

Approved Building Consent Documents

Please Note: A copy of the stamped approved documents must be available on site for all inspections.

Inspection booking timeframes

Call received	before 3pm inspection will be done	after 3pm inspection will be done
Monday	Wednesday	Thursday
Tuesday	Thursday	Friday
Wednesday	Friday	Monday
Thursday	Monday	Tuesday
Friday	Tuesday	Wednesday

Building inspections and enquiries phone: 03 347 2839

Please ensure all work for inspection is ready the day before. Incomplete work requiring re-inspection will incur an additional inspection fee.

PROJECT SPECIFICATION

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

Lamb and Alves Dwelling (project name)

Lot 12, 2 Branthwaite Drive
ROLLESTON
(project address)

JACK WILLIAM LAMB AND LARA MARTIN ALVES
(owners name)

Job Number
860839

DATE: December 2023

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1220 PROJECT

1 GENERAL

This general section describes the project including:

- A description of the work
- Design construction safety
- Principal's Health & Safety matters
- Site description, features and restrictions
- Design parameters for design by contractor
- Archaeological discovery

1.1 READ ALL SECTIONS TOGETHER

Read all general sections together with all other sections.

1.2 RESTRICTED BUILDING WORK

This project includes Restricted Building Work.

Site

1.3 LEGAL DESCRIPTION

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

Site environment - Wind

1.4 WIND DESIGN PARAMETERS - NON SPECIFIC DESIGN

The design wind pressures are to [NZS 3604](#), Table 5.4 Determination of wind zone, up to and including Extra High Wind Zone.

Building wind zone H (refer to [NZS 3604](#), table 5.4)

Site environment - Durability

1.5 EXPOSURE ZONE

The exposure zone is to [NZS 3604](#), Section 4 Durability, 4.2 Exposure zones and [NZBC E2/AS1](#).

The site zone is: C

Site environment - Seismic

1.6 EARTHQUAKE ZONE - NON SPECIFIC DESIGN

The zone is to [NZS 3604](#), Section 5 Bracing design, 5.3 Earthquake bracing demand.

The earthquake zone 2 is:

Archaeological discovery

1.7 REPORT FINDING ANY 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 [Heritage New Zealand Pouhere Taonga Act 2014](#). If such items or evidence is discovered work must stop immediately and the Contract Administrator must be notified immediately. The site may be classified as an Archaeological Site under the Act, and the Contract Administrator or Owner must contact the Heritage New Zealand 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 definitions and interpretation that are used in this specification.

1.1 DEFINITIONS

Hold point:	A stage of the construction where the contract administrator and any other nominated person requires notice to be given that particular work is to be carried out. Work may not proceed on that particular part until the contract administrator and any other nominated person has advised that work can continue. A notice period of 2 Working Days is required unless stated otherwise.
Notification point:	A stage of the construction where the contract administrator and any other nominated person requires notice to be given that particular work is to be carried out. Work may continue and the contract administrator and any other nominated person may choose whether or not they wish to witness the particular work being carried out. A notice period of 2 Working Days is required unless stated otherwise.
Product:	A thing or substance produced by natural process or manufacture.
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.
Required:	Required by the documents, the New Zealand Building Code or by a statutory authority.
Review:	Review by the contract administrator and other consultants is for general compliance only. Review does not remove the need for the contractor to comply with the stated requirements, details and specifications of the manufacturers and suppliers of individual components, materials and finishes. Neither can the review be construed as authorising departures from the contract documents.
Working day:	Working day means a calendar day other than any Saturday, Sunday, public holiday or any day falling within the period from 24 December to 5 January, both days inclusive, irrespective of the days on which work is actually carried out.
Workplace:	Workplace means the place where work is being carried out, or is customarily carried out, for a business or undertaking including any place where a worker goes, or is likely to be, while at work (under Health and Safety at Work Act 2015).

1.2 PERSONNEL

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. 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
COP	Code of practice
CSIRO	Commonwealth Scientific and Industrial Research Organisation

HERA	Heavy Engineering Research Association
LBP	Licensed Building Practitioner
MBIE	Ministry of Business, Innovation and Employment
MPNZA	Master Painters New Zealand Association Inc
NZBC	New Zealand Building Code
NZS	New Zealand Standard
NZS/AS	Joint New Zealand/Australian Standard
NZTA	New Zealand Transport Agency
NUO	Network Utility Operator
OSH	Occupational Safety and Health
PCBU	Person Conducting a Business or Undertaking (under Health and Safety at Work Act 2015)
RBW	Restricted Building Work
SARNZ	Scaffolding and Rigging New Zealand Inc
SED	Specific Engineering Design
TA	Territorial Authority
TNZ	Transit New Zealand (Transit New Zealand is now New Zealand Transport Agency NZTA - some specifications are still prefixed TNZ)

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.

WORDS IMPORTING PLURAL AND SINGULAR

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

1233 REFERENCED DOCUMENTS

1 GENERAL

1.1 REFERENCED DOCUMENTS

Throughout this specification, reference is made to various [New Zealand Building Code](#) Compliance Documents (NZBC ___), acceptable solutions (___ AS ___) and verification methods (___ VM ___) for criteria and/or methods used to establish compliance with the [New Zealand Building Code](#).

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

It is the responsibility of the contractor to be familiar with the materials and expert in the techniques quoted in these publications.

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

1.2 DOCUMENTS

Documents referred to in the GENERAL sections are:

NZBC F5/AS1	Construction and demolition hazards
AS/NZS 1170.2:2011	Structural design actions - Wind actions
NZS 1170.5	Structural design actions - Earthquake actions - New Zealand
AS/NZS 3012	Electrical installations - Construction and demolition sites
NZS 3109	Concrete construction
NZS 3114	Specification for concrete surface finishes
NZS 3602	Timber and wood-based products for use in building
NZS 3604	Timber-framed buildings
NZS 4210	Masonry construction: Materials and workmanship
NZS 4781	Code of Practice for Safety in Welding and Cutting
AS/NZS 5131	Structural steelwork - Fabrication and erection
NZS 6803	Acoustics - Construction Noise
Building Act 2004	
Building Regulations 1992	
Health and Safety at Work Act 2015	
Health and Safety at Work (General Risk and Workplace Management) Regulations 2016	
Health and Safety at Work (Hazardous Substances) Regulations 2017	
Health and Safety in Employment Regulations 1995	
New Zealand Building Code	
Heritage New Zealand Pouhere Taonga Act 2014	
Resource Management Act 1991	
Smoke-free Environments Act 1990	
WorkSafe	Guidelines for the provision of facilities and general safety in the construction industry
WorkSafe	Good Practice Guidelines - Excavation Safety
WorkSafe	Scaffolding in New Zealand - Good Practice Guidelines
WorkSafe	Managing Work Site Traffic - Good Practice Guidelines

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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 and hoardings
- Scaffolding
- General care and protection
- Rubbish removal

Temporary works

1.1 COSTS RELATING TO TEMPORARY WORKS

Pay all rates/fees in respect of temporary works.

1.2 MAINTENANCE OF TEMPORARY WORKS

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

1.3 SAFEGUARD THE SITE, THE WORKS AND MATERIALS

Take reasonable 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.

1.4 SITE FENCING

Provide and maintain a site fence, 2 metres high from ground level on the side accessible to the public. Construct to comply with [NZBC F5/AS1](#) Construction and demolition hazards. Construct as required for public areas and as shown on the drawings.

Construct the fence with:

- galvanized chain link netting with a 50mm x 50mm maximum grid size
- posts at 2.5 metre centres maximum
- gap at the bottom of the fence no greater than 100mm

1.5 SITE HOARDINGS

Provide and maintain hoardings, 2 metres high from ground level on the side accessible to the public. Construct to comply with [NZBC F5/AS1](#) Construction and demolition hazards. Construct as required for public areas and as shown on the drawings.

Construct hoardings with continuous cladding of:

- close butted timber at least 19mm thick; or
- 6mm exterior grade plywood on studs at 600mm centres maximum; or
- 9mm exterior grade plywood on studs at 1 metre centres maximum; or
- continuous metal cladding suitably supported to provide strength and rigidity

1.6 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

1.7 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.

1.8 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.

Large project and those without suitable ground area - prevent run off by:

- plan and implement washwater control measures based on the expected volumes, allow for the timely removal and safe disposal of liquids and solids.
- Limit the volume of water used for washing down to the extent required.
- Control the flow of washwater so that it is directed to proper catchments.
- providing watertight bunds, pits or tanks, filtered washwater is not to be discharged to drains.

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

1.9 WATER

Provide clean, fresh water for the works and make arrangements for distributing about the site.

1.10 ELECTRICITY

To AS/NZS 3012.

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 more than three monthly intervals.

Scaffolding

1.11 SCAFFOLDING

Provide scaffolding for the efficient execution of the works.

Comply with:

- [Health and Safety at Work Act 2015](#)
- [Health and Safety in Employment Regulations 1995](#)
- Health and Safety at Work (General Risk and Workplace Management) Regulations 2016
- [Worksafe - Scaffolding in New Zealand - Good Practice Guidelines](#)

Care and protection - existing buildings

1.12 MAKE GOOD - SITE

Make good all damage to existing roads, footpaths, grounds, services, landscape elements and site features caused in carrying out the contract works.

1.13 CONSTRUCTION KEYING AND SECURITY

Provide locksets with temporary keying, or install with the cylinders removed.

1.14 TEMPORARY STORAGE

Provide temporary storage areas and protective covers and screens to meet the requirements of the products to be stored.

1.15 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.

1270 CONSTRUCTION

1 GENERAL

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

- Quality control and assurance
- Noise and nuisance
- Set-out and tolerances
- Common execution requirements
- Qualifications
- Common product requirements
- Common requirements for samples and prototypes
- Common requirements for spare and maintenance products
- Cleaning during the works
- Removal of protection
- Completion requirements
- Commissioning
- Practical completion submission
- Defects period submissions
- Completion submissions

Quality control and assurance

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.

COMMENCEMENT OF WORK

Do not commence any part of the contract works, other than establishment, setting out and site preparation until the contract administrator has completed their final review of the quality plan.

Noise and nuisance

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 1995](#) clause 11.

ACCEPTABLE NOISE LEVELS

Refer to [NZS 6803](#) Tables 2 and 3 for the upper limits of construction work noise received in residential zones, dwellings in rural areas, industrial areas and commercial areas, note also the allowed adjustments. Do not exceed these limits or any limits imposed by regional councils or territorial authorities.

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 [NZS 6803](#), table 2 and table 3, cease the noise generating operation and remedy the problem.

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 precautions to prevent damage and nuisance from water, fire, smoke, dust, rubbish and all other causes resulting from the construction works.

1.8 SMOKE FREE REQUIREMENTS

In accordance with the Smoke Free Environments Act 1990 smoking is not allowed on site.

Set-out and tolerances

1.9 SURVEY INFORMATION

Locate and verify survey marks and datum points required to set out the works. Where these do not exist or cannot be located advise the contract administrator who will arrange for the required points to be established.

Record and maintain their position. Re-establish and replace disturbed or obliterated marks.

1.10 DATUM

Establish a permanent site datum to confirm the proposed levels and their relationship to all other existing and new levels.

1.11 SET-OUT

Set out the work to conform with the drawings.

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 To NZS 3114 Concrete surface finishes
Masonry construction:	To NZS 4210 Masonry construction: Materials and workmanship Clause 2.6.5 Tolerances Table 2.2 Maximum tolerances
Structural steelwork:	To NZS 3404.1 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 depends, to ensure it is of the required standard.

1.16 MINIMISE DELAYS DUE TO WEATHER

Use appropriate techniques and methods to prevent damage and minimise delays due to weather.

Qualifications

1.17 QUALIFICATIONS GENERALLY

The work is to be carried out by workers and / or supervisors who are experienced, competent and familiar with the materials and the techniques specified. Workers must also be familiar with the manufacturers' and suppliers' installation and application instructions and standard details provided by them in relation to the use of the products for this project. If requested provide evidence of qualification / experience.

1.18 QUALIFICATIONS WORKERS – RESTRICTED BUILDING WORK

Where restricted building work (RBW) forms part of the contract works, workers, or supervisors of that work must be licensed building practitioners (LBP) holding current licenses for the particular restricted building work.
For rare instances where non-RBW also requires an LBP refer to individual work sections for details.

1.19 QUALIFICATIONS WORKERS – MANUFACTURER / SUPPLIER REQUIREMENTS

Where required by a manufacturer or supplier, workers must be specifically trained /approved / accredited / registered / licensed / certified by them. Refer to individual work sections for details.

1.20 NEW PRODUCTS

Products to be new unless stated otherwise, of the specified standard, and complying with all cited documents.

1.21 COMPATIBILITY OF PRODUCTS

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.

1.22 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

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 PRODUCTS

To be in perfect condition when incorporated into the work.

1.26 INCOMPATIBLE PRODUCTS

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

Spares & maintenance products

1.27 SPARES & MAINTENANCE PRODUCTS

Collect, protect, package, label and store safely all spares and maintenance products specified in the work sections. Give the contract administrator an inventory of all spares and maintenance products.

If no instruction is given within a work section for the location of spares and maintenance products, then deliver to the owner ~.

If no instruction is given within a work section for timing in relation to the provision of spares and maintenance products, then provide at practical completion.

Refer to SPARES & MAINTENANCE PRODUCTS clauses in work sections for further detail.

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. Do not use metal scrappers that may 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.

Commissioning

MOVING PARTS

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

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 & 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

Documents

1.1 DOCUMENTS

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

- | | |
|--------------------------|--|
| NZS 3604 | Timber-framed buildings |
| WorkSafe | Good Practice Guidelines - Excavation Safety |

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 1220 PROJECT 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 VOLCANIC TUFF FILL

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

2.3 ROCK FILL

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

2.4 SAND FILL

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

2.5 HARD FILL

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

2.6 GRANULAR FILL

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

2.7 DRESSING COURSE

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

2.8 FREE-DRAINING AGGREGATE

Scoria or crushed gravel graded 50 to 14 clean.

3 EXECUTION

3.1 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 [WorkSafe, Good Practice Guidelines - Excavation Safety](#).

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 EXISTING TREES, PLANTING, OR LANDSCAPE FEATURES

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 ROCK EXCAVATION

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

3.13 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.

3.14 INADEQUATE BEARING

If localised bearing is not to [NZS 3604](#), 3.1.2 **Foundations** and 3.1.3 **Determination of good ground**, then excavate further and backfill with material as follows:

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

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

Confirm any changes with the territorial authority.

For inadequate bearing or over excavation of service trenches, use hardfill compacted in 150mm layers.

3.15 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.

3.16 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.

3.17 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.

3.18 RETAINING WALLS

Backfill behind retaining walls with free draining granular material and compact in 200mm layers. Ensure any tanking membranes, protection sheets, drain coil and damp-proofing are not damaged.

3.19 SURPLUS MATERIAL

Remove surplus and excavated material from the site.

3820 CARPENTRY

1 GENERAL

This section relates to the supply and erection of timber framing, as a framed structure, or as partitioning. It includes prefabricated timber and engineered wood.

1.1 DOCUMENTS

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

NZBC B2/AS1	Durability
AS/NZS 1328.1	Glued laminated structural timber - Performance requirements and minimum production requirements
AS/NZS 1604.1	Preservative-treated wood-based products - Part 1: Products and treatment
NZS 3602	Timber and wood-based products for use in building
NZS 3603	Timber structures standard
NZS 3604	Timber-framed buildings
NZS 3622	Verification of timber properties
NZS 3640	Chemical preservation of round and sawn timber
AS/NZS 4357.0	Structural laminated veneer lumber - Specification
FTMA CoP	Frame and Truss Manufacturers Association Code of Practice
*A copy of NZS 3604 Timber-framed buildings, must be held on site.	

1.2 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](#), [NZBC B2/AS1](#) and treatment to [NZS 3640](#), [NZBC B2/AS1](#). Structural grade (SG) to [NZS 3604](#), [NZS 3622](#) with properties to [NZS 3603](#).

2.2 TIMBER FRAMING, CHEMICAL FREE

Species, grade and moisture content in service as set out in [NZS 3602](#), [NZBC B2/AS1](#).

2.3 LAMINATED TIMBER

Radiata pine laminations to [AS/NZS 1328.1](#); treated as required by [NZS 3602](#), [NZBC B2/AS1](#), to the requirements of [NZBC B2/AS1](#), [AS/NZS 1604.1](#), [NZS 3640](#), with special attention to Appendix B "Specification advisory notes". Supply weather resistant sealed.

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 COACH SCREWS

Bolts and coach screws complete with washers, to the requirements of [NZS 3604](#), clause 2.4.5 Bolts and Coach Screws, and section 4, **Durability**, and of the type, 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

For interior timber, treated with copper-based timber preservatives (H3.2 or higher), use a minimum of hot-dipped galvanized steel fixings and fasteners.

For exterior timber, timber in damp areas and timber subject to occasional wetting, use only stainless steel (or equivalent) fixings and connectors, when the timber is treated with; Copper Azole (CuAz, Preservative code 58), Alkaline Copper Quaternary (ACQ, Preservative code 90), Micronise Copper Azole (code 88) or Micronised Copper Quaternary (code 89).

2.9 DPC

Refer to 4161 UNDERLAYS, FOIL AND DPC section

EXECUTION

EXECUTION GENERALLY

To [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).

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

ATTENDANCE

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

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

SET-OUT

Set out framing in accordance with the requirements of [NZS 3604](#) and as required to support sheet linings and claddings. When necessary provide framing to suit any required cladding/lining control joints and sheet joints.

FRAMING WALLS

Frame to required loading and bracing complete with lintels, sills and nogs, all fabricated and fastened to [NZS 3604](#), section 8, **Walls**.

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**.

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**.

INSTALLING WALL UNDERLAYS

Refer to 4161 UNDERLAYS, FOIL AND DPC section

FIT CAVITY BATTENS

Fit and fix 20mm cavity battens over wall underlay or rigid air barrier, fully nail to timber studs to the requirements of the manufacturer or to [NZS 3604](#). Fit and fix related flashings. Make allowance for cladding control joints where required. Fit and fix cavity closers to base of walls, open horizontal (or raking) junctions and over openings (windows, meters etc.).

3.11 DPC TO LOSP TREATED TIMBER

Refer to 4161 UNDERLAYS, FOIL AND DPC section.

3.12 DPC TO TIMBER

Refer to 4161 UNDERLAYS, FOIL AND DPC section.

4 SELECTIONS

4.1 EXTERIOR WALL FRAMING - RADIATA PINE

Member	Species	Grade	Treatment
Exterior walls:	Radiata pine	SG8	H1.2
Parapets:	Radiata pine	SG8	H1.2
Enclosed decks and balconies:	Radiata pine	SG8	H1.2
Cantilevered joists enclosed decks and balconies:	Radiata pine	SG8	H3.2
Nogs	Radiata pine	SG8	H1.2
Wall battens (not cavity):	Radiata pine	Merch	H1.2
Jamb battens:	Radiata Pine	Merch	H3.1

4.2 CAVITY BATTENS

Cavity battens	Species	Grade	Treatment
Timber - Non Structural:	Radiata pine	Merchantable	H3.1

4.3 ROOF FRAMING - RