edges and surface finishes from damage.
- 3.4 **SEPARATION**
Isolate dissimilar materials in close proximity as necessary by painting the surfaces or fitting separator strips of compatible materials. Place isolators between metals and treated timber and cement based materials. Do not use unpainted lead sheet or copper in contact with or allow water run-off onto galvanized and aluminium/zinc-coated metals.
- Application**
- 3.5 **SET-OUT**
Set cladding to vertical plumb lines and maintain verticality. Set all exposed fixings with horizontal string lines. Carefully set out sheets with side laps away from the main line of sight, and with the widths of end sheets the same. Check during fixing to eliminate creep or spread and to keep fastenings in line.
- 3.6 **AVOID END LAPS**
End laps are not permitted, except where specifically detailed.
- 3.7 **THERMAL MOVEMENT**
Fixing and jointing to conform with the cladding manufacturer's requirements for thermal movement.
- 3.8 **FIXING GENERALLY**
Install and fix in accordance with the MRM NZ Metal roof and wall cladding - Code of practice, and to the cladding manufacturer's required fixing patterns and details for each area of the building cladding. Use only screws as required by the cladding manufacturer. Paint colour matched fixings and accessories before installation.
- 3.9 **INSTALL DRAINED CAVITY**
20mm nominal thickness drained cavity to NZBC E2/AS1: 9.0 Wall claddings, where required. Fix vertical cavity battens to wall framing studs and provide a separation strip of metal cladding underlay over batten. The battens are fixed by the cladding fixings which will penetrate the wall framing studs over the building wrap. Install vermin-proofing at base.

- 3.10 **PENETRATIONS**
Confirm that exterior wall openings have been prepared ready for the installation of all window and door frames and other penetrations through the cladding. Required preparatory work includes the following:
- wall cladding underlay/building wrap to openings finished and dressed off ready for the installation of window and door frames and other penetrations
 - claddings neatly finished off to all sides of openings
 - installation of flashings (those required to be installed prior to installation of penetrating elements).
- 3.11 **MARKING AND CUTTING**
Cut only by shearing tools. Do not use black lead pencils for marking aluminium/zinc coated products.
- 3.12 **FIX SHEETS**
Fix sheets in place using the fastening system required by the manufacturer of the specified profiled metal cladding, making due allowance for dynamic local wind pressures on the building and thermal movement in the sheet.
- 3.13 **INSTALL FLASHINGS**
Flash to penetrations, cap corners and edges, using sealant and rivets to detail, to the cladding manufacturer's requirements and to BRANZ Bulletins 467 Principles of flashing design and 465 Domestic flashing installation.
- 3.14 **COMPLETE**
Ensure the work is complete with all flashings, finishings and trim properly installed so the cladding system is completely weathertight.
- 3.15 **SEPARATION**
Separate metal sheeting from CCA treated timber with building paper or other suitable isolation material.
- Completion**
- 3.16 **REPLACE**
Replace all damaged or marked elements.
- 3.17 **LEAVE**
Leave this work complete with all necessary flashings and cappings all properly installed as the work proceeds so the finished cladding is completely weathertight.
- 3.18 **REMOVE**
Remove debris, unused materials and elements from the site.

4284PE PSL GRAPHEX CLADDING

1. GENERAL

This section relates to the supply and fixing of **PSL Graphex** insulated exterior wall cladding system based on Graphex sheets fixed to timber / metal framing with a drained cavity.

Documents

1.1 DOCUMENTS REFERRED TO

Documents referred to in this section are:

AS/NZS 1170.2	Structural design actions - Wind actions
AS 1366.3	Rigid cellular plastics sheets for thermal insulation
AS 3566	Self-drilling screws for the building and construction industries
NZS 3604	Timber framed buildings
NZBC E2/AS1	External moisture
BRANZ	Appraisal Certificate No. 453 (2005)
OSH	Guidelines for the provision of facilities and general safety in the construction industry
	Health and Safety in Employment Act 1992

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

1.2 MANUFACTURER'S DOCUMENTS

PSL documents relating to work in this section are:

PSL Product Manual

Materials and execution to **PSL** specification except where varied by this specification and supported by architectural detailing.

Copies of the above literature are available from

Web: www.plastersystems.co.nz
Telephone: 0800 114400
Facsimile: 09 444 9561

1.3 ABBREVIATIONS

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

EIFS	Exterior Insulation and Finish Systems
MPNZA	Master Painters New Zealand Association

1.4 NO SUBSTITUTIONS

Substitutions are not permitted to any specified **PSL** plaster render system.

1.5 QUALIFICATIONS

Use only applicators that are approved to apply the **PSL** plaster render systems.

1.6 DURABILITY

The work covered by this part of the specification has been designed and constructed to achieve a durability of 15 years. Refer to the following;

BRANZ	Appraisal Certificate No. 453 (2005)
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Documentation

1.7 FINISH SAMPLE

If requested submit one 300mm x 300mm panel of the selected finish texture and colour for approval. Obtain signature of acceptance on sample and return to the approved applicator.

- 1.8 **MAINTENANCE INSTRUCTIONS**
Provide **PSL Plastercare** maintenance instructions before practical completion of the contract for issuing to the building owner.
- 1.9 **PRODUCER STATEMENT**
Provide an appropriate producer statement compiled by the applicator in the form as required by the Building Consent Authority.
- 1.10 **HEALTH AND SAFETY**
Refer to the requirements of the Health and Safety in Employment Act and OSH: Guidelines for the provision of facilities and general safety in the construction industry. If the elimination or isolation of potential hazards is not possible then minimise hazards in this work on site by using the proper equipment and techniques as required in the MPNZA Painters hazard handbook. Supply protective clothing and equipment. Inform employees and others on site of the hazards and put into place procedures for dealing with emergencies. Obtain from **PSL** the material safety data sheets for each product. Keep sheets on site and comply with the required safety procedures.

Warranties

- 1.11 **MANUFACTURERS WARRANTY**
Warrant this part of the work under normal environmental and use conditions against failure of materials and execution. The plaster system is warranted as follows:
- 15 years: For materials, from date of practical completion issued by **PSL**.

Performance

- 1.12 **PERFORMANCE**
Accept responsibility for the structural and weather-tight performance of the exterior render application.
- 1.13 **PROTECTION OF NEW PLASTER**
Confirm the protection systems to be applied to fresh plaster coats. Plastering not to begin until systems are confirmed.
- 1.14 **INSPECTIONS**
Allow to inspect the whole of the work at each stage. Determine a programme for inspections including notification when each part and stage of the work is ready for inspection prior to the work commencing. Permit representatives of **PSL** to inspect the work in progress and to take samples of their products from site.
- 1.15 **FIXINGS, WIND**
Design and use the fixings appropriate for the wind zone (R) and topographical classification (T) of this site and building height; as required by NZS 3604 and the wind loads on various wall areas as given by AS/NZS 1170.

2. PRODUCTS

Materials

- 2.1 **GRAPHEX BASE COAT RENDER**
Factory-mixed specially blended acrylic modified cement based plaster compound. For **Graphex** systems.
- 2.2 **EZYTEX FINISHING PLASTER**
Factory-mixed polymer modified cement based finishing plaster.
- 2.3 **PAINT**
Insulcote 100% acrylic latex compatible with cement based plaster and suitable for textured surfaces.

Components

- 2.4 **GRAPHEX COMPOSITE BOARDS FOR GRAPHEX CLADDING**
Graphex 60mm: 60mm thick **Graphex** sheet.
- 2.5 **EXTERIOR WALL CAVITY BATTENS**
Graphex peel 'n' stick vented battens, 50 x 20mm thick.
- 2.6 **FLASHINGS AND ACCESSORIES**
Proprietary profiles made from rigid uPVC for head, sill, and jamb flashings, corner beads, cavity vent strip (base bead), Z flashings and horizontal and vertical control joint flashings for exterior applications.
- 2.7 **EXTERIOR CAVITY BASE CLOSURE MOULDING**
PSL uPVC punched base vented bead.

Accessories

- 2.8 **FIXINGS, TIMBER**
40mm system: 90mm x 3.6mm hot-dipped galvanized flat head nails with either a 22mm or 40mm diameter plastic washers.
- 2.9 **FIXINGS, STEEL**
40mm system: 75mm x 8mm exterior grade self tapping steel screws with 40mm diameter plastic washers.
Screws to comply with AS 3566 class 3 in corrosion zones 1, 2, and 3 and corrosion class 4 screws in corrosion zones 1, 2, 3, and 4 as defined by NZS 3604, used with 40mm diameter washers.
- 2.10 **REINFORCING MESH**
Quik-mesh alkali-resistant fibreglass woven reinforcing mesh.
- 2.11 **SEALANTS**
BRANZ appraised modified MS sealant.
- 2.12 **ADHESIVE**
Solvent free PVC construction adhesive compatible with EPS and in accordance with **PSL** requirements.

3. EXECUTION

Conditions

- 3.1 **DELIVERY**
Keep plaster products dry in transit. Take delivery of plaster products dry and undamaged. Reject all damaged materials.
- 3.2 **STORAGE**
Deliver all materials in original unopened packaging with labels intact. Provide dry storage on site, stack carefully, protect from mechanical damage. Keep bagged render off concrete surfaces.
- 3.3 **PLASTERING CONDITIONS**
Carry out plastering to **PSL** specification under conditions which will not adversely affect the finished work.
- 3.4 **PROTECT**
Before application of plaster, apply masking film and tape to all joinery, pipes, roofs and all areas likely to be marked by the plaster. Use drop cloths and ground covers to keep the working areas clean. Clean off droppings onto finished work immediately.

- 3.5 **SUBSTRATE**
Do not commence work until openings and apertures have been cut, pipes, fixtures, fixing pads and plugs have been fixed and flashings and other preparations are complete. All defects in substrate must be rectified prior to application of plaster coatings. Ensure that backgrounds and adjoining surfaces are, after the preparation called for in this section, is of the required standard by **PSL**.
- 3.6 **FLASHING AND DETAILING**
Comply with **PSL** penetration flashing guidelines. Carry out to the required standard of execution to ensure water does not penetrate.
- 3.7 **CONFIRM LAYOUT**
Before commencing work confirm the layout of expansion joints and other visual detailing of the finished work.

Application

- 3.8 **PENETRATIONS**
Confirm that exterior wall openings have been prepared ready for the installation of all window and door frames and other penetrations through the cladding. Required preparatory work includes the following:
- wall cladding underlay/building wrap to openings finished and dressed off with flexible flashing tape ready for the installation of window and door frames and other penetrations.
 - installation of window and door joinery.
 - installation of flashings (those required to be installed prior to installation of penetrating elements).
 - where electrical cables pass through cladding, put into conduit to ensure that there is no direct contact with the Graphex board.
- 3.9 **CAVITY BATTENS**
Fix self adhesive vented battens full length to studs to achieve a 20 mm minimum thickness drained cavity to NZBC E2/AS1: 9.0 Wall claddings. The battens are fixed by the cladding fixings which will penetrate the wall framing studs over the building wrap. Seal the top of the cavity. There must be a minimum of 50mm between horizontal packers and any other packer or batten. Use cavity spacers where fixing is required between cavity battens. Fix additional battens to internal and external corners and around openings to **PSL** standard details.
- 3.10 **PENETRATION FLASHINGS**
Fix in place required uPVC trims, profiles flashings and control joints. Seal service penetrations such as piping and light fittings.
- 3.11 **FLASHING AND ACCESSORIES**
Fit flashings to jambs and sill on recessed joinery using **PSL** proprietary flashings. Reinforce external corners and bottom edges of Graphex sheets with uPVC angles and channel extrusions. Fit joinery heads with a head flashing (if not protected by boxed eaves or other protection).
- 3.12 **GRAPHEx SHEETS, NAILED TO CAVITY BATTENS**
Butt-joint, continuously support all edges and nail with heads flush, the polystyrene sheet to **PSL** details. Install vermin-proof punched base bead at base of Graphex sheets.
- 3.13 **MOVEMENT CONTROL JOINTS**
Incorporate in accordance with the design information supplied by **PSL**. Control joints to be positioned over solid timber backing at abutments to different cladding types, where cladding covers structural materials, and over a movement joint in the underlying framing. Horizontal Control joints set at maximum 6m centres and Vertical control joints at maximum 20m centres. Confirm locations in writing to the owner before work commences.
- 3.14 **FINISHING**
Refer to client for type and colour.

- 3.15 **GRAPHEX BASE RENDER AND MESH COAT**
Apply base plaster coat 3mm minimum. Embed fibreglass mesh into the wet plaster. Overlap each successive length by 50mm minimum. To opening reveals mesh over the uPVC flashings. Apply diagonal reinforcement strips at all corners of windows, doors and other exterior openings.
- 3.16 **PLASTER FINISH COATING**
Apply the coating of the selected texture, to the **PSL** recommended techniques and thicknesses.
- 3.17 **CURE FINISHES**
Cure and protect from rapid drying in accordance with the **PSL** requirements.
- 3.18 **PAINT FINISH**
Apply a minimum two coats of **Insulcote** 100% acrylic latex paint to exterior plastered surfaces. Allow a minimum of 3 days for the cement plaster to dry before the application of the paint system.
-

Completion

- 3.19 **CLEANING**
Remove debris, unused materials and elements from the site relating to the plaster system application. Replace damaged, cracked or marked elements. Leave the whole of this work to the required standard.

4311 PROFILED METAL ROOFING

1. GENERAL

This section relates to the supply and fixing of proprietary overlap rigid sheet metal profiled roofing complete with accessories.

Related work

1.1 RELATED SECTIONS

Refer to RAINWATER SPOUTING SYSTEMS for rainwater disposal

Documents

1.2 DOCUMENTS REFERRED TO

Documents referred to in this section are:

AS/NZS 1170.2	Structural design actions - Wind actions
AS 1397	Steel sheet and strip - hot-dipped, zinc-coated or aluminium/zinc-coated
NZS 2295	Pliable, permeable building underlays
AS 3566	Self-drilling screws for the building and construction industries
NZS 3604	Timber framed buildings
AS/NZS 4200.1	Pliable building membranes and underlays - Materials
AS/NZS 4200.2	Pliable building membranes and underlays - Installation requirements
AS/NZS 4534	Zinc and zinc/aluminium-alloy coatings on steel wire
AS/NZS 4389	Safety Mesh
NZMRM	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.

1.3 ABBREVIATIONS

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

BMT	Base metal thickness
MRM	New Zealand Metal Roofing Manufacturers Inc
MS	Modified silyl

Requirements

1.4 QUALIFICATIONS

Carry out work with experienced, competent installers familiar with the products being used and with appropriate qualifications such as the National Certificate in Metal Roofing and Cladding.

Warranties

1.5 WARRANTY - INSTALLER/APPLICATOR

Warrant this work under normal environmental and use conditions against weatherproofing failure.

Period:	5 years from the date of completion of the roof
Form:	Roofing installers standard form

Include a copy of the roofing manufacturers' maintenance requirements with the warranty. Refer to the general section WARRANTIES - INSTALLER/APPLICATOR for additional requirements.

1.6 WARRANTY - MANUFACTURER/SUPPLIER

Warrant this work under normal environmental and use conditions against materials failure.

15 years	For failure of coating adhesion
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15 years For weatherproofing by material penetration
Form: Roofing manufacturers standard form

Performance

- 1.7 **FIXINGS, WIND**
Design and use the fixings appropriate for the design loads of this site; as required by NZS 3604 and AS/NZS 1170.2. Allow for specific loadings at corners and the periphery of the roof, where localised pressure factors apply.
- 1.8 **CO-ORDINATE**
Co-ordinate to ensure substrate and preparatory work is complete and other work programmed in the order required for access and completion of the roof. Ensure that all necessary members are positioned so that flashings can be fastened at both edges through the roof profile or cladding to the primary structure.
- 1.9 **PERFORMANCE**
Accept responsibility for the weather-tight performance of the completed roofing system, including penetrations through the roof and junctions with walls and parapets.

2. PRODUCTS

Materials

- 2.1 **WIRE NETTING**
Galvanized hexagonal 75mm mesh from 1mm diameter steel wire to AS/NZS 4534.
- 2.2 **SAFETY MESH**
Safety mesh to AS/NZS 4389.
- 2.3 **UNDERLAY**
Breather type kraft paper laminates to NZS 2295.
- 2.4 **PRE-FINISHED COATED STEEL**
Formability G550 steel sheet coated to AS 1397.
- 2.5 **FLASHINGS GENERALLY**
Formable grade 0.55 BMT for pre-painted steel, to the same standards as the profiled sheets, notched where across profile or provided with a soft edge.

Components

- 2.6 **FASTENERS GENERALLY**
Minimum Class 4 and durability not less than the roofing material being fixed. Screw fasteners to be head stamped identifying the manufacturer and class.
- 2.7 **FIXING CLIPS**
Galvanized steel (powder coated for aluminium) to suit the material and profile of the rigid sheet and location as required by the roofing manufacturer. Fix to steel with 16mm x 10 gauge galvanized wafer head self-drilling screws and to timber with 50mm long x 4.5mm galvanized spiral rolled flat head nails.
- 2.8 **FIXING SCREWS**
To AS 3566. Screws appropriate to the roofing material and the supporting structure, as required by the roofing manufacturer and with a minimum Class 4 durability and not less than the material being fixed.
- 2.9 **RIVETS**
Sealed aluminium, minimum diameter 4mm.

Accessories

2.10 **SEALANT**
Neutral Curing silicone or MS polymer sealant as required by the roofing manufacturer and used as directed.

2.11 **CLOSURE STRIPS**
Compressible, closed cell profiled foam strips to fit the sheet profile.

2.12 **LAP SEALING TAPE**
Closed cell self adhesive nitrile tape.

3. EXECUTION

Conditions

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

3.2 **STORAGE**
Take delivery of and accept packs of roofing undamaged on delivery. Reject all damaged material. Store on a level firm base with packs well ventilated and completely protected from weather and damage. Do not allow moisture to build up between sheets. If sheet packs become wet, fillet or cross stack to allow air movement between sheets.

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

3.4 **SEPARATION**
Place isolators between dissimilar metals, also separate roofing from treated timber and cement based materials. Do not use unpainted lead sheet or copper in contact with or allow water run-off onto galvanized or Zinalume[®] materials.

Application

3.5 **SAFETY MESH**
Fix safety mesh over exposed roof areas to AS/NZS 4389 and the manufacturer's requirements.

3.6 **WIRE NETTING**
Fix wire netting where specified, drawn tight and nailed or screwed to purlins with edges butted and twitched together to form a complete net.

3.7 **LAY ROOF UNDERLAY**
Fit and lap roofing underlay over the netting/mesh. Lay underlay horizontally or vertically with a 150mm side lap, oversailing the spouting and/or gutters by 10mm.

3.8 **FIX INSULATION**
Run and fix insulation blanket as detailed and to the insulation manufacturer's requirements.

3.9 **SET-OUT**
Carefully set out with consideration of the position of side laps to take account of the line of sight. Ensure all sheets are square and oversailing the gutter true to line. Check during fixing to eliminate creep or spread and string lines along purlin centres to keep fastenings in line.

3.10 **END LAPS**
End laps are not permitted, except where specifically detailed.

- 3.11 **FIXING GENERALLY**
Install and fix in accordance with the NZMRM NZ Metal roof and wall cladding - Code of practice requirements, and to roofing manufacturer's recommendations. Paint colour matched fixings and accessories before installation.
- 3.12 **MARKING AND CUTTING**
Cut only by shearing tools. Do not use black lead pencils for marking aluminium/zinc coated products.
- 3.13 **FIX SHEETS**
Fix sheets in place using the fastening system required by the roofing manufacturer for specified profiles, making due allowance for dynamic local wind pressures on the building and thermal movement in the sheet.
- 3.14 **STOP ENDS AND DOWNTURNS**
Form stop-ends at the upper end of sheets. Form downturns at the gutter line where the roof pitch is less than 8 degrees. Form using purpose made tools.
-
- 3.15 **FLASHINGS**
Flash roof to parapets, walls and penetrations to detail. Where no detail is provided flash to MRM NZ Metal roof and wall cladding - Code of practice recommendations and the roofing manufacturer's requirements. Cut accurately and fix using sealant and rivets to detail and to the roofing manufacturer's requirements to form a weatherproof cover. For highly visible flashings, plan joints/junction to take account of the aesthetic requirements.
- 3.16 **USE OF SEALANTS**
Select and use sealants only as recommended by the roofing manufacturer. Apply sealant in two narrow beads transversely across flashing intersections, close to the two edges. Avoid exposing sealant on outside surfaces.
- 3.17 **FLASHING PENETRATIONS**
Flash all penetrations through the roof. Fit pipe flashings with a proprietary collar flashing to manufacturer's requirements, with other penetrations flashed as detailed and to provide a weathertight installation. Ensure that flashings are set to avoid any ponding of water.
- 3.18 **INSTALL RIDGING**
Install ridging by fastening to the purlins through the leading edge of the roofing to manufacturer's requirements.
- Completion**
- 3.19 **REPLACE**
Replace damaged or marked elements.
- 3.20 **LEAVE**
Leave this work complete with all necessary flashings, undercloaks, valleys, ridges and hips all properly installed as the work proceeds so the finished roof is completely weathertight.
- 3.21 **REMOVE**
Remove trade rubbish and unused materials from the roof and surrounds daily during the work. Sweep down at the end of each day, and clean out spoutings, gutters and rainwater pipes on completion of the roof. Remove debris, unused materials and elements from the site.

4422A ARDEX BUTYNOL MEMBRANE ROOFING

1. GENERAL

This section relates to Butynol as single-layer external waterproof covering bonded to:
- construction plywood, including all underlays and accessories

Documents

1.1 DOCUMENTS

Documents referred to in this section are:

Ardex waterproofing solutions manual

NZBC E2/AS1 External moisture, 8.5 Membrane roofs and decks

AS/NZS 2269 Plywood - structural - Specifications

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

1.2 MANUFACTURER'S DOCUMENTS

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

Ardex waterproofing solutions manual

BRANZ Appraisal 436 - Butynol® Roofing Membrane

Copies of the above literature are available from Ardex

Web: www.ardex.com

Telephone: 0-9-580 0005 Auckland

0-4-568 5949 Wellington

0-3-384 3029 Christchurch

Requirements

1.3 NO SUBSTITUTIONS

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

1.4 QUALIFICATIONS

Roofing work to be carried out by an Ardex approved Butynol roofing applicator.

Application to be strictly in accordance with the Ardex waterproofing solutions manual and BRANZ Appraisal 436 - Butynol® Roofing Membrane.

1.5 PROJECT REGISTRATION

This project is registered with Systems Ardex for quality assurance. Confirm with Ardex quality assurance co-ordinator any relevant key dates and proposed tenderers. The main contractor is to contact Ardex prior to starting project.

Warranties

1.6 BUTYNOL WARRANTY

Warrant this work under normal environmental and use conditions against failure.

Warranty period: Materials up to 20 years

Warranty period: Execution up to 5 years

Provide separate material and application warranties signed by Ardex and the applicator.

Refer to the general section for the required form of WARRANTY AGREEMENT and details of when completed warranty must be submitted.

Performance

1.7 TEST

Where required a suitable time lapse or water test shall be carried out.

- 1.8 **PERFORMANCE**
Accept responsibility for the weather-tight performance of the completed roofing system, including all penetrations through the roof and junctions with walls and parapets. All penetrations to comply with NZBC E2/AS1 and Ardex recommendations.

2. PRODUCTS

Materials

- 2.1 **BUTYNOL RUBBER SHEET**
Single ply membrane compounded from butyl.
Thickness: 1.0mm

Components

- 2.2 **BUTYNOL SEAM TAPE**
Ardex uncured butyl cold gum seam tape.

- 2.3 **BUTYNOL SEALANT**
Ardex sealant.

- 2.4 **BUTYNOL FLASHING TAPE**
Ardex flashing tape.

- 2.5 **ARDEX DETAIL TAPE**
Ardex semi-cured silicone backed detail/finishing tape.

- 2.6 **ARDEX ADHESIVES AND SOLVENTS**
Ardex adhesives and solvents.

- 2.7 **EDGE TRIM**
Metal or timber to Ardex details to suit the specific location.

Accessories

- 2.8 **ROOFING ACCESSORIES**
Ardex substrate ventilators, roof outlets, overflows, scuppers and rainwater heads.

3. EXECUTION

Conditions

- 3.1 **GENERALLY**
All work and materials to the Ardex waterproofing membranes manual.

- 3.2 **STORAGE**
Take delivery of Ardex Butynol branded rolls, undamaged and allow for site handling facilities where required. Store membranes and accessory materials under conditions that ensure no deterioration or damage.

- 3.3 **WEATHER**
Apply coverings in a dry atmospheric condition and only when the air temperature is 6°C and above.

Application - preparation

- 3.4 **PRELIMINARY WORK**
Ensure that preliminary work, including formation of falls, flashing rebates, grooves, ducts, provision of battens and fillets and fixing of vents and outlets 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, outlets and projections, will ensure work of the required standard.
- 3.6 **CONCRETE SUBSTRATE**
Ensure concrete substrate has been allowed to cure for at least 28 days before commencing application. Prepare the surface, including vacuum cleaning and acid etching as necessary to leave smooth, clean, dry and free of debris.
- 3.7 **PLYWOOD SUBSTRATE**
Plywood to be a minimum of 17mm thick and complying with AS/NZS 2269, minimum CD structural grade with the sanded C side upwards. Hazard Class H3 with waterborne CCA treatment and kiln dried after treatment. Lay with staggered joints (brick bond) with all edges of the sheets fully supported or with tongue and groove jointing. Provide 20mm timber fillets at the base of all upstands and chamfer all external edges with a minimum radius of 5mm. Fix with 10 gauge x 50mm stainless steel countersunk head screws, with a 3mm gap between all sheets. Fix at 150mm centres on edges and 200mm in the body of the sheets. Do not use probe meters to test moisture content.
- Plywood and the timber substructure to have a maximum moisture content of 20% when the membrane is adhered.
- Application - laying Butynol**
- 3.8 **GENERAL**
Tape plywood joints using 25mm Ardex approved self-adhesive tape. Run out sheets and allow to relax for 20 minutes before laying. Do not stretch sheets or tapes in laying.
- 3.9 **APPLY ADHESIVE**
Apply adhesive to the substrate and the Butynol rubber sheeting by brush, spray, or roller at a spreading rate of not less than 2.5 square metres per litre. Leave to tack dry before bonding the two surfaces together.
- 3.10 **LAY SHEETS**
Lay sheets across the roof slope and lap long edges to full width of selvage, 50mm minimum. Smooth down and roll to remove entrapped air. Adhesive bond and seal to the membrane manufacturer's requirements and roll or rub down as the work proceeds.
- 3.11 **BONDING LAPS**
Bond all laps to Ardex requirements. Where the roof slope is less than 5 degrees, where coloured membranes are used, where ponding can occur and in all gutters, use special lap bonding incorporating Ardex seam tape and seam primer.
- 3.12 **MINOR MOVEMENT JOINTS**
Lay sheets across joint but leave unbonded on both sides.
Unbonded width: 25mm minimum
All joints to be taped using Ardex approved self adhesive tape.
- 3.13 **INSPECT**
Inspect and test joints on completion.
- 3.14 **PENETRATIONS**
Form and finish upstands, downturns, penetrations, sumps and vents to conform with Ardex details and NZBC E2/AS1.
- 3.15 **PENETRATIONS AND JUNCTIONS**
Check that adjoining walls and parapets are prepared ready for the installation of the roofing. Confirm that openings have been prepared ready for the installation of skylights and other penetrations through the roof. Required work includes the following:
- 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).

Finishing

- 3.16 **FOOT TRAFFIC**
Foot traffic is to be limited during and after laying.
- 3.17 **ACCESS BOARDS**
Provide access boards for later operations and remove when no longer needed.
- 3.18 **ACCEPTANCE**
Sign off on completed areas. The main contractor to protect and maintain roofing until completion of the contract works.
- 3.19 **SUBSEQUENT WORK**
Make good any damage 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.

Completion

- 3.20 **CLEAN UP**
Clean up as the work proceeds.
- 3.21 **LEAVE**
Leave work to the standard required by following procedures.
- 3.22 **REMOVE**
Remove debris, unused materials and elements from the site.

Window installation is a very important stage that will determine the final performance of the window. During the window installation process a lot of specific nuances may arise that require experience and knowledge to solve. A minor mistake during the installation, that may not show itself straight away, may cause major problems in the future. In order to achieve the best result with your windows we highly recommend to let professionals that specialise in window installation perform the installation of your windows.

Contact

Cascade International Ltd. (New Zealand)

Tel. (09) 265 03 41

Fax (09) 265 03 42

Address: 63 Kerwyn Avenue, East Tamaki, Auckland, New Zealand

Find us on Wises.co.nz

e-mail: info@warmwindows.co.nz

Preparation for the Installation

Before the installation we highly recommend that the area surrounding the window is free of any objects, and the furniture is covered with plastic wrap to prevent dust accumulating on it. Use drop sheets to cover the floor.

Make sure you have the following tools ready: drill, screws, level, and packers.

Installation

1. Make sure the external frame is ready with protector wrap and sill tray/head flashing as required by NZS3604 and NZS3606.
2. Apply the window to the external frame. Do your first adjustments by the base level (the bottom of the frame). Using the level make sure the window is perfectly still, use packers to even out the window. Ideally the gap between the jam and the frame should be between 5mm and 15mm (10mm optimal).
3. Fixate the bottom of the window.
4. Fixate the rest of the window with screws through jam leaving the optimal gap. It is most important to keep the window horizontally and vertically levelled. Use packers to control the gap.
5. After the basic installation is completed all the gaps must be filled with PEF ROD. It must be forced to the far side inside the gap, and must not stick outside.
6. Apply air foam (builders sealing foam) into the gaps with PEF ROD.
7. Leave the foam to dry for a few hours.
8. Use a sharp knife to shape and prepare the foam for the next installation stage.
9. Apply architrave if needed.

After the Installation

Clean the window with soap water, jif cream and glass cleaner. Do not use any cleaners that contain abrasives, acids or solvents on the UPVC frame.

All of our products leave the factory with no scratches. If there are any minor scratches found on the frame after the installation use fine sand paper (800-1200) as finish and carefully polish the scratched area. Try to polish the area just around the scratch; do not go too far and do not apply too much force, as the area polished with sand paper will lose glossiness. After polishing apply jif cream, and polish the area with a soft cloth.

Adjustments

Normally, if the installation step is completed properly then no adjustments are needed at all. All of our products are assembled in the factory in such a way that they should fit and operate perfectly at the place of installation.

However there are some minor issues that might arise after the installation.

1. If the locks are too tight and heavy to operate, try oiling their moving parts. It is common for new locks to be a bit "heavy" at first.
2. If you find a gap between the bead and the window frame, try pushing the bead towards the frame to illuminate the gap, you might use a soft rubber hammer.
3. The handle might be a bit loose after the installation. To tighten the handle, remove the decorative cover and tighten the bolts underneath it.
4. With the Tilt and Turn model make sure that you only operate the handle when the sash is closed, otherwise the locking mechanism might suffer damage.

If you have any other issues that are not listed here, do not try to fix them yourself. Remember your windows and doors are covered by 5 years warranty. Contact us if you have any problems.

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Phone number: +64 9 265 0341
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PO Box: 258-004, Greenmount Auckland
Email: info@warmwindows.co.nz

Everything you need to know about WarmWindows

Windows are one of the most important architecture elements in any kind of building. Good windows develop an aesthetic value and can improve health and general environment indoors.

Cascade International Ltd, traded as Warm Windows, is offering you a choice of fine UPVS double glazed windows. These windows and doors are utilising such technologies that make them perfectly suited for New Zealand weather conditions. They also meet the requirements of NZS 4211:1985 standards and ISO 9001:2000 specifications. The flexibility of Warm Windows profile allows for different combinations of UPVC profiles to be used in the production process, letting us to manufacture windows with sizes and features to suit any of your requests.

Warm Windows do not require special care, while they deliver comfort for many years after installation.

Advantages: Why UPVC?

The demand for UPVC Windows is increasing because UPVC Windows are not only efficient for thermal insulation, soundproofing, and heat shielding, but also are available in various colors and different shapes. High quality UPVC windows and doors can transform your home, drastically reducing problem draughts, heat loss, noise and condensation, while increasing value of your property.

Maintenance free

With conventional wooden frames the annual pilgrimage up and down ladders, sanding priming and re-painting is an unfortunate fact of life.

UPVC, in contrast, requires little in the way of routine maintenance - nothing more than an occasional wipe over with soapy water. All our windows are virtually maintenance free, there is no paint stripping or painting at all.

Heat & Draught isolation

According to the fact, in the air-conditioning buildings, windows with low thermal conductive material can reduce the loss of energy up to 37%. The intelligent selection on factors of thermal conductivity is the material of the window profiles and the selection of the glass. The thermal conductivity of UPVC is 0.14Kcal/m²hr.Co this means that UPVC based windows can reduce heat loss over 30%. UPVC double glazed windows reflect heat back inside keeping your home warm and draught-free.

Noise isolation

Our UPVC double glazed windows, made of non vibrant material, reduce outside noise significantly making your home quiet.

The Looks

Our Products are not only practical and durable, they are also very attractive. The beauty of high quality white or wood-grain PVCU windows is that they are almost indistinguishable from the original frames. The modern technology allows producing a window of any shape you need - square, round, oval, etc.

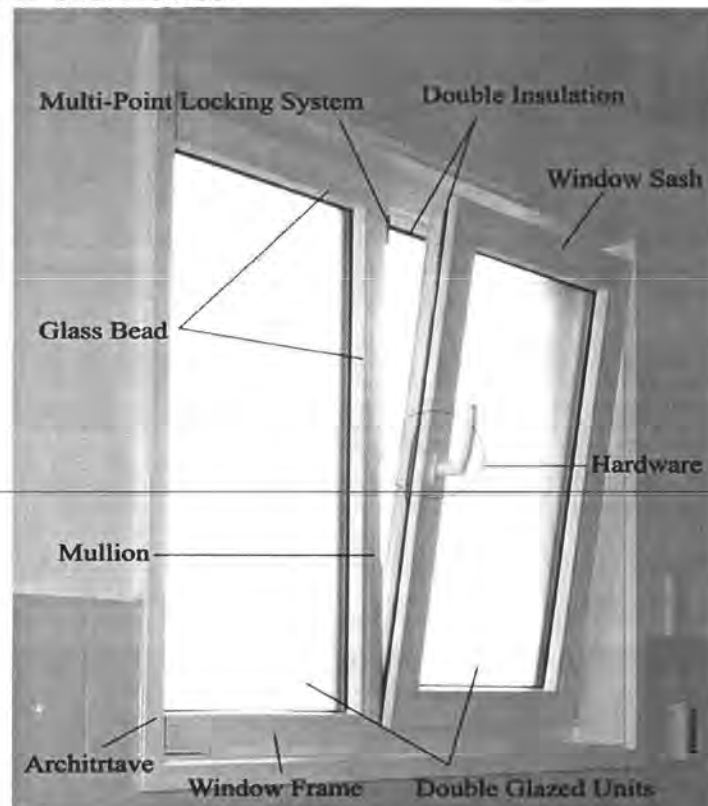
Safety and Security

We know that when customers are considering replacing their windows, safety and security features are of paramount importance.

All of our products incorporate the latest technological advances so that we are confident that you and the things you love are well protected.

All the modern windows, made with use of any reasonable materials, have excellent performance. The difference is mainly in the preferences. For example timber windows are more aesthetic, as well as much more expensive, but also this type of windows requires often, regular and careful maintenance. Aluminium windows are perfectly suited for industrial objects; however they will be cold when installed at residential sites.

Main window elements:



Window Frame –static plastic component of the window, upon which sash and interior timber liners are applied.

Window Sash – opening part of the window.

Insulated Double Glazed Unit (IGU) - a special glass unit which is made up of two separate sheets of glass glued with a special swiggle strip. There is always a chamber between the sheets of glass in a proper double glazed unit.

Hardware – locks, handles, locking mechanisms, hinges and additional devices that allow a window to open, lock and close.

Galvanized Steel Reinforcement is inserted inside the UPVC profile for the additional support.

Every single UPVC construction is made of a number of different UPVC profiles:

Frame Profile – the profile that is used to make Window Frame, usually makes up the external part of the window.

Sash Profile – the profile that is used to make Window Sash, and other opening elements.

Mullion – profile used to divide the inside of the window in to smaller areas. It can also be used as the internal support for the frame.

Bead – a UPVS strip that holds the Double Glazed Unit inside the frame. It is usually installed from the interior side of the window.

Head Flashing – is a devise designed to direct any waterfowls away from interior window cavities.

Exterior Skirting – is an external outside part of the window that covers the gap between the window and external cladding.

Maintenance

UPVC Windows Maintenance

UPVC windows require very little maintenance altogether, here is the list of all the things you would have to do to keep the windows in perfect condition for many years.

The First Post-installation Cleaning

Right after the installation we recommend to check your windows carefully for any left-over spots of concrete (if applicable), whitewash, crack filler and lacquer (if you have a wooden window-still). If any of those are found, than it is wise to remove them as soon as possible.

Routine Cleaning

To clean the UPVC windows use soapy water or only those cleaners that DO NOT contain abrasives, acids or solvents, as they might damage the UPVC frame. Even if the powder or solid cleaners meet the requirements, it is safer to use liquid cleaners instead.

The Handle

From time to time it is normal for the window handle to get a little bit loose, to fix that problem remove the handle cover and tighten the bolts underneath it.

Interior Window Drainage Holes

By the design of UPVC windows, there are special channels that allow rain water to drain. The drainage holes exits are located at the bottom of the frame, to access them open the sash. From time to time these channels might get blocked by dirt, and has to be cleaned.

4610 GLAZING

1. GENERAL

This section relates to the supply and glazing of glass into external and internal joinery on or off site, and other specialty glasswork:

- shower screens
- balustrade panels
- mirrors

1.1 DOCUMENTS

Documents referred to in this section are:

NZBC B1/AS1	Structure
NZBC F2/AS1	Hazardous building materials
NZBC F4/AS1	Safety from falling
NZS 3604	Timber framed buildings
NZS 4223.1	Glazing in buildings - Glass selection and glazing
NZS 4223.3	Glazing in buildings - Human impact safety requirements
NZS 4223.4	Glazing in buildings - Wind, dead, snow and live action
AS/NZS 2208	Safety glazing materials in building
AS/NZS 4666	Insulating glass units
AS/NZS 4667	Quality requirements for cut-to-size and processed glass

2. PRODUCTS

2.1 GLASS

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

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

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

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

2.2 TEMPORARY PROTECTION FILM

Factory applied UV resistant film to protect the glass from construction damage.

2.3 MIRROR GLASS

Clear silvering quality annealed mirror glass including, silver (copper free), activation, passivation and 2 protective coats.

2.4 SAFETY MIRROR GLASS

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

2.5 GLASS SCREENS

Proprietary shower screens, formed to shape before toughening, complete with matching hardware.

Components, mirrors

2.6 MIRROR ADHESIVE

Adhesive mirror-mastic and double-sided adhesive tape.

3. EXECUTION

3.1 GLAZING GENERALLY

To NZS 4223.1 and 4, and for human impact safety glazing to NZS 4223.3.
To AS/NZS 4666 for IGU's.

Application aluminium

3.2 INSTALL GLASS TO ALUMINIUM FRAMES

Install glass to NZS 4223.1.

Bead glaze to Section 4 Glazing.

Channel glaze to Section 4 Glazing, Section 5 Framed, Unframed,
Partly Framed Glass Assemblies.

3.3 INSTALL SAFETY GLASS

To NZS 4223.3, as modified by NZBC F2/AS1.

Application mirrors

3.4 MIRRORS, SCREW FIXED

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

3.5 MIRRORS, CHANNEL MOUNTED

Fix with proprietary mounting channels, to the channel manufacturer's requirements.

3.6 MIRRORS, ADHESIVE FIXED

Fix with adhesive mirror-mastic and double-sided adhesive tape.

Application miscellaneous

3.7 INSTALL GLASS BALUSTRADES

Confirm/design and carry out installation to requirements of NZBC B1/AS1: 7.0 Glazing, NZBC F2/AS1: Glazing and NZBC F4/AS1: Safety from falling: 1.0 Barriers in buildings.

3.8 INSTALL GLASS SCREENS

Install shower screens and doors to manufacturer's requirements. Fix wall channel with silicone sealant.

Finishing

3.9 SAFETY

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

3.10 MANIFESTATIONS

To comply with NZS 4223.3, 303.1. Manifestations (making glass visible)

3.11 TRADE CLEAN

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

4710P PINK® BATTS® & PINK® BATTS® SILENCER® INSULATION

1. GENERAL

This section relates to Tasman Insulation Pink® Batts® insulation materials installed into residential buildings.

It includes:

Thermal:

- Pink® Batts® Wall Insulation
- Pink® Batts® Ceiling Insulation

1.1 ABBREVIATIONS AND DEFINITIONS

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

The following abbreviations apply specifically to this section:

STC	Sound Transmission Class
IIC	Impact Insulation Class

1.2 DOCUMENTS REFERRED TO

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

NZBC H1/AS1	Energy efficiency
NZS 3602	Timber and wood-based products for use in building
NZS 4218:2004	Energy Efficiency - Small building envelope
NZS 4243.1	Energy Efficiency - Large buildings - Building thermal envelope
NZS 4246	Energy efficiency - Installing insulation in residential buildings
AS 1530.1	Methods for fire tests on building materials, components and structures - Combustibility test for materials
NZCEP 54	NZ Electrical Codes of Practice for the installation of recessed luminaires and auxiliary equipment (available at www.energysafety.govt.nz)

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 related to this section are:
Tasman Insulation New Zealand: Product Data Sheets

Copies of the above literature are available at

Web: www.pinkbatts.co.nz

Telephone: 0800 PINK BATTS (746 522)

Warranties

1.4 GUARANTEE

Provide a Tasman Insulation durability statement.

On completion of the installation, a PinkFit® guarantee form is provided to confirm the insulation has been installed to NZS 4246.

Requirements

1.5 QUALIFICATIONS, PINK® BATTS®

Installers to be PinkFit® - Preferred Pink® Batts® installers. A list of approved installers can be obtained at www.pinkbatts.co.nz, by telephoning Freephone 0800 746 534 (0800 PINKFIT) or from the local building supplies merchant.

1.6 NO SUBSTITUTIONS

Substitutions are not permitted to any specified Tasman Insulation Pink® Batts® insulation or associated products, components or accessories.

Performance

- 1.7 **ENERGY EFFICIENCY**
Maintain the energy efficiency requirements, of NZBC H1/AS1, for small buildings to NZS 4218, and in large buildings to NZS 4243, as set out in SELECTIONS. Installation must maintain these requirements.

2. PRODUCTS

Materials - thermal

- 2.1 **PINK® BATTS® CEILING INSULATION**
Pink® Batts® Ceiling Insulation is a light weight flexible bio-soluble glass wool manufactured from up to 80% recycled glass, bonded with a thermosetting resin to form rectangular insulating slabs and blanket.
- 2.2 **PINK® BATTS® WALL INSULATION**
Pink® Batts® Wall Insulation is a light weight flexible bio-soluble glass wool manufactured from up to 80% recycled glass, bonded with a thermosetting resin to form rectangular insulating slabs and blanket.

Components

- 2.3 **FASTENERS**
Insul anchors complete with retaining washer.
- 2.4 **TAPES**
Proprietary plastic tape stapled across framing to retain insulation in unlined wall and ceiling locations.
- 2.5 **ADHESIVE TAPE**
Pressure sensitive adhesive tape.

3. EXECUTION

- 3.1 **STORAGE**
Accept materials undamaged and dry and store in a location that protects them from the weather and damage. Avoid distortion, stretching, compression, puncturing and damage to edges of materials. Do not use damaged or wet insulation materials.
- 3.2 **HANDLING**
Wear protective clothing as necessary and when handling, avoid delamination or distortion of the rectangular form. Maintain full thickness unless compression is an installation system requirement.
- 3.3 **INSPECTION**
Before starting installation of blankets and slabs, check that the location and framing are free from moisture, that the cavities are not interconnected and that mesh, building papers and vapour barriers are in place.
- 3.4 **INSTALL INSULATION GENERALLY**
Lay, install, fit and fix thermal insulation to NZBC H1/AS1: 2.0 and to the Pink® Batts® requirements. Install in housing to NZS 4218 and NZS 4246, and in large buildings to NZS 4243.1. Install thermal and acoustic insulation as per detail. Do not cover vents and cut around all recessed light fittings and metal flues to the safety requirements of NZECP 54. Lift up electrical wires and lay the insulation underneath.

Application, thermal insulation

- 3.5 **INSTALL PINK® BATTS® CEILING INSULATION**
Ensure that the product is installed dry; if wet replace before installation. If cutting is required, cut oversize by 5-10mm to ensure a friction fit. Insulate around vents (not over

them) to allow unhindered ventilation. Insulate directly up to bricked chimneys leaving no gaps.

Fit **Pink® Batts® Ceiling Insulation** beneath electrical wiring and plumbing. Install to the outer edge of the top plate. Maintain a 25mm gap clearance between the **Pink® Batts®** insulation and roof underlay. Adhere to the clearances as per product datasheet for recessed light fittings; clearances are required for some fittings to prevent light fittings from overheating and failing. Refer to NZS 4246 for installation guidelines and **Pink® Batts®** Product Data Sheets, for detailed installation instructions.

3.6 INSTALL PINK® BATTS® WALL INSULATION

Ensure the product is installed dry; if wet replace before installation. If cutting is required, cut oversize by 5-10mm to ensure a friction fit. Fill gaps around windows and doors with off-cuts. Insulate around vents (not over them) to allow unhindered ventilation.

Fit **Pink® Batts® Wall Insulation** behind electrical wiring and plumbing. Ensure there are no gaps, folds or undesirable compression at edges.

Refer to NZS 4246 for installation guidelines and **Pink® Batts®** Product Data Sheets, for detailed installation instructions.

Completion

3.7 CLEAN UP

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

3.8 LEAVE

Leave work to the standard required by following procedures.

3.9 REMOVE

Remove debris, unused materials and elements from the site.

4821 FLASHINGS

1. GENERAL

This section relates to the fabrication and installation of flashing systems not forming part of a proprietary system.

Documents

1.1 DOCUMENTS

Documents referred to in this section are:

Code of practice	NZ metal roof and wall cladding
NZBC B2/AS1	Durability
NZBC E2/AS1	External moisture
AS/NZS 2728	Prefinished/prepainted sheet metal products for interior/exterior building applications - Performance requirements
AS 3566	Self-drilling screws for the building and construction industries - General requirements and mechanical properties
NZS 3604	Timber framed buildings

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

Requirements

1.2 QUALIFICATIONS

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

1.3 VERIFY DIMENSIONS

Verify dimensions against site measurements prior to fabrication.

Standards of performance

1.4 DURABILITY REQUIREMENTS

Design and install the flashings appropriate for the durability applications in accordance with NZBC B2/AS1. Clause 3.2 requires that all hidden elements have at least the same durability as that of the element that covers it. Refer to B2/AS1 Table 1: Durability Requirements of Nominated Building Elements and NZBC E2/AS1 Table 20 Material selection.

1.5 COMPATIBILITY REQUIREMENTS

Each flashing material shall be selected in accordance with NZBC E2/AS1 Table 20 to minimise corrosion. Refer to either NZS 3604 Clause 4.2 or AS/NZS 2728 for the relevant exposure conditions. For compatibility of materials in contact and subject to run-off, refer to NZBC E2/AS1 table 21 and 22.

1.6 DESIGN

For flashings where there are no specific details or drawings, provide a full size mock up of the flashing to integrate components into the weathertight system. Co-ordinate with the trades affected by the installation.

2. PRODUCTS

2.1 FLASHING MATERIALS

Acceptable materials for flashings are described in NZBC External Moisture E2/AS1 Clause 4.0. Material, grade and colour as detailed and scheduled. Ensure that materials used for flashings are compatible with the building and cladding materials and their fixings. Fabricate flashings from a ductile grade of metal designed for lateral strength by folding, stiffening or ribbing on external edges, having a maximum un-stiffened width of 300mm.

- 2.2 **FIXINGS**
Rivets, screws, nails and cleats to be compatible with the materials being fastened. Fasteners complying with the corrosion requirements of AS 3566 are suitable for use with ZINCALUME® steel products. Use only low carbon non-conductive sealing washers.

- 2.3 **JOINTS - SEALANTS**
Neutral curing silicone rubber sealant that is acetic acid free with low resistance to compression and be-able to withstand large temperature variations.

3. **EXECUTION**

Conditions

- 3.1 **DELIVERY**
Keep flashings dry in transit. Take delivery of flashings in an undamaged condition. Reject all damaged materials.

- 3.2 **STORAGE**
Store materials and accessories on a level, firm base, in dry conditions, well ventilated, out of direct sunlight and completely protected from weather and damage. Ensure storage areas are away from current work areas. Cover to keep dry until fixed.

- 3.3 **HANDLING**
Avoid distortion and contact with potentially damaging surfaces/substances. Do not drag flashings across each other, or across other surfaces. Protect edges, corners and surfaces from damage.

- 3.4 **SUBSTRATE**
Do not commence work until the substrate is of the standard required by the installer for the specified flashings, level and in true alignment.

- 3.5 **PROTECT**
Protect surfaces, window and door joinery, and finishes already in place, from the possibility of damage during the installation process.

- 3.6 **CONFIRM LAYOUT**
Before commencing work confirm the proposed installation of the flashings and expansion joints and other visual considerations of the finished work.

- 3.7 **CO-ORDINATE INSTALLATION**
Co-ordinate installation of flashings with associated trades.

Application

- 3.8 **INSTALLATION**
Install flashings in accordance with NZ Metal Roof and Wall Cladding Code of Practice and in compliance with NZBC E2/AS1 4.0 Flashings. For very high wind zones and where the pitch of the roof is below 10° the flashing joint laps shall be sealed with sealant at each end of the lap to prevent the ingress of water.

Form hem on vertical upstands of hidden flashings to prevent capillary action. Refer to NZBC E2/AS1 Table 7 for general dimensions of flashings.

- 3.9 **FIXINGS**
Fix flashings with fasteners appropriate to the situation. For fixing flashings with proprietary brackets or clips ensure they are aligned to allow for movement and are compatible with the flashing material.

Fix screws with the shank perpendicular to the surface of the flashing with the washer fitted firmly against the flashing. Screws to be compatible with the flashing material.

Rivets 'blind' or 'pop' are to be sealed when used. Aluminium rivets are compatible with AZ coated steel. Minimum diameter of rivet to be used is 4.0mm. Drill hole 1mm larger than the rivet size. Seal head of rivet with neutral cured silicone.

3.10 JOINTING - SEALANTS

Clean surfaces to be lapped using a solvent ensuring all traces of the solvent are removed with a clean rag. Apply sealant by gun in a continuous bead of approximately 5mm diameter. Width of sealant when compressed should not exceed 25mm. Sealant joints shall be mechanically fixed for strength. Refer to NZ Metal Roof and Wall Cladding Code of Practice for details.

3.11 FINAL INSPECTION

A final inspection by the installer to take place after completion of the flashing work. Any defects or subsequent damage to be made good.

Completion

3.12 PROTECT

Protect new work from damage.

3.13 REPLACE

Replace all damaged or marked elements.

3.14 LEAVE

Leave work to the standard required for following procedures.

3.15 REMOVE

Remove debris, unused materials and elements from the site.

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
- wet area systems

1.1 RELATED SECTIONS

Refer to GIB® PLASTERBOARD FIRE & SOUND LININGS for performance wall linings

1.2 ABBREVIATIONS

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

AWCINZ Association of Wall and Ceiling Industries New Zealand

Documents

1.3 DOCUMENTS REFERRED TO

Documents referred to in this section are:

NZBC E2/AS1	External moisture
AS 1397	Steel sheet and strip - hot-dipped, zinc-coated, or aluminium/zinc-coated
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	

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.

1.4 MANUFACTURER'S DOCUMENTS

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

GIB® Site Guide (May 2006)
GIB Ultraline® Plus lining system (February 2006)
GIB Aqualine® Wet Area Systems (March 2007)
GIB® Rondo® Metal Ceiling Batten Systems
GIB® Goldline™ Platinum Tape-on Trims
GIB® UltraFlex high impact corner mould
BRANZ Appraisal 324 - GIB Ultraline® Plus Lining Systems
BRANZ Appraisal 427 - GIB Aqualine® Wet Area Systems
BRANZ Appraisal 97/008 - Standard 10 and 13mm GIB® plasterboard

Copies of the above literature are available at

Web: www.gib.co.nz

Telephone: 0800 100 442

Requirements

1.5 NO SUBSTITUTIONS

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

1.6 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

- 1.7 **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.
- 1.8 **BRACING REQUIREMENTS**
Provide braced wall systems using GIB® Ezybrace Systems to meet the requirements of NZS 3604 when tested to BRANZ Technical paper P21. 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 Ultraline® high quality surface plasterboard
GIB Braceline® plasterboard
GIB Aqualine® wet area plasterboard
- 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 **METAL ANGLE TRIMS**
GIB® galvanized steel slim angle trims.
- 2.6 **CONTROL JOINTS**
GIB® Rondo® P35 control joints.
GIB® Goldline™ tape-on trims
- 2.7 **TAPE ON TRIMS AND EDGES**
GIB® Goldline™ tape-on trims
GIB® UltraFlex high impact corner mould.
- 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(r) MaxSet®, GIB ProMix® All Purpose, GIB Plus 4®

Finishing compound:	GIB ProMix® All Purpose GIB ProMix® Lite, GIB® U-Mix, GIB Plus 4®, GIB® Topcoat
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

2.12 MOULD RESISTANT SEALANT
GIB® Aquaseal ultra low VOC mould resistant water based silicone sealant

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.

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.

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.

3.6 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

3.7 INSTALL CEILING BATTENS

Install to GIB® Rondo™ Ceiling Batten Systems.

3.8 LINING WALLS AND CEILINGS GENERALLY

Form to GIB® Site Guide. Ensure bulk insulation thickness shall not exceed that of the wall framing.

- 3.9 **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.
- 3.10 **FORM WET AREA SYSTEMS**
Form to GIB Aqualine® Wet Area Systems.
- 3.11 **FORM CONTROL JOINTS**
Form control joints to GIB® Site Guide.
- 3.12 **INSTALL COVES**
Install to GIB-Cove® literature using GIB-Cove® Bond.
- 3.13 **INSTALL TAPE-ON TRIMS**
Install to GIB® Goldline™ Tape-on trims literature and/or GIB® Ultraflex high impact corner mould literature.

Finishing

- 3.14 **FINISHING GENERALLY**
To GIB® Site Guide and AS/NZS 2589.

Completion

- 3.15 **REPLACE**
Replace damaged sheets or elements.
- 3.16 **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.
- 3.17 **REMOVE**
Remove debris, unused materials and elements from the site.
- 3.18 **LEAVE**
Leave work to the standard required by following procedures.

5230 INTERIOR DOORS

1. GENERAL

This section relates to the supply and installation of interior doors.

1.1 DOCUMENTS

Documents referred to in this section are:

NZS 3602	Timber and wood-based products for use in building
NZS 3604	Timber framed buildings
NZS 3610	Specification form profiles of mouldings and joinery

2. PRODUCTS

2.1 TIMBER

To NZS 3602.

2.2 INTERIOR DOORS, TIMBER VENEER

Solid/hollow core doors as scheduled complete with matching 6mm clashing strip to both sides and to the exposed edge of cavity slider doors.

2.3 INTERIOR CAVITY SLIDER

Solid/hollow core door hung within a proprietary cavity slider frame and complete with brand-matched sliding door gear.

2.4 DOOR HINGES

Size and gauge to carry door. 3 hinges per door.

3. EXECUTION

3.1 SITE MEASURE

Confirm framed openings on site for dimension, plumb and straightness prior to fabrication or ordering of timber joinery. Confirm lintel head and sill deflection for sliding or bi-fold door systems is within the manufacturer's specified tolerances. Provide not less than 10mm unless otherwise required.

3.2 EXECUTION GENERALLY

Manufacture to the 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 FACTORY FIT HARDWARE

Factory fit the following where specified: -
- Hinges

3.4 FACTORY FINISHING

Before delivery to site: -

- Brace square and provide protection to assemblies during delivery to site. Where factory glazed, indicate the presence of transparent glasses with whiting, tape or signs compatible with the glass type.

Internal doors

3.5 INTERNAL JOINERY FRAMES

Fabricate as detailed. Wedge and rigidly fix in place without distortion, plumb, and true to line and face. Pre drill for fixings through frame. Countersink and plug frames scheduled for clear finish.

3.6 INTERNAL DOOR LINERS, EXTENDED

Heads and jambs finished 30mm, rebated for wall linings and extended a minimum of 10mm. 10mm planted door stops. Hang doors on hinges, sliding and bi-fold gear to the door manufacturer's requirements and to operate freely. Countersink and plug frames scheduled for clear finish. Fit hardware.

- 3.7 **INTERNAL CAVITY SLIDERS**
Install in accordance with the door manufacturer's requirements, allowing for removal of top trim for maintenance.

Completion

- 3.8 **CHECK**
Check and adjust operation of all sashes, doors, hardware and furniture.
- 3.9 **TEMPORARY PROTECTION**
On completion remove any temporary protection and leave ready for following work..

6221 FLOOR TILING

1. GENERAL

This section relates to the supply and setting of ceramic tiles to:

- concrete
- timber substrate floors
- timber floor overlays

Documents

1.1 DOCUMENTS REFERRED TO

Documents referred to in this section are:

NZBC D1/VM1	Access routes
NZBC D1/AS1	Access routes
NZBC E3/AS1	Internal moisture
AS 2358	Adhesives - For fixing ceramic tiles
AS/NZS 3661.1	Slip resistance of pedestrian surfaces - Requirements
AS 3958.1	Ceramic tiles - Guide to the installation of ceramic tiles
NZS 4121	Design for access and mobility - Buildings and associated facilities
AS/NZS 4671	Steel reinforcing materials
BS 5385	Wall and floor tiling. Code of practice for the design and installation of internal ceramic and natural stone wall tiling and mosaics in normal conditions
I.S EN 87	Ceramic floor and wall tiles - Definitions, classification, characteristic and marking
BRANZ	Good practice guide: Tiling

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.

Requirements

1.2 SAMPLES

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

1.3 QUALIFICATIONS

Tiling to be carried out by competent workers experienced with the materials and in the techniques specified.

1.4 DEFLECTION CRITERIA

Check that the deflection of suspended floors does not exceed $\frac{1}{360}$ th of the span under dead and live load.

1.5 ADHESIVES COMPATIBILITY

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

1.6 PROVIDE SPARE TILES

Provide spare tiles.

Warranties

1.7 WARRANTY

Warrant this work under normal environmental and use conditions against failure of materials and execution

Warranty period: 2 years

Refer to the general section for the required form of WARRANTY AGREEMENT and details of when completed warranty must be submitted.

Performance

- 1.8 **SLIP RESISTANCE FOR ACCESS ROUTES**
Slip resistance for tiles to comply with NZBC D1/AS1: 2.1 Level access routes and 3.1 Ramps.
- when in place on a level access route, to have a mean coefficient of friction (μ) not less than 0.4 when tested in accordance with AS/NZS 3661.1.
 - when in place on a sloping access route, to have a coefficient of friction (μ) not less than $0.4 + 0.0125S$ (S = slope of surface expressed as a percentage).
- 1.9 **PROVIDE EVIDENCE OF SLIP RESISTANCE**
Provide evidence that the tiles comply with the standard of performance specified.
- 1.10 **CERTIFY SLIP RESISTANCE**
Provide certificates and any other evidence at the time of selection/supply that the tiles comply with NZBC D1/VM1 and NZBC D1/AS1: Access routes.

2. PRODUCTS

Materials

- 2.1 **FLOOR TILES**
To I.S EN 87. Refer to SELECTIONS for product selection.
- 2.2 **REINFORCING MESH**
To AS/NZS 4671, galvanized 500mm x 500mm x 2.5mm.
- 2.3 **SEPARATING LAYER**
Single layer polyethylene film.
- 2.4 **BUILDING PAPER**
Breather type bitumen saturated kraft paper.

Components

- 2.5 **EXPANSION JOINT, PLASTIC**
Rigid stabilised PVC sides with flexible central section.

Accessories

- 2.6 **SCREED**
Mix of 3:1 Portland cement, coarse washed sand gauged with liquid polymer additive to the tile manufacturer's stated requirements.
- 2.7 **CEMENT MORTAR**
Sand and cement bedding coat with liquid polymer additive, to the tile manufacturer's stated requirements.
- 2.8 **SHEET WATERPROOFING MEMBRANE**
Proprietary sheet waterproofing system.
- 2.9 **TILE ADHESIVE**
Cement based ceramic tile adhesive to AS 2358 and BS 5385, part 4.
- 2.10 **SAND AND CEMENT GROUT**
1 part Portland cement to 2-3 parts fine, washed sand, mixed to a paste consistency with a minimum of clean, potable water.
- 2.11 **PROPRIETARY GROUT**
Cement based, compressible and to suit the particular location and/or use and the tile manufacturer's requirements.

- 2.12 **MOVEMENT JOINT SEALANT**
To BRANZ Good practice guide: Tiling, section 5.0.
- Neutral cured sealant for areas where waterproof membranes are used or where used against aluminium.
 - Acid cured sealant except for areas where waterproof membranes are used or where used against aluminium.

3. EXECUTION

3.1 HANDLING AND STORAGE

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

3.2 CHECK TILES

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

3.3 CONFIRM LAYOUT

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

3.4 SETTING OUT

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

3.5 GENERALLY

Prepare surface and complete tiling work in accordance with AS 3958.1, as modified by BRANZ Good practice guide: Tiling.

Conditions

3.6 SERVICES AND ACCESSORIES

Ensure that all services and accessories are in place and located to suit the tile layout, and that the substrate, background and adjoining surfaces (with the preparation called for in this section) are of the quality necessary to allow tiling of the required standard.

3.7 DO NOT START

Do not start laying tiles until concrete floors are cured, moisture content of floors is such that shrinkage is complete, thermal movement has been accommodated and the levels and surface finish will achieve tile laying of the required standard.

3.8 SUBSTRATE TEMPERATURE

Do not carry out tiling where the substrate temperature is below 5°C or above 40°C.

3.9 MOISTURE CONTENT

Ensure the floor is dry and if in doubt check for moisture content by hygrometer. Do not proceed with tiling work until readings for the whole area show 75% relative humidity or less.

Application - preparing new surfaces

3.10 CONCRETE FLOORS

Completely remove surface contaminants such as paints, oils, release and curing compounds. Remove projections, unevenness and loose material to leave a clean dust and dirt free surface.

3.11 SCREEDS

Form screeds with a deviation from plane of not more than 5mm over 3 metres.

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

Unless stated otherwise provide minimum fall gradients to BRANZ Good Practice Guide - Tiling, clause 6.5 Falls in floors.

1 : 60 minimum For enclosed shower bases

Movement joints

- 3.13 **MOVEMENT JOINTS**
Provide movement joints with a minimum width of 4mm, carried through tile and bedding and where substantial movement is anticipated, through the rigid sheet to the structure. Install joints over expansion joints, at junctions between different backgrounds, abutting other materials, at internal corners and at junctions with floors and columns. Ensure joints are clean, formed, filled and with sealant inserted to the sealant manufacturer's requirements.

- 3.14 **METAL EXPANSION JOINT**
Accurately locate and fix joints in situ, with the bedding, or on top of the bedding, to finish flush with the installed tile and to the tile manufacturer's requirements. Fit and fix rubber/rubber compound inserts to finish flush. Fit expansion joints at regular intervals over the floor area at intervals not exceeding 4 metres, at changes in floor plane and where the floor plane is interrupted.

Waterproofing

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

Unenclosed shower cubicle

To 1800mm above floor and 300mm above shower rose.

To at least 1500mm from shower rose.

To the floor within 1500mm of the shower rose.

Splashback to a vanity

To 300mm minimum up wall behind the vanity.

To the floor level at least twice the width of the vanity and 500mm min beyond it at each end.

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

Application - tile installation

- 3.17 **BONDED CEMENT MORTAR**
Apply proprietary cement slurry bond coat over the whole of the floor to the tile manufacturer's requirements. Thoroughly mix and place the 40mm thick mortar bed over the bond coat and firmly tamp, screed and compact to the required level. Apply proprietary cement slurry bond coat to the wet mortar bed and set tiles while still tacky, firmly beating into the bedding and aligning the 3mm tile joints at the same time.
- 3.18 **MODIFIED CEMENT BASED ADHESIVE**
Apply and float thick or thin bed of modified cement based adhesive to bed thickness to the adhesive manufacturer's requirements. Rib surface with a notched trowel, press tiles and place with required grout joints and to obtain adequate coverage by adhesive on the back of each tile to AS3958.1.

- 3.19 **MODIFIED CEMENT BASED ADHESIVE AND WATERPROOF MEMBRANE**
Apply appropriate waterproof membrane to Davco Specifications. Apply and float thick or thin bed of modified cement based adhesive to bed thickness to the adhesive manufacturer's requirements. Rib surface with a notched trowel, press tiles and place with required grout joints and to obtain adequate coverage by adhesive on the back of each tile to AS3958.1.

- 3.20 **PLASTER SCREED AND SEPARATING LAYER**
Lay polyethylene sheet/building paper to a smooth surface, joints lapped 100mm minimum. Place galvanized steel mesh over with spacers to centralise it in the mortar bed. Thoroughly mix and place the proprietary screed mix to the manufacturer's requirements and compact to the required level. Ensure drying times are observed before installation of tiles by thin/thick set method.

Grouting

- 3.21 **APPLY GROUTING**
Remove spacers. Apply grouting mix to as large an area as can be worked before setting commences. Work with a grouting tool back and forth until joints are completely filled with no adhesive showing. Avoid damage to the surface of tiles, using masking tape where necessary. Finish to depth of cushion and flush with surface to cushion edge and square-edge tiles. Remove surplus grout with a damp sponge and tool the joints to finish the grout uniform in colour, smooth and without voids, pinholes or low spots.

- 3.22 **APPLY PROPRIETARY GROUTING**
Remove spacers. Prepare joints, mix and apply grout and finish off to the grout manufacturer's requirements, to finish the grout uniform in colour, smooth and without voids, pinholes or low spots.

Completion

- 3.23 **REPLACE**
Replace damaged tiles or elements.
- 3.24 **CLEANING**
Upon completion of setting and grouting, thoroughly sponge and wash the tiles to leave them completely clean and without blemish. Finally polish glazed tiles with a clean dry cloth.
- 3.25 **LEAVE**
Leave work to the standard required by following procedures.
- 3.26 **REMOVE**
Remove debris, unused materials and elements from the site.
- 3.27 **PROTECT TILES**
Protect tiles from damage. Ensure tiles are not disturbed by foot traffic for at least 24 hours after laying and after grouting. Provide protection to tiles by laying sheet material such as insulating board for the period between completion of laying and completion of the contract works.

6700R RESENE PAINTING GENERAL

1. GENERAL

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

1.1 RELATED WORK

Refer to **RESENE INTERIOR PAINTING**

Refer to **RESENE EXTERIOR PAINTING**

1.2 ABBREVIATIONS AND DEFINITIONS

Refer to the general section INTERPRETATION AND 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

1.3 DOCUMENTS REFERRED TO

Documents referred to in this section are:

Health and Safety in Employment Act 1992

MPNZA Specification manual

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.

1.4 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

1.5 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.

1.6 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.

1.7 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.

1.8 CONTROL SAMPLES

Prepare samples of the finished work, including the specified preparation. Refer to SELECTIONS for location and type. Obtain approval in writing of the appearance before proceeding. Use the **Resene Architectural Sample Box** as a basis of standard where appropriate.

1.9 COLOUR SAMPLES

Control reference: Check colours to Resene colour samples prior to application and keep the Resene colour samples on site as a control reference. Colour matches are not permitted as they will differ in appearance, durability and performance to the original selected colour over the life of the coating. Samples of Resene colours may be ordered online from <https://secure.clearfield.com/resene/SelectChart.asp?productType=3> or by calling 0800 RESENE (737 363). Use the **Resene Architectural Sample Box** as a basis of standard where appropriate.

1.10 PRIOR TO WORK COMMENCING

Before any work commences painters should verify, with Architects or specifying authority, that their paint matches a previously supplied standard card or panel. Differently coloured paints will vary in price, opacity and durability. Resene normally only specify two coats of colour but with certain colours, such as yellows and oranges, three coats may be needed.

1.11 SUPERVISED CONTROL SAMPLES

Prepare samples of the finished work including the specified preparation. Make arrangements for the supervision of the relevant stages. Obtain written approval before proceeding.

Supervised control samples may, after written approval, be used for comparative testing of dry film thicknesses of the complete coating systems.

1.12 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.

1.13 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.

Performance

1.14 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.

- 1.15 **INSPECTION OF THE WORK**
Inspection of the whole of the work at each of the stages as required. 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**
- Materials**
- 2.1 **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 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** 'Cool Colour' technology reducing heat absorption of a wide range of colours. Contact your local Resene Representative or visit www.resene.co.nz for more information. View a list of Resene colours available as Resene Cool Colours online at www.resene.co.nz/swatches/index.php.
- 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.
- Accessories**
- 2.4 **ACCESSORIES**
Contact your local **Resene ColorShop** for a full range of accessories and usage advice.
3. **EXECUTION**
- Conditions**
- 3.1 **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.
- Application - preparatory work**
- 3.6 **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.
- Application - generally**
- 3.15 **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.

3.16 MIXING

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

3.17 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.

3.18 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.

3.19 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.

3.20 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.

3.21 DEFECTIVE WORK

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

3.22 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

3.23 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.

3.24 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.

- 3.25 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.
- 3.26 REPLACE
Replace hardware without damage to it or the adjoining surface and leave hardware properly fitted and in working order.
- 3.27 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.
- 3.28 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/comn/services/maintenance.htm.

7112 RAINWATER STORAGE TANKS

1. GENERAL

This section relates to the installation of domestic rainwater storage tanks.

Related work

1.1 RELATED SECTIONS

Refer to DRAINAGE GENERAL for general requirements
Refer to RAINWATER SYSTEMS for downpipe installation
Refer to ELECTRICAL section for electrical connections

Documents

AS/NZS 1260	PVC-U pipes and fittings for drain, waste and vent application
AS 2070	Plastic materials for food contact use
AS/NZS 2845.1	Water supply - Mechanical backflow prevention devices
AS/NZS 3000	Electrical installations
AS/NZS 3500.1	Plumbing and drainage - water services
AS/NZS 3500.3	Plumbing and drainage - stormwater drainage
AS/NZS 4020	Testing of products for use in contact with drinking water
AS/NZS 4130	Polyethylene (PE) pipes for pressure applications
AS/NZS 4766	Polyethylene storage tanks for water and chemicals
ATS 5200.026	Technical Specification for plumbing and drainage products - Cold water storage
NZBC G1	Personal Hygiene
NZBC G12/AS1	Water Supplies
HB 230	Rainwater Tank Design and Installation Handbook

Requirements

1.2 HEALTH REQUIREMENTS

Refer to The Ministry of Health publication "Household water supplies: The selection, operation, and maintenance of individual household water supplies" for guidance.

1.3 QUALIFICATIONS

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

Performance

1.4 DESIGN AND INSTALLATION

To HB 230 Rainwater Tank Design and Installation Handbook, to AS/NZS 3500.3 and to NZBC G1 and G12.

1.5 TESTING OF PRODUCTS

Materials used in the manufacture of rainwater tanks to be tested to AS/NZS 4020.

2. PRODUCTS

Components

2.1 RAINWATER STORAGE TANK

- Underground tank manufactured from reinforced concrete. To be designed, inspected and certified by a professional consulting engineer in accordance with the specified test method, performance requirements, pressure testing and objects of AS/NZS 1546.1 and AS/NZS 4766.

Tanks to be fitted with a secure fitting lid to provide internal access for cleaning or inspection.

Accessories

- 2.2 **TANK FITTINGS**
Fittings kit supplied with the tank for complete installation.
- 2.3 **POLYETHYLENE PIPES AND FITTINGS**
High density polyethylene pipe and fittings to AS/NZS 4130.
- 2.4 **WATER PUMP**
Pump designed to pressurised water supply from tank into the building.
- 2.5 **TANK VENT**
Vent with insect proof stainless steel mesh fitted on top of the tank.
- 2.6 **FIRST FLUSH WATER DIVERTER**
Wall mounted or underground system specific to installation. To prevent the first flow of water from the roof entering the water storage tank.
- 2.7 **FILTER SYSTEM**
Inline cartridge filter housing fitted between the first flush diverter and the inlet, or a 955 micron filter tank screen system fitted within the tank.
- 2.8 **TANK VACUUM SYSTEM**
Designed to suck from the bottom of the tank when the tank is full to overflowing. System to include anti siphon device.
- 2.9 **WATER TREATMENT (UV)**
Combination filtration and UV disinfection system.
- 2.10 **SEALS**
Uniseals for pipe connections to the top of the tank.
- 2.11 **TANK BASE BEDDING**
Clean sand or concrete 100 to 150mm thick.
- 2.12 **CONCRETE**
To NZS 3104: Prescribed mix 17.5 MPa: For in situ tank base and water pump pad.
- 3. EXECUTION**
- Conditions**
- 3.1 **SITE ACCESS**
Transportation on site to the position of the tank is at the risk and responsibility of the contractor. Make provision for manoeuvring and unloading of tank
- Application - site**
- 3.2 **SITE EXCAVATION FOR UNDERGROUND GROUND TANK**
Excavate to required size. Place tank into excavation and connect up to the plumbing system with backflow prevention fitted to AS/NZS 3500.1. Drainage system to AS/NZS 3500.3. Backfill with free draining material to manufacturer's requirements. Ensure tank access lids are designed and installed to prevent child and stormwater ingress.
- 3.3 **LAYING AND JOINTING**
Lay in straight lines between changes of line or grade from the lower end of the drain with sockets pointing uphill. Set each pipe true to line and grade and each joint completed before the next pipe is laid.
- Application - fittings**
- 3.4 **WATER PUMP INSTALLATION**
Install pump on a solid base bolted down through base plate. Place weather tight housing over the pump and secure to base. Connect to water supply and power supply

- 3.5 **WATER TREATMENT SYSTEM INSTALLATION**
Install ultraviolet light radiation treatment unit between pump and house to manufacturer's specifications. Connect to power supply provided.

- 3.6 **BACK FLOW PREVENTION DEVICES**
Install to AS/NZS 2845.1, to AS/NZS 3500.1 and to NZBC G12/AS1.

Application - connections

- 3.7 **FIRST FLUSH WATER DIVERTER**
Install either adjacent to the tank or underground, first flush water diverter. Connect downpipes from the roof gutter to the first flush water diverter. Connect the first flush diverter to the top of the tank. Refer to manufacturer's installation details.

- 3.8 **FILTER INSTALLATION**
Install proprietary in-line filter before the inlet connection.

- 3.9 **INLET CONNECTION**
Install inlet pipe into top of tank at manufacturer's designated mounting area using a Uniseal type connection.

- 3.10 **OUTLET CONNECTION**
Install pipe to manufacturer's installation details. To the outlet connect a floating arm draw-off to deliver water from 100mm below the surface. From the base connection run a flexible hose to the pump. Install ball valve in line between base connection and water pump. Support all pipework at outlet.

- 3.11 **OVERFLOW PIPE**
Install pipe to manufacturer's installation details and connect into stormwater system or directed away from base of tank into garden.

- 3.12 **PIPE SEALS**
Insert Uniseals in clean cut holes of the correct size. Insert Uniseal into hole with widespread facing the pipe to be inserted. Lubricate the pipe with detergent and push through the Uniseal. Use only on top of tank connections.

- 3.13 **ELECTRICAL CONNECTION**
Installation to AS/NZS 3000. Allow to connect up water pump and water treatment unit to the power supply as provided.

Commissioning

- 3.14 **POST INSTALLATION TESTING**
Test and commission the completed system to manufacturer's requirements and AS/NZS 3500.1.16 Testing and Commissioning. At the completion and testing of the water service, check all valves and other components to confirm their correct performance.

Completion

- 3.15 **REPLACE**
Replace damaged or marked elements.
- 3.16 **LEAVE**
Leave work to the standard required by following procedures.
- 3.17 **CLEAN**
Clean and flush out the whole installation. Remove silt and debris.
- 3.18 **REMOVE**
Remove debris, unused materials and elements from the site.

7120 HOT AND COLD WATER SYSTEM

1. GENERAL

This section relates to potable water supply connection to the project, and the installation of hot and cold water supply pipework, hot water cylinders and isolation valves.

Related work

1.1 RELATED SECTIONS

Refer to SANITARY FIXTURES, TAPWARE AND ACCESSORIES for sanitary fixtures and tapware selections.

1.2 DOCUMENTS

Documents referred to in this section are:

NZBC B2/AS1	Durability
NZBC G12/VM1	Water supplies
NZBC G12/AS1	Water supplies
NZBC H1/AS1	Energy Efficiency
AS/NZS 2492	Cross Linked Polyethylene (PE-X) pipe for hot and cold water applications
AS/NZS 2537	Mechanical joining fittings for use with cross-linked Polyethylene (PE-X) fittings for hot and cold water applications
AS/NZS 2845.1	Water supply - Backflow prevention devices - Materials, design and performance requirements
AS/NZS 3500.5	National plumbing and drainage - Domestic installations
NZS 4305	Energy efficiency domestic type hot water systems
NZS 4607	Installation of thermal storage electric water heaters: valve-vented systems
NZS 4617	Tempering (3-port mixing) valves

1.3 QUALIFICATIONS

Plumbers to be experienced competent workers, familiar with the materials and the techniques specified. Carry out all work under the direct supervision of a plumber registered under the Plumbers, Gasfitters and Drainlayers Act 2006.

Warranties

1.4 WARRANTY

Warrant this work under normal environmental and use conditions against failure of materials and execution.

Warranty period: 2 years

Refer to the general section for the required form of WARRANTY AGREEMENT and details of when completed warranty must be submitted.

2. PRODUCTS

2.1 CROSS LINKED POLYETHYLENE PIPE

Cross Linked Polyethylene Pipe to AS/NZS 2492 and fittings to AS2537 with a minimum pressure capability of 1200 kPa complete with fittings and accessories brand matched to the pipe manufacturer's requirements with durability to NZBC B2/AS1 Durability, table 1 and NZBC G12/VM1.

2.2 VALVES

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

2.3 BACKFLOW PREVENTION DEVICES

Provide backflow prevention devices to AS/NZS 2845 where it is possible for water or contaminants to backflow into the potable water supply. Refer to NZBC G12 AS/1 3.4 Backflow protection, and table 2, Selection of Backflow Protection.

- 2.4 **TEMPERING VALVE**
Tempering valve to NZS 4617 to NZBC G12/AS1: Water supplies.
- 2.5 **TANKS**
Pre-formed black polyethylene or stainless steel tank, complete with access opening and lid and overflow tray.

Materials - hot water heating appliances

- 2.6 **ELECTRIC HOT WATER CYLINDER, LOW PRESSURE**
To NZS 4305 and NZS 4602, copper thermal storage cylinder insulated and complete with pressure reducing valve and required fittings.

Components

- 2.7 **INSULATION**
Pre-formed pipe sections complete with bends and fittings, with fixing tape to the manufacturer's requirements and to NZBC H1/AS1.
- 2.8 **PROTECTIVE TAPE**
Plasticised PVC tape system with primer, mastic fixing and outer coating.

3. EXECUTION

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

Store tapware in a shelved, dry and securely locked area. Retain tapware in the manufacturer's original packaging, complete with all fixings and installation instructions. Label each unit separately with its space/fixture number to match.
- 3.2 **EXECUTION GENERALLY**
Generally carry out the whole of this work and tests to NZBC G12/VM1 or G12/AS1: Water supplies.
- 3.3 **CORE HOLES AND SLEEVES**
Review location and fit core holes and sleeves as needed throughout the structure in conjunction with the boxing, reinforcing and placing of concrete. Strip core holes and make good after installation of pipework.
- 3.4 **CONCEAL**
Conceal pipework within the fabric of the building unless detailed otherwise. Satin finish chrome plate exposed work, complete with matching ferrule at the surface penetration.
- 3.5 **CORROSION**
Separate all metals subject to electrolytic action from each other and from treated timber, concrete and other lime substances by space, painting of surfaces, taping, or separator strips.
- 3.6 **THERMAL MOVEMENT**
Accommodate movement in pipes resulting from temperature change by the layout of the pipe runs, by expansion joints and by sleeving through penetrations.
- 3.7 **PIPE SIZE**
Flow rates to each outlet to be no less than those given in NZBC G12/VM1 or G12/AS1: Water supplies, table 3, Acceptable flow rates to sanitary fixtures. Pipe size as determined in table 4, Tempering valve and nominal pipe diameters.

- 3.8 **ELECTROLYTIC ACTION**
Avoid electrolytic action by eliminating contact or continuity of water between dissimilar metals.
- 3.9 **EXCAVATE**
Excavate for the water main to a firm, even trench base in straight runs. Allow to backfill.
- Application - jointing**
- 3.10 **JOINTING POLYPROPYLENE PIPE**
Fusion weld joints to manufacturer's requirements.
- Application - pipework installation**
- 3.11 **WATER SUPPLY CONNECTION**
Arrange with the network utility operator for a connection to the water main and from there through a water meter and gate valve. Provide back flow prevention to NZBC G12/AS1: Water supplies.
- 3.12 **POTABLE WATER SUPPLY PIPEWORK INSTALLATION**
From connection point, run pipes complete with all fittings, support and fixing, joins and install to manufacturers specifications. Size the pipes and branches in straight runs to deliver the acceptable flow rate to NZBC G12/VM1 or G12/AS1: Water supplies, table 3, Acceptable flow rates to sanitary fixtures at each outlet. Allow for the expected concurrent use of adjoining fixtures and size the piping layout to eliminate loss of pressure at any point by simultaneous draw-off. Pipework support spacing to be firmly fixed and buffered to eliminate noise and hammer, with preformed tee-connection take-offs and branches, with machine made 3 diameter bends, complete with necessary valves and fittings. Conceal pipework and pressure test before the wall linings are fixed.
- 3.13 **HOT WATER PIPEWORK**
Use a take-off spigot to give separate branches to each fitting, lay out pipes with support spacing to NZBC G12/VM1 or G12/AS1: Water supplies, table 7 Water supply pipework support spacing. Fix firmly and buffer to eliminate noise and hammer, with preformed tee-connection take-offs and branches, and preformed 3 diameter bends, complete with all necessary valves and fittings.
- Lag all pipes with rigid insulation to the manufacturer's requirements and G12/VM1 or G12/AS1: Water supplies.
- 3.14 **EQUIPOTENTIAL BONDING**
Earth metallic water supply pipe and metallic sanitary fixtures to NZBC G12/AS1: Water supplies: 9.0.
- 3.15 **IN-LINE FILTER**
Install an in-line filter immediately adjacent to the main isolating valve at the point of entry to the building, in an accessible position to allow for easy cleaning.
- Application - hot water systems**
- 3.16 **INSTALLING HOT WATER PIPE INSULATION**
Insulate all hot water pipes to NZBC H1/AS1 Energy Efficiency, AS/NZS 3500.5, 3.11.7 Insulation of piping and to the insulation manufacturer's instructions. Cut insulation sections tight between timber framing and tight between the webs of steel studs.
- 3.17 **INSTALL ELECTRIC HOT WATER CYLINDERS AND BOILING CYLINDERS**
Install where shown complete with all the necessary fittings to the cylinder manufacturer's requirements and in accordance with NZBC G12/AS1: 6.11. Valve-vented systems to NZS 4607.
- 3.18 **INSTALL HOT WATER CYLINDER OVERFLOW TRAY**
Install drained overflow tray to hot water cylinder to NZBC G12/AS1: Energy Efficiency.

- 3.19 **INSTALL TEMPERING VALVE**
Install 1 metre minimum from outlet of hot water cylinder and to manufacturer's instructions. Install copper pipework for 1 metre minimum downstream of tempering valve prior to connection of non-metallic pipework.

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

Installation - valves

- 3.21 **INSTALLING BELOW GROUND ISOLATING VALVE**
Install all below ground items such as main isolating valves and water meters in preformed concrete pits or approved equivalent.

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

- 3.23 **INSTALLING BACKFLOW PREVENTION DEVICE**
Provide and install backflow prevention device as near as practicable to the potential source of contamination, and in an accessible position for maintenance and testing to AS/NZS 2845.3.

Completion

- 3.24 **LABEL**
Label all pipework with permanent adhesive markers at 3 metre minimum intervals.

- 3.25 **CLEAN IN-LINE FILTER**
Clean all in-line filters on completion of works.

- 3.26 **REPLACE**
Replace damaged or marked elements.

- 3.27 **LEAVE**
Leave work to the standard required by following procedures.

- 3.28 **REMOVE**
Remove debris, unused materials and elements from the site.

7411D DIMOND RAINWATER SPOUTING SYSTEMS

1. GENERAL

This section relates to Dimond rainwater disposal systems including spouting and downpipes, in metal.

Documents

1.1 DOCUMENTS REFERRED TO

Documents referred to in this section are:

NZMRM 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 MANUFACTURER'S DOCUMENTS

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

Dimond, Roofing and Cladding Systems Design Manual, September 2001 (web based with updates)

Copies of the above literature are available from:

Web: www.dimond.co.nz

Telephone: 0800 DIMOND (0800 346 663).

Warranties

1.3 MANUFACTURER'S WARRANTY

Warrant this work under normal environmental and use conditions against:

Failure of coating adhesion: 10 year manufacturer's standard warranty

Weatherproofing by material penetration: 10 year manufacturer's standard warranty

Weatherproofing by substandard workmanship: 3 years

From: Date of completion of installation

Refer to the general section WARRANTIES for details of when completed warranty must be submitted.

Requirements

1.4 NO SUBSTITUTIONS

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

1.5 QUALIFICATIONS

Installers to be experienced competent gutter installers, familiar with the **Dimond** materials and the techniques specified.

1.6 MAINTENANCE INSTRUCTIONS

Provide one bound copy of all relevant **Dimond** maintenance information on completion of the roofing work.

Performance

1.7 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

- 2.1 SPOUTING
Complete with matching brackets to suit the spouting and screws.
- 2.2 DOWNPIPES
Complete with stand-off brackets, galvanized screw fixed.
- Components**
- 2.3 DROPPERS
Steel or plastic droppers, sized to fit inside the downpipe.
- 2.4 DOMES
Wire mesh in round form with legs to clip inside the outlet opening to the downpipe.
- 2.5 SPOUTING MESH
Flexible plastic mesh fitted into the spouting to the spouting mesh manufacturer's requirements.

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 fascia, barge 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.
- 3.3 THERMAL MOVEMENT
Make adequate provision in the fixing and jointing of the spouting for thermal movement in the length of the spouting. Provide an expansion joint in spouting over 12 metres in length for steel gutter.
- 3.4 CORROSION
Separate 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.

Check compatibility of metals used for rainwater goods, against the materials being used for roofing and flashings.

Application - metal

- 3.5 INSTALL METAL SPOUTING
Establish minimum falls necessary (minimum 1:500) to outlets to prevent ponding and screw fix brackets true-to-line at 900mm centres maximum or 600mm centres maximum when using profile option Box 300. In areas where snow fall is possible and or high wind areas, the centres should be reduced to 600mm. Lap spouting joints in direction of flow, a minimum of 40mm to seal between and over the top of joint and seal with silicone sealant and fix with rivets. Ensure the joint is fixed over its full girth. Cut out neatly for and fit the pre-formed downpipe dropper and rivet and seal around the joint. All installation to **Dimond** details and NZMRM NZ Metal roof and wall cladding - Code of practice recommendations.
- 3.6 INSTALL METAL DOWNPIPES
Form downpipes complete with cast zinc 115 degree angle bends as needed with all joints lapped and silicone sealed and fixed with 2-4mm diameter aluminium blind rivets. Galvanize screw fix with galvanized steel pipe clips to rigidly stand 40mm off the wall plumb and discharging into stormwater gully or inlet pipe. All installation to **Dimond**

details and NZMRM NZ Metal roof and wall cladding - Code of practice recommendations.

- 3.7 **INSTALL PROTECTION**
Fit wire mesh domes to downpipe outlets and plastic mesh to spouting to the spouting manufacturer's requirements.

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.

7420 SANITARY SYSTEMS

1. GENERAL

This section relates to above ground gravity flow sanitary systems;

- for foul water and grey water
- from sanitary fixtures to first underground drain connection
- including system wastes, floor wastes, floor waste gullies, traps, vents and valves
- with associated components and accessories to make the system work

Related work

1.1 RELATED SECTIONS

Refer to SANITARY FIXTURES, TAPWARE AND ACCESSORIES for sanitary fixtures tapware and accessories.

1.2 DOCUMENTS

Documents referred to in this section are:

NZBC G12/AS1	Water supplies
NZBC G13/AS1	Foul water
AS 2887	Plastic waste fittings
AS/NZS 1260	PVC pipes and fittings for drain, waste and vent applications
AS/NZS 2032	Installation of PVC pipe systems
AS/NZS 3500.2	Plumbing and drainage - Sanitary plumbing and drainage
NZS 7643	Code of practice for the installation of unplasticised PVC pipe systems
Plumbers, Gasfitters and Drainlayers Act 2006	

1.3 QUALIFICATIONS

Carry out work by or under the direct supervision of a person registered under the Plumbers, Gasfitters and Drainlayers Act 2006.

2. PRODUCTS

2.1 UPVC WASTE, DISCHARGE AND VENT PIPES

uPVC pipe to AS/NZS 1260 complete with fittings brand-matched to the pipe manufacturer's requirements.

2.2 EXPOSED PIPES AND TRAPS

Chrome plate on copper pipes and associated copper and brass fittings.
White polybutylene or PVC, including all associated fittings.

3. EXECUTION

3.1 EXECUTION GENERALLY

Carry out this work and complete all tests to AS/NZS 3500.2.

Carry out this work and complete all tests to NZBC G1/AS1: 2.0, 3.0 and G13/AS1.

3.2 ELECTROLYTIC ACTION

Avoid electrolytic action by eliminating actual contact or continuity of water between dissimilar metals.

3.3 INSTALL TRAPS, WASTE AND VENT PIPES

Connect waste outlets to traps and run waste pipes and back vents concealed, sized and fixed to AS/NZS 3500.2 /NZBC G13/AS1 and NZS 7643. Discharge wastes into the drainage system stack, soil pipe, or gully trap as shown. Bird proof mesh to all roof vents and vermin proof mesh to all untrapped waste pipes.

3.4 PENETRATIONS

At penetrations through constructions provide and fit collars and escutcheon plates to match pipework.

- 3.5 TEST
Test soil and waste disposal systems to ensure no leakage exists and leave in proper working order.
- 3.6 CLEAN UP
Remove labels and clean fittings. Remove unused materials from the site.

7430 DRAINAGE

1. GENERAL

This section relates to the supply and laying of gravity foul water (sewage), stormwater and field drains.

1.1 DOCUMENTS REFERRED TO

Documents referred to in this section are:

NZBC B1/AS1	Structure - general
NZBC E1/AS1	Surface water
NZBC E2/AS1	External moisture
NZBC G13/AS2	Foul Water
AS/NZS 1254	PVC pipes and fittings for storm and surface water applications
AS/NZS 1260	PVC pipes and fittings for drain, waste and vent applications
AS/NZS 2032	Installation of PVC pipe systems
AS/NZS 2033	Installation of Polyethylene pipe systems
AS/NZS 2566.1	Buried Flexible Pipelines - Structural Design
AS/NZS 2566.2	Buried Flexible Pipelines - Installation
AS/NZS 3500.2	Plumbing and drainage - Sanitary plumbing and drainage
AS/NZS 3500.3	Plumbing and drainage - Stormwater drainage
AS/NZS 4671	Steel reinforcing materials
AS/NZS 5065	Polyethylene and polypropylene pipes and fittings for drainage and sewerage applications
NZS 3104	Specification for concrete production
Plumbers, Gasfitters and Drainlayers Act 2006	

1.2 AS-BUILT DRAWINGS

Supply a 1:100 scale as-built drawing of drains and fittings to the territorial authority and to the owner on completion.

1.3 QUALIFICATIONS

Drainlayers to hold a current licence within the terms of the Plumbers Gasfitters & Drainlayers Act 2006 and be experienced, competent and familiar with the materials and techniques specified.

2. PRODUCTS

2.1 CONCRETE

17.5 MPa prescribed mix to NZS 3104.

2.2 REINFORCEMENT

Plain round and/or deformed steel bars, Grade 300 to AS/NZS 4671.

2.3 UPVC PIPES

uPVC pipes bends, junctions, fittings and joints to AS/NZS 1254 and AS/NZS 1260.

2.4 FIELD DRAINS

Plastic piping for field drains perforated (straight sections or coiled) with filter fabric to prevent silting of the pipe.

2.5 GULLY TRAPS

To NZBC G13/AS2: 3.3 Gully traps, complete with grating.

2.6 STRIP DRAIN CHANNEL

Proprietary, modular, variable invert, PVC or precast concrete drainage channel sections and drainage sump, embedded in site concrete and fitted with selected metal gratings.

2.7 INSPECTION COVERS

Cast iron frame with screw-down cover.

- 2.8 DRAINAGE AND FILLING MATERIALS**
- Granular: Clean gravel or crushed stone or a blend of these. Particle size from minimum 7mm to maximum 20mm.
- Selected: Fine grain soil or granular material suitable for bedding; excluding topsoil.
- Ordinary: Top soil or other excavated materials.
- 3. EXECUTION**
- 3.1 EXCAVATE**
Excavate for drains to a firm even base with correct gradients set in straight runs.
- 3.2 MANUFACTURER'S REQUIREMENTS**
All drainage installations to the pipe and fitting manufacturer's requirements.
- 3.3 DRAINAGE GENERALLY**
Carry out drainage work and tests to AS/NZS 3500.2 (sanitary drainage) AS/NZS 3500.3 (stormwater drainage) as modified by NZBC B1/AS1: 6.0. Lay uPVC pipe systems to relevant sections of AS/NZS 2032, NZS 2566.1 and AS/NZS 2566.2. Lay polyethylene pipes and fittings to relevant sections of AS/NZS 2033 and NZS 2566.1.
- 3.4 LAY FOUL WATER DRAINS**
Lay drains in straight runs to correct gradients, to discharge into the network utility operator's sewer. Set inspection fittings on a concrete base.
- 3.5 INSTALL GULLY TRAPS**
Set on concrete 50mm above the surrounding ground or paving and brought up to protect the top of the fitting. Trowel off.
- 3.6 LAY STORMWATER DRAINS**
Confirm the required location of downpipes and finished ground levels before commencing pipework. Set downpipe bends in concrete with the concrete brought up to protect the top of the bend from damage. Lay drains in straight runs to correct gradients to discharge into the network utility operator's stormwater system.
- 3.7 LAY SUBSOIL DRAINS**
Lay perforated piping firmly in a granular bed in straight runs to correct gradients, discharging into a cesspit. Carry the granular bed up over the pipes without disturbing them to a total depth of 300mm and cover with geotextile fabric to the pipe manufacturer's requirements. Carry the high end of all lines up to the surface to allow for flushing out and finish with a protected removable cap.
- 3.8 LAY SUBSOIL DRAINS TO BASEMENT WALLS**
To NZBC E2/AS1: External moisture, 12.3 Drainage. Lay perforated piping firmly in a granular bed in straight runs to correct gradients, discharging into a cesspit. Carry the granular bed up over the pipes without disturbing them to a total depth of 300mm and cover with geotextile fabric to the pipe manufacturer's requirements. Carry the high end of all lines up to the surface to allow for flushing out and finish with a protected removable cap.
- 3.9 INSTALL STRIP DRAIN CHANNEL**
Excavate trench and form site concrete base to fall. Set interlocking channel sections, sumps and accessories in place, all in accordance with the channel manufacturer's requirements. Check falls and install gratings and covers.
- 3.10 INSTALL STORMWATER INSPECTION CHAMBERS**
To NZBC E1/AS1, with a 75mm fall across the chamber and with channels to form a cascade where necessary. Channel top should be 100mm above the pipe soffit. Bench from channels at 1V on 10H. Benching should be made of 17.5 MPa concrete vibrated to smooth finish. Plastering is not allowed. Fit a cast iron cover and frame.

- 3.11 **INSTALL FOUL WATER INSPECTION CHAMBERS**
To NZBC G13/AS2, with ceramic channels to form a 75mm fall across the chamber. Channel top should be 100mm above the pipe soffit. Bench from channels 1V on 10H. Benching should be made of 17.5 MPa concrete vibrated to smooth finish. Plastering is not allowed. Fit a cast iron cover and frame.
- 3.12 **SOAKHOLES**
Dispose of stormwater on site as shown on the drawings, by soakage, to suit local geology and soil structure; all as directed by the territorial authority.
- 3.13 **CONCRETE ENCASEMENT**
Concrete encase shallow drains and drains under driveways, on a 100mm deep 17.5 MPa concrete bed reinforced with three 10mm mild steel bars. Surround pipes with a polythene membrane to allow movement and encase in 100mm 17.5 MPa concrete.
- 3.14 **FIELD TEST**
Field test drains for watertightness (UPVC to AS/NZS 2032 or AS/NZS 2566. 2 Appendix N) to the satisfaction of the territorial authority inspector.
-
- 3.15 **BACKFILL**
Backfill drain lines in 150mm layers, well tamped but without disturbing the drains. Finish off with 150mm of topsoil, slightly mounded above the finished ground line.

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

1.1 ABBREVIATIONS AND DEFINITIONS

Refer to the general section INTERPRETATION AND 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 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

Documents

1.2 DOCUMENTS REFERRED TO

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

NZBC E2/AS1	External moisture
NZBC F6/AS1	Lighting for emergency
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 1670.6	Fire detection, warning, control and intercom systems - System design, installation and commissioning - Smoke alarms
AS/NZS 2293	Emergency escape lighting for buildings
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	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 4301.1	Intruder alarm systems - systems installed in clients premises
AS/NZS 5000.2	Electric cables - Polymeric insulated - for working voltages up to and including 450/750v
NZIECP	NZ Electrical Codes of Practice
NZIECP 54	NZ Electrical Codes of Practice for the installation of recessed luminaires and auxiliary equipment (available at www.energysafety.govt.nz)
IEC 61643	Components for low voltage surge protection devices

1.3

WARRANTY

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

1 year: Warranty period

Refer to the general section for the required form of WARRANTY AGREEMENT and details of when completed warranty must be submitted.

Requirements

1.4

COMPLY

Comply with the Electricity Regulations 1997, AS/NZS 3000, AS/NZS 3008.1.2 and the New Zealand electrical codes of practice for listed and prescribed work and with the utility network operator's requirements. Apply for the service connection. Arrange for the required inspections of listed work. Pay all fees.

1.5

QUALIFICATIONS

Carry out work under the direct supervision of a holder of a practising licence under the Electricity Regulations 1997.

1.6

QUALIFICATIONS - SECURITY SYSTEM

Installation by an installer licensed under the Private Investigators and Security Guards Act. Installation of all security equipment to comply with NZS 4301 Intruder alarm system - systems installed in client's premises.

1.7

CERTIFICATE OF COMPLIANCE

Supply a certificate of compliance to the owner, as required by the Electricity Regulations 1997 clause 39, within 20 days of completion as required by clause 42. The network utility operator is to inspect before the meter installation, listed work inspection, polarity check and supply becoming live.

2.

PRODUCTS

2.1

MAINS SUPPLY, SINGLE PHASE

Tough plastic sheathed neutral screened cable to AS/NZS 4961 and AS/NZS 3008.1.2, with a minimum rating of 60 amps per phase. Include pilot cable where required by network utility company.

2.2

CABLES

Tough plastic sheathed copper conductors to 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
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

2.5mm² 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

Range/oven/hob circuits: Single phase: 6mm² on 32 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.

2.3 METER BOX

Proprietary manufactured, zinc plated powder coated metal case, or ABS plastic, with glazed panel door, weatherproof where mounted outdoors, and complete with meter mounting, main switch and fuse.

2.4 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.

2.5 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.

2.6 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.

2.7 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.

2.8 HOT WATER SYSTEM SWITCH

One way 20 amp switch complete with cable clamp for flexible PVC conduit to element enclosure.

2.9 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.

2.10 SMOKE ALARMS

Type 1 domestic smoke alarm to NZBC F7/AS1. 1.2 **Descriptions of alarm systems.** Alarm to AS 3786. A wired 230 volt ionised smoke detector type.

2.11 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.

2.12 CEILING ROSES

White plastic mounting base with screwed cover, manufactured to AS/NZS 3113. Terminal type. Cylindrical section TPS for suspended fittings.

2.13 BATTEN HOLDERS

Standard white plastic bayonet cap, with cap angled where wall mounted. Brass liners.

2.14 DOOR BELL SYSTEM

Complete with transformer for mounting on distribution board.

- 2.15 **LIGHT FITTINGS**
Fluorescent and High Intensity Discharge fittings with low loss control gear and power factor corrected to 0.95 minimum. Control gear suitable for dimming if this is required. All fittings complete with lamps; Incandescent GLS lamps pearl, coiled-coil 230v rated, bayonet cap; Fluorescent triphosphor 2700K; CFL; halogen ELV 12v dichroic reflector with cover glass unless detailed otherwise.
- 2.16 **EXHAUST FANS**
Ceiling, wall or duct mounted exhaust fans for ventilation to NZBC G4/AS1, and compliant with AS/NZS 3350.
- 2.17 **HEATED TOWEL RAILS**
Fixed wired heated towel warmers, double insulated, IPX4 splash-proof, compliant with AS/NZS 3350, scratch resistant powdercoated or chrome finish.
- 2.18 **OUTDOOR SWITCHES & SOCKETS**
Using materials with superior UV protection, impact strength, and addition chemical resistance when compared with interior polycarbonate fittings. Weather protected, switches to IP56 minimum, and sockets to IP53 minimum. Sockets fitted with safety shutters behind socket pins, and all products able to be padlocked off or on.

Electrical Automation System

- 2.19 **ELECTRICAL AUTOMATION SYSTEM**
Electrical automation system designed to enable if required:
- Lighting - automated control and dimming timer control.
 - Heating including heated towel rails and ventilation systems.
 - Security - programmable to simulate lights and other devices to give appearance home is occupied - ability to interface with security system and smoke detectors to activate lights.
 - Energy efficiency - automatically switch circuits off when not required or on during low tariff times.
 - Appliances.
 - Irrigation systems.

Security System

- 2.20 **CONTROL PANEL**
Control panel system with a minimum of one installer code, one master code, 6 zones minimum and 6 user codes. The installer to select codes to suit installation.
- 2.21 **DETECTORS**
There are two main types of detectors:
- Standard passive infrared sensors: Install in stable environments with no wind flow and no direct bright sunlight.
 - Passive infrared/ microwave sensors: Install in area where environmental stability is an issue.
- 2.22 **AUDIBLE DEVICES**
Internal sirens can be either a 12V Piezo Siren or a Horn speaker with a sound pressure level of no less than 95dB.
- External siren can be either a stainless steel design or have hardened plastic casing. Both designs to be fully weatherproof but not limited to IP66 Rating. The siren box to contain a strobe diffuser in either blue or red. The siren shall contain a horn speaker, 12v speaker or an electronic siren. The external siren box to have both a cover and rear wall tamper mechanism.
- 2.23 **CABLING**
Security alarm wiring to NZS 4301.1 for installation.
Security alarm wiring to NZS/AS 1125 for cables.
Security alarm wiring to be multi stranded and not single stranded, minimum 0.5mm².

- 2.24 PERIPHERALS**
Fit anti-tamper devices to detectors, control panels and equipment housings, programmed to give a tamper indication when the system is unset and a tamper alarm when the system is set.
- Standard keypad manufactured of moulded hardened plastic with either a LED or LCD screen, to match the style of the wiring accessories in diameter, colour and aesthetics.
- 2.25 COMMUNICATIONS**
Digital dialler to be built into the PCB of all control panels, with the options for both monitoring and remote dial in windows based software. Digital dialler to comply with all the industry standard communication formats including contact I.D and SIA, and NZ Telepermit certification.
- Remote software able to upload / download programming changes and or history events and change status of the security alarm with the ability to be turned off if required.
- 3. EXECUTION**
- 3.1 MAIN SUPPLY**
Lay underground mains to the NUO requirements. Excavate trench, install cable and marker tape and backfill.
- 3.2 METER BOX**
Fit to meter box manufacturer's and Electricity Retailer's requirements. Recess into external wall in sheltered area and flash to weatherproof to NZBC E2/AS1 fig 69. Arrange for meter installation and connection.
- 3.3 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.
- 3.4 CIRCUIT PROTECTION**
Install MCBs at distribution board to AS/NZS3000 to protect each final sub circuit.
- 3.5 EARTH BONDS**
Bond together and to earth all plumbing fittings not adequately isolated, to AS/NZS 3000, the Electricity Regulations 1997 and the fitting manufacturer's requirements.
- 3.6 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.
- 3.7 EARTH LEAKAGE PROTECTION**
Install RCD protection to AS/NZS 3000.
- 3.8 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.
- 3.9 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.
 - Where intended for use with cleaning equipment.
 - Hand-held tools subject to movement in use, i.e. work-shops, garages.
- 3.10 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.

3.11 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.

3.12 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.

3.13 WALL BOXES

Mount flush in cavity construction size to fit products selected. Fix vertically mounted wall boxes to studs. Screw fix horizontally mounted switched socket outlet wall boxes to solid blocking or noggs. Fix switch panel wall boxes to solid blocking.

3.14 SWITCH AND SOCKET UNITS

Fit all single and double switch units, all sockets to the following heights (to the centre of the unit) unless shown otherwise on the drawings.

Switch Units: 1000mm
Socket Units: 150mm above work benches
400mm elsewhere

Mount light switches and switch socket outlets vertically and socket units horizontally. Label all switch units that control electrical equipment or special lighting circuits by colour filled engraving on the switch. Use proprietary engraved switch mechanisms where applicable.

3.15 ISOLATING SWITCHES

Locate isolating switches in positions as confirmed by the owner, when not specifically shown on the drawings.

3.16 LIGHT FITTINGS

Install light fittings in locations and at heights specified and confirmed by the owner, in accordance with the fitting manufacturer's requirements. Install recessed fittings to NZECP 54.

3.17 EXTRA LOW VOLTAGE LIGHTING

Use electronic transformers for ELV lamps, one transformer per lamp. Locate to manufacturer's requirements and as close as practicable to the lamp. Ensure transformers and rear of light fittings are adequately ventilated and clear of any thermal insulation, to NZECP 54.

3.18 ELECTRIC HOT WATER SYSTEM

Wire as a separate circuit through a wall-mounted isolating switch, with the cable from switch to element encased in flexible PVC conduit, clamp fixed at each end. Hot water cylinders, thermostats and 3000 watt element supplied and fitted under HOT AND COLD WATER SYSTEM.

3.19 SMOKE ALARMS

Install Type 1 domestic smoke alarm system to NZBC F7/AS1 3.1 **Domestic smoke alarms**, AS 1670.6 and to the alarm manufacturer's requirements. Fit neatly and without damage to the surrounding finish.

- 3.20 **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.
- 3.21 **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.
- 3.22 **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
 - Exhaust fans: Install exhaust fans to manufacturer requirements. Installed in accordance with AS/NZS 3000 and NZBC G4/AS1.
- 3.23 **OUTDOOR/EXTERIOR SERVICES**
Install all wiring systems in accordance with AS/NZS 3000 and in accordance with the manufacturer's recommendations:

 Provide circuits and connections for exterior installations, including ELV 12/24 Volt path lighting and electronic irrigation systems. Refer to drawings for connection points. Where underground, ensure appropriate protection, such as thickness of sheathing, conduit, depth of cabling, and proximity to other services.

 Use the appropriate rated fittings for power control and power supply. Weather protected switches to IP56, and sockets to IP53 as a minimum. Install to manufacturer's specifications using recommended fittings and sealants to maintain the products integrity.

 Earth leakage protection to be provided for in areas where there is increased risk to human safety in the form of either RCDs at the distribution board, or socket outlet. RCDs are recommended for visible awareness of protection.
- 3.24 **ELECTRICAL AUTOMATION SYSTEM**
Fit distribution cabinet in wall, cut-out to finish flush with the wall surface, or surface mounted. Configure installation to manufacturer's instructions. Provide adequate user training and operating manual to the owner.
- 3.25 **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.
- Security System**
- 3.26 **SECURITY SYSTEM**
Install to the system manufacturer's requirements, control panel, detectors and associated equipment fitted neatly and without damage to surrounding finishes. Installation of security equipment to NZS 4301.3 Intruder alarm system. All 230v mains power connections to the security panel are to be in accordance with AS/NZS 3000. The 230V power is to be switched using a dedicated single gang Isolator switch or similar.
- 3.27 **COMPLETION**
Leave installation operating correctly, with equipment clean and operational.



CHECKSHEET (Effective from 31 March 2005)

Single Residential Dwelling and Accessory Building

Use for single stand-alone dwellings, dwelling additions and/or alteration, repiles, garages, decks, gazebos, sheds, retaining walls etc

Address

8 Ngawara Rd - Waikare

This checklist shows you the information that has to be supplied with your building consent application. Please attach **2 copies** of the following information (unless otherwise specified) with your completed Building Consent Application form.

Please tick each relevant box in the Customer Use column as you attach the information. If the box is not relevant to your application, write **NA** across the box. Please check each section carefully and complete those sections that are relevant to your project.

A guidance document is available to help complete the section in the application form on 'means of compliance' for each building code clause

Once you have attached all the required information, please check for completeness as an incomplete application or lack of any supporting information will mean that your application cannot be accepted for processing.

Customer use

1. GENERAL

COMPLETE FOR ALL APPLICATIONS

- | | | |
|-------------------------------------|--|-------------------------------------|
| ☒ | <p>a Building Consent Application Form (1 copy)
Completed and signed by the owner or by an agent on behalf of the owner.</p> | ☒ |
| ☒ | <p>b Proof of ownership (1 copy) <i>KCDC to obtain</i>
One recent copy of <u>current</u> certificate/s of title (i.e. not older than 3 months) or where applicable one copy of purchase agreement (if recently purchased) or one copy of relevant portions of current lease</p> | ☒ |
| ☒ | <p>c Locality plan (1:500) showing:
Physical location of the subject building in relation to streets or landmarks, north point, name of building and lot and DP number</p> | ☒ |
| ☒ | <p>d Inspections and monitoring
Details of proposed inspection regime including monitoring by council officers and other professionals eg architects, engineers, surveyors and certification to be supplied on completion.</p> | ☐ |
| ☒ | <p>e Application fee
Applications will not be accepted without payment of the appropriate fees. Fees payable are set out in the published fee schedule of the council that has jurisdiction over the project site.</p> | ☒ |

2. DEMOLITION / REMOVAL

COMPLETE FOR ALL PROJECTS INVOLVING DEMOLITION OF SIGNIFICANT PARTS OF BUILDINGS OR THE DEMOLITION OR REMOVAL OF WHOLE BUILDINGS.

Note: Where the project is only for the complete removal or demolition of a building you are not required to complete any further sections

- ☐ a **Means of barricading the site**
Provide details of temporary barriers, gates which swing inwards or other means of restricting public access to the area
- ☐ b **Proposed tipping location for demolition materials (address/landfill)**
- ☐ c **Hazardous building materials**
Provide safety plan detailing the safe handling and disposal of hazardous materials
- ☐ d **Site management plan covering**
Management to control silt run off, noise and dust
- ☐ e **Proposed destination for relocated building:**
- ☐ f **Access to and from the site including (use of kerb and crossings)**
- ☐ g **Specify termination of existing services**
 - Water
 - Sewer
 - Stormwater
- ☐ h **Details about the building such as:**
Number of storeys, type of materials the building is constructed of (note: Photographs of the building would be useful)

Note: You will need to contact the relevant service authorities specified below to advise them of the extent of your work:
Electricity, gas, drainage, water, transport, telecommunications, cable television or any other services that may be affected.

Note: Transportation of relocated building -
You will be required to contact and provide details to Council's Transportation and Traffic Department

3. FOUNDATIONS / FLOOR

COMPLETE FOR ALL NEW BUILDINGS, FOR EXISTING BUILDINGS WHERE THE FOOTPRINT OF THE BUILDING WILL CHANGE OR WHERE AN ADDITIONAL STOREY IS BEING ADDED

- ☒ a **Site Plan (1:100) showing**
Dimensions of all boundaries, north point, finished floor levels, ground contours (extended to boundaries) and/or levels, site area, street name and number, lot and DP number, outline of building and distances to boundaries. Include on the site plan the designated wind zone of the site (e.g. specific design, very high, high, medium or low)
- ☒ b **Foundation plan (1:100/1:50) showing:**
 - dimensions of all new foundations
 - sub-floor, including bracing
 - footing details
 - if a concrete slab, show basic details including reinforcing and contractions joints
 - piles and footings
 - if the addition is an upper storey show details on upgrading existing foundations, joints, piles, etc
 - indicate ventilation to sub floor spaces
- ☒ c **Subfloor bracing**
Provide subfloor bracing plan and calculations for all piled structures. Where the structure is specifically engineered, this should be included with the structural calculations
Subfloor bracing plan and calculations are required where an additional storey is to be added.
- ☒ d **Foundation details**
Details including reinforcing and connections

4. CONSTRUCTION

COMPLETE FOR ALL NEW STRUCTURES OR ALTERATIONS TO EXISTING STRUCTURES

- N/A ☐
- ☒ a **Existing floor plan (1:100/1:50) showing**
(for additions and alterations only)
- all levels
 - all designated spaces
 - all removals
 - sanitary fixtures
 - smoke detectors
- ☒ b **Proposed floor plans (1:100/1:50) showing:**
- room dimensions
 - location of partitions
 - all designated spaces
 - all floors (new or altered)
 - location of sanitary fixtures
 - stairs, barriers, handrails, floor joists and beams
 - floor joist layout for each level with timber floors
 - smoke detectors
- ☒ c **Wall bracing plan (1:100/1:50) showing:**
Bracing details and calculations for wall bracing (also required for existing lower storeys where an additional storey is being added)
Sub-floor bracing for decks projecting more than 2m from the house
Location, type and number of bracing elements to indicate compliance with NZS 3604:1999 (include calculations)
If the bracing was specifically designed by a structural engineer, provide calculations (required for specific design wind zones and lateral distribution of upper floor loads where lower storey bracing is provided in walls beyond the upper storey footprint)
- ☒ d **Sections and details (1:50/1:20/1:10) showing:**
- stairs, handrails, decks and decking
 - insulation systems and materials to floors, walls and roof
 - barriers providing safety from falling. Specific engineering design required where detail does not comply with NZBC B1/AS2
 - framing sizes, beams, lintels, trusses including fixing and other structural items. Lintels carrying point loads, such as from girder trusses, require specific engineering design
 - roof cladding, eaves, fascias, gutters, flashings to openings
 - fire rated systems on all walls - closer than 1 metre to boundary
 - stud heights of rooms and total height from lowest ground floor level to top of ridge
 - truss layout supported by design certificate and design of fixing details and load path to ground
 - retaining wall details e.g. type, height of retained ground, relationship to boundary, waterproof membrane and proposed drainage.
 - truss design details
- N/A ☐
- ☐ e **Fire report:**
For domestic dwellings of 4 storeys or more, or buildings providing more than one household unit.

5. STRUCTURAL

COMPLETE FOR ALL PROJECTS INCORPORATING SPECIFIC STRUCTURAL DESIGN

- ☒ a **Structural calculations**
If any design work required the services of a structural engineer, attach 2 copies of the calculations with this application along with structural drawings
The calculations must be prefaced with information explaining the design philosophy and justification of assumptions and methodologies used in analysis
- ☒ b **Producer statements:**
If this application for consent relies on any producer statements certifying compliance with the New Zealand Building Code, a copy must be attached with this application. (Note all structural producer statements are required to have accompanying calculations)

6. EXTERNAL

COMPLETE FOR NEW BUILDINGS OR EXISTING BUILDINGS WITH ALTERATIONS TO THE EXTERNAL SHELL

- ☒ a **Elevations (1:100/1:50) showing:**
Accurate lines from boundary to boundary on each elevation, relevant District Plan daylight control lines, the maximum height on each elevation, location of door and window openings, fixed and opening sashes, sill heights, floor levels in relation to ground levels, exterior cladding nominated to all elevations, down pipes and spouting, ventilators to sub-floor area (suspended floors only)
- ☒ b **Risk assessment**
(Risk matrix in E2/AS1 may be used)
Consider exposure, design and detailing to support appropriate selection of cladding
- ☒ c **Cladding details (1:50/1:20/1:10)**
Provide details around all penetrations, joinery and other junctions at a level appropriate to the level of risk e.g. roof/wall, balcony/ wall, junction of different types of cladding, backflashing details for cavity systems
- ☒ d **Product certification**
Supply copies of product certificates relied on as compliance documents
- ☒ e **Alternative solutions**
If the proposal uses products or systems that are not covered in the Acceptable Solutions of clause E2 of the building code provide supporting current information including independent test results (full signed reports), case studies, expert opinion (including evidence of experience/qualification, basis for forming opinion, and statement of independence) etc to demonstrate compliance

7. SERVICES

COMPLETE FOR ALL PROJECTS WITH NEW INSTALLATION OR ALTERATION OF PLUMBING OR DRAINAGE SERVICES

- ☒ a **Plumbing and Drainage plan (1:100) showing:**
Note: If you have supplied drainage details for surface water disposal on the site plan, no drainage plan is required
 - fixtures and fittings, hotwater system(s)
 - if the building is more than one storey with sanitary fittings on upper floors, provide an isometric layout showing wastes, pipes and falls
 - drainage layout with inspection bends and junctions indicated for both sewer and stormwater
 - any other drainage on site including council mains and retaining wall field drains
 - ventilation of sanitary rooms
 - calculations for sizing of downpipes

8. CHANGE OF USE

COMPLETE FOR ALL EXISTING BUILDINGS WHERE THE PROPOSAL INVOLVES FORMING A HOUSEHOLD UNIT WHERE ONE DID NOT EXIST BEFORE

Example: the conversion of a garage or shed into a residential unit

- ☒ a **Assessment of the building for compliance with the building code**
Section 115(a) of the Building Act 2004 requires that the work comply fully with all clauses of the building code.
- ☒ b **Reasonably practicable**
The above assessment must relate to all building code clauses. If the proposal is for the project to meet anything less than full compliance with any clauses, your application must clearly state your reasoning, with supporting documentation, and show how you will meet the highest level of compliance that can be considered reasonably practicable.

9. SPECIFICATIONS

COMPLETE FOR ALL APPLICATIONS

Note: The specification must be specific to the project and cover all aspects of the proposed work.



a **Specification: General**

- elements of structure (size, spacing, timber treatment)
- finish of fixings to meet durability requirements
- plumbing and drainage materials and design that installation is to comply with
- wet area surfaces
- ventilation systems
- flooring slip resistance for access routes
- glazing
- type of smoke detectors (including existing smoke detectors where they will remain)



b **External claddings**

For each of the following claddings provide details of the product name, manufacturer, maintenance requirements and warranties offered

- Building wraps
- Wall claddings
- Roof claddings
- Membranes (roofs and decks)
- Tanking
- Joinery



NOTES

The issue of a building consent does not relieve the owner of any duty or responsibility under any other act

Please check with your local territorial authority regarding the requirement for other approvals required and fees payable. These may include:

- Consents under the Resource Management Act
- Approvals under bylaws including earthworks, vehicle crossings and road openings

The following Councils developed this checksheet in partnership: Kapiti Coast District, Porirua City, Wellington City, Hutt City, Upper Hutt City.

Planning Processing Check Sheet

Building Consent Number: BC 100171P

New Dwelling
8 Ngarara Road
WAIKANAE

Property Information				
Property Address	8 Ngarara Road, Waikanae			
Legal Description	Lot 9 D.P. 13765			
Planning Zone	Residential. M1			
Building Project	New Dwelling			
	Yes	No	Action reqd	Actioned
Certificate of Title	✓			
Easements		✓		
Section 221		✓	Include copy	
District Plan Items to Check				
	Yes	No	Action Reqd	Actioned
Designations	✓		Waikanae Precinct - Garden	
Heritage Register		✓	Airport Conical Surface 1:20	
Flood Hazards		✓		
Min Floor Level		✓		
Other Hazards		✓		
EQ Faults		✓		
Services	✓			
Eco-site/Native Veg		✓		
	Complies?		Action Reqd	Actioned
Yards (+water bodies)	✓		Neighbours Approval??	
HIRB	✓			
Max Height	✓			
Site Coverage	✓			

BC Number: BC 100171

Permeable Surface	✓			
Earthworks	✓			
Fences/Retaining Wall	✓			
Parking	✓			
Water Tank / Siting	✓✓			
Airport Noise 45dbL	N/A			
Other Provisions				
	Yes	No	Action reqd	Actioned
Does the building straddle a Title/cross-lease boundary?		✓		
Existing Resource Consent?		✓		
Resource Consent Required?		✓	Apply Section 37 and advise Plan Vetting Team.	
DIF Required?	✓		Calculate Fees: \$15717.69	2nd dwelling - Waikanae Urban
Section 72 or 77 Required?		✓	Advise Plan Vetting Team and send letters out.	
Section 221 Consent Notice		✓	Advise Plan Vetting Team	

Additional Comments

* DIF Fees \$15717-69. *

Decision: (delete item that does not apply)

- Application complies with District Plan requirements
- Application does not comply with District Plan – BC to be issued subject to s37

Officer's Name & Signature: J. Burke

Date: 10.3.10



**COMPUTER FREEHOLD REGISTER
UNDER LAND TRANSFER ACT 1952**

Search Copy



R. W. Muir
Registrar-General
of Land

Identifier **WN529/191**
Land Registration District **Wellington**
Date Issued 26 September 1947

Prior References

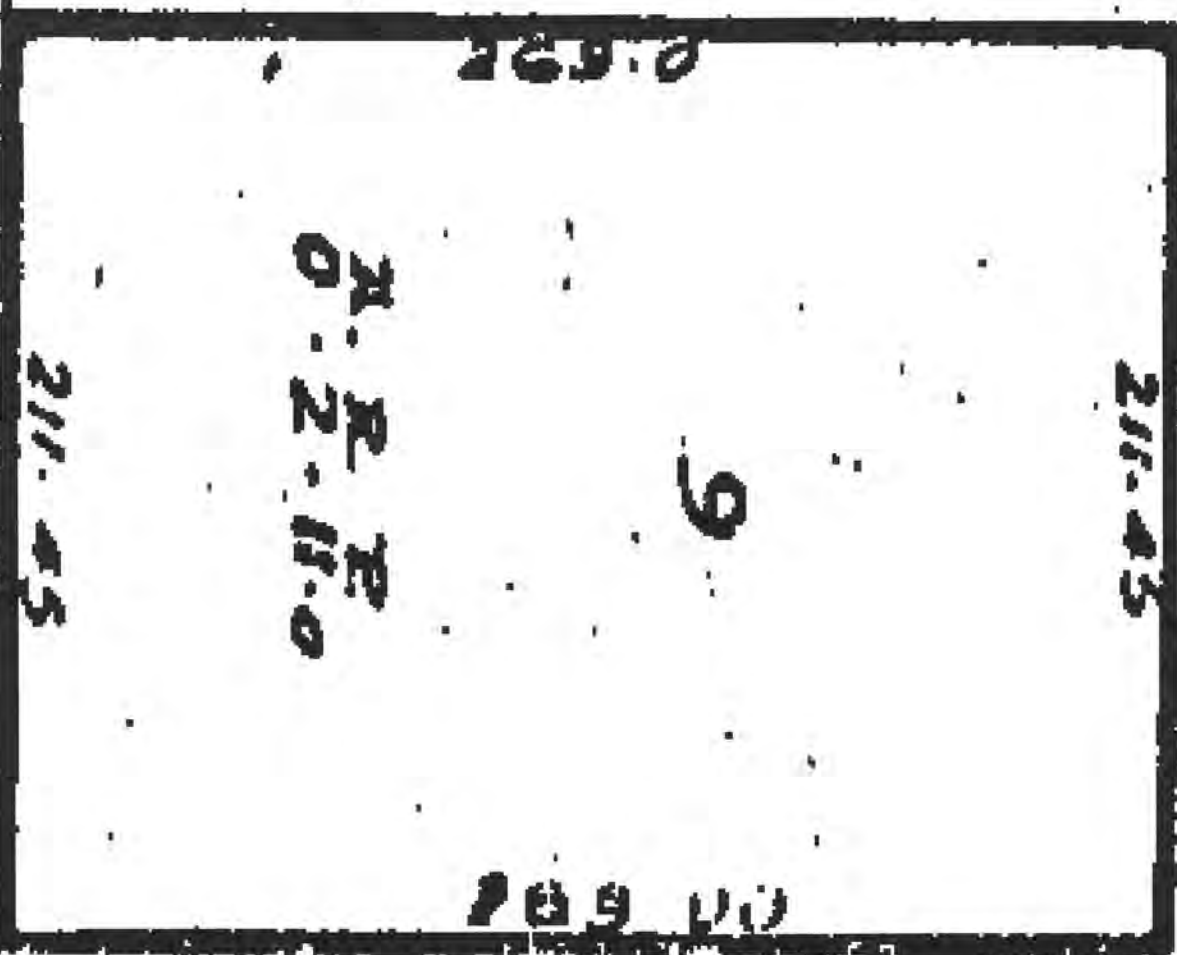
WN436/169

Estate	Fee Simple
Area	2302 square metres more or less
Legal Description	Lot 9 Deposited Plan 13765
Proprietors	
Christopher David Beggs and Leonie Frances Beggs	

Interests

7201402.2 Mortgage to ASB Bank Limited - 23.1.2007 at 9:00 am

10



To Ngara Road



Kapiti Coast District Council [KCDC] does not warrant the accuracy of information in this publication and any person using or relying upon such information does so on the basis that KCDC shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.

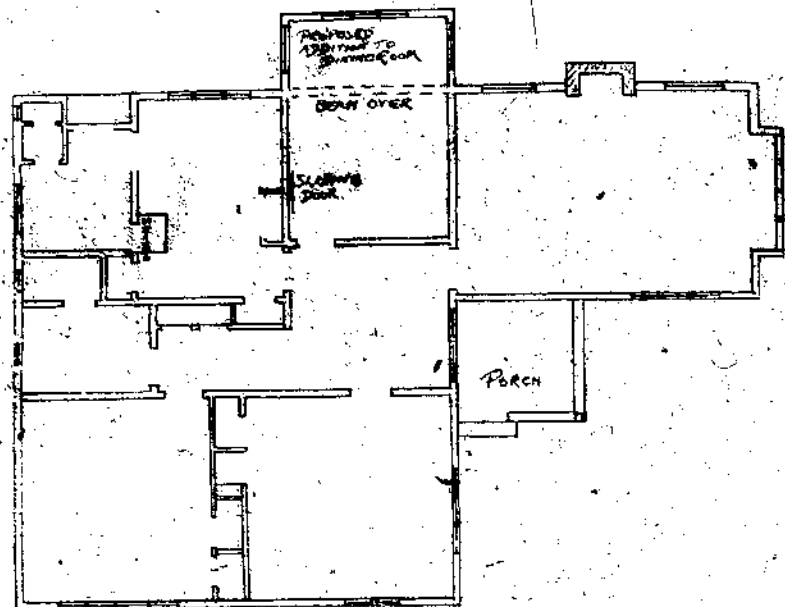
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Map Projection:
New Zealand Transverse Mercator
(NZGD2000)

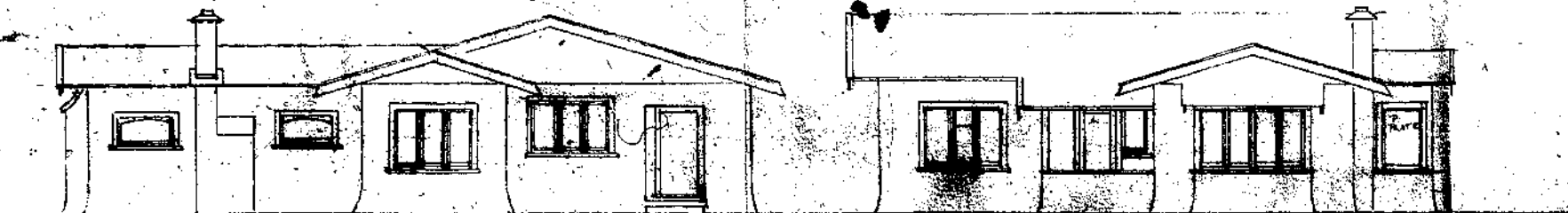


Scale A4 1:496

ENTER TITLE HERE



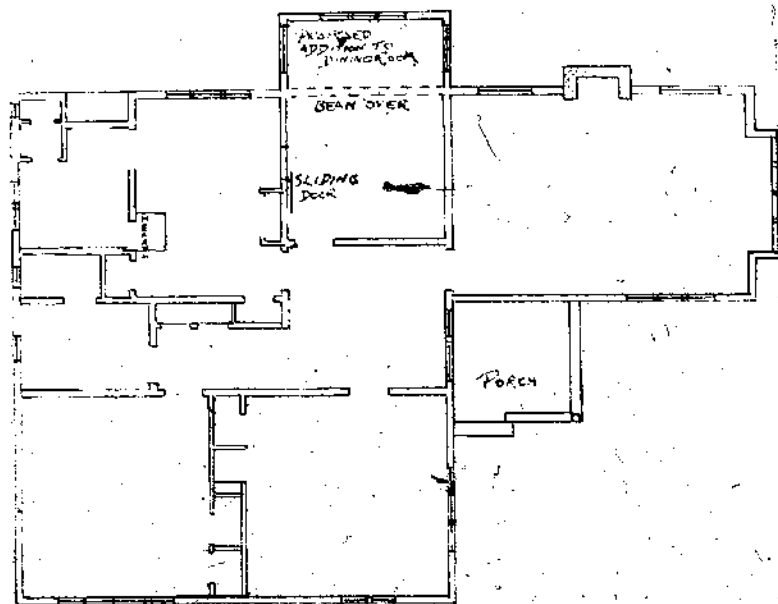
~ PLAN ~



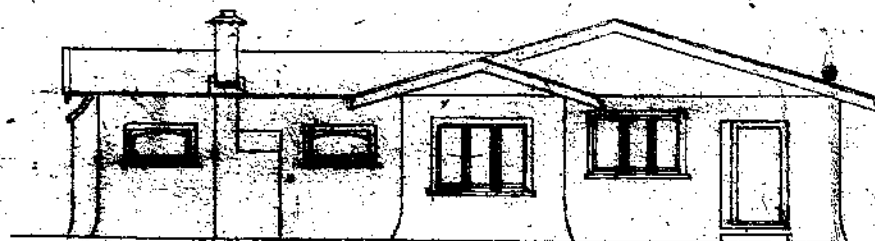
~ WEST ELEVATION ~

~ NORTH ELEVATION ~

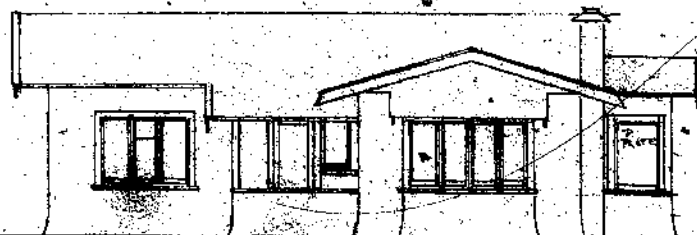
~ PROPOSED ADDITION FOR G. DAVIS ESQ ~
 ~ NIAGARA RD WAIKANA E ~



~ PLAN ~



~ WEST ELEVATION ~



~ NORTH ELEVATION ~

~ PROPOSED ADDITION FOR G. DAVIS ESQ ~

~ NGARARA RD WAIKANA E ~

Horowhenua County Council

PERMIT No. 1431

LOCALITY

Waihanu

DATE RECEIVED

29 : 1 : 60.

DATE ISSUED

4 : 2 : 60.

APPLICATION FOR BUILDING PERMIT

OWNER'S NAME

J. Davis

FOR OFFICE USE ONLY.

REMARKS:

APPROVED

J. H. Duckworth

COUNTY ENGINEER

DATE

1/2/60

NOTE—

1. Buildings must NOT be erected within FIVE feet of adjoining properties.
2. All Plans and Specifications must be in ink.

83-8

Application for Building Permit

TO THE BUILDING INSPECTOR,
Horowhenua County Council,
Bath Street,
Levin.

Postal Address: Horowhenua County Council,
P.O. Box 17,
Levin.

I, the undersigned, do hereby apply for a PERMIT to erect BUILDINGS in accordance with the undermentioned particulars in Waikanae Township RIDING.

1. Type of Building: Addition of Bathroom

Dwellings, etc.; additions or alterations.

Particulars of Building: Foundations: Piles Walls: Timber Roof: Iron

Total floor area: 500 sq. ft.

2. Allotment: Lot: 9 D.P.: 13765 Section: Part of Waikanae

Area: Block: 18 Kaitiaki S.D. Locality: Section No. 5

3. Owner's Full Name J. Davis

Address Ngamua Rd. Waikanae

4. Previous Owner If Section has been recently transferred

5. Frontage (Length) Name of Street or Road Ngamua

6. Estimated Value of Building, £ 150 :

Plumbing and Drainage £ : : Total £ 150 : 0 : 0.

7. Fees £ 1 : 0 : 0 No. of Receipt 6865

See Scales of Fees on Back Page.

All work will be carried out in accordance with Horowhenua County Council's By-laws.

NOTE:—The following MUST accompany this Application:—

Plans and Specifications in Duplicate, including—

- Ground Plans of Proposed Work showing position of all sanitary fittings and names of various rooms.
- Where the building is on a sloping site the correct height of foundations must be shown.
- Front, Rear and Side Elevations.
- Cross section showing framing with bracing.
- Where a building requires Plumbing and Drainage Work, a Separate Application Form must be filled in and Permit obtained before commencing any such work.

Signature of Applicant R.B. Smith as BUILDER or OWNER

Address Kanaka Grove Waikanae

Builder's Name and Address If not the applicant

Horowhenua County Council

PERMIT NO. *4461*LOCALITY *Teaharo*

DATE RECEIVED

DATE ISSUED

16: 9: 57

APPLICATION FOR BUILDING PERMIT

OWNER'S NAME

FOR OFFICE USE ONLY

REMARKS:

APPROVED

J W Duckworth

COUNTY ENGINEER

*Per 2*DATE *2. 9. 57***NOTE—**

1. Buildings must NOT be erected within Five feet of adjoining properties.
2. All Plans and Specifications must be in ink.

83-8

Application for Building Permit

TO THE BUILDING INSPECTOR,
Horowhenua County Council,
Bath Street,
Levin.

Postal Address: Horowhenua County Council,
P.O. Box 17,
Levin.

I, the undersigned, do hereby apply for a PERMIT to erect BUILDINGS in accordance with the undermentioned particulars in 11 Aukland RIDING.

1. Type of Building: Detached

Dwellings, etc.: additions or alterations.

Particulars of Building: Foundations: Pile Walls: Weatherboard Roof: Iron

Total floor area: 78 sq. ft.

2. Allotment: Lot: 9 D.P.: 2255 Section: 1

Area: 0 Block: 11 S.D.: 1 Locality: Levin

3. Owner's Full Name George Burns

Address 14 Aukland Rd, Auckland

4. Previous (If Section has been recently transferred.) Owner

5. Frontage (Length) 40 Name of Street or Road: Ngarewa Rd

6. Estimated Value of Building, £ 200 : 0 : 0

Plumbing and Drainage £ 0 : 0 : 0 Total £ 200 : 0 : 0

7. Fees £ 10 : 0 : 0 No. of Receipt 4625 G

See Scale of Fees on Back Page

All work will be carried out in accordance with Horowhenua County Council's By-laws.

NOTE—The following MUST accompany this Application:—

Plans and Specifications in Duplicate, including—

- Ground Plans of Proposed Work showing position of all sanitary fittings and names of various rooms.
- Where the building is on a sloping site the correct height of foundations must be shown.
- Front, Rear and Side Elevations.
- Cross section showing framing with bracing.
- Where a building requires Plumbing and Drainage Work, a Separate Application Form must be filled in and Permit obtained before commencing any such work.

Signature of Applicant [Signature] as BUILDER or

Address [Signature] ~~OWNER~~

Builders Name [Signature] If not the applicant, and Address [Signature]

Horowhenua County CouncilPERMIT No. W5552LOCALITY Warkanae SewerDATE RECEIVED 7-3-83DATE ISSUED 10-3-83APPLICATION
FOR PLUMBING AND DRAINAGE PERMITOWNER'S NAME L. B. WilkinsonFOR OFFICE USE ONLY

REMARKS:

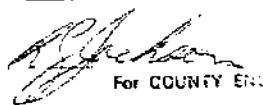
\$18

\$12

\$18

\$48

APPROVED


For COUNTY ENG.

DATE

7-3-83

83-8

NOTE.—In all cases where septic tanks are installed the site and position must be first approved by the County Health Inspector.

Application For Plumbing and Drainage Permit

TO THE COUNTY HEALTH INSPECTOR,
Horowhenua County Council,
Bath Street,
Levin.

Postal Address:
Horowhenua County Council,
P.O. Box 258,
Levin.

I, the undersigned, do hereby apply for a permit to carry out DRAINAGE and PLUMBING work in accordance with the undermentioned particulars

Description of Drainage and Plumbing Work

New Sewer Connection

Allotment. Lot:

9

D.P.

13765

Section:

Area:

Block:

S.D.:

Locality:

Previous Owner

If Section has been recently transferred

Frontage (Length)

(Name of Street or Road)

8. Ngawara Rd.

Water Supply (Description)

H.P.

Est. Material Value of Plumbing Work \$

Est. Labour Value of Plumbing Work \$

Est. Material Value of Drainage Work \$200.00

Est. Labour Value of Drainage Work \$200.00

200.00

200.00

Total Value \$400.00

All work will be carried out in accordance with Horowhenua County Council's By-laws and the Drainage and Plumbing Regulations 1978 and Amendments.

Permit Fee Based on Labour Value \$

18 ✓

Receipt No.:

2397

Water Connection Fee \$

Receipt No.:

Full Name and Address of Owner:

L. B. Watkins

8 Ngawara Rd.

NOTE.—The following MUST accompany this Application—

(a) Ground Plan of Building showing all drains, vents, sumps, septic tanks and sanitary fittings to be plotted on opposite page. For a sewer connection, complete enclosed carbonised form.

(b) Specifications of work materials to be used.

Plan showing "drain" should be drawn to scale of 1-100.

Stormwater drains should be shown (if any) in dotted lines.

Signature of Applicant:

G. O. McEneaney

Address

5 Patterson Grove Warkanae.

Craftsman.

Plumber's Signature,

Address, and

Registered No.

Registered Drainlayer's

Signature, Address, and

Registered No.

As Above

Reg No 2949

20 June 1988.

Mrs. L.B. Wilkinson,
8 Ngarara Road,
WAIKANAE.

Dear Mrs. Wilkinson,

I return herewith your recent application for a building permit for a proposed "Rayline" heater that it was proposed to install in an existing brick fireplace and chimney.

I must regrestfully advise that the installation cannot be approved nor a permit issued due to the chimney being of brickwork construction, unless it can be shown by physical inspection that there is a minimum of 50mm (2") clearance between all parts of that chimney and any adjacent timbers or combustible materials.

At this date the appliance has been approved by the manufacturer as being suitable for installation in a precast pumice concrete chimney only and subsequently your application is declined.

Yours faithfully,

B. Todd,
SENIOR BUILDING, PLUMBING
& DRAINAGE INSPECTOR.

83-8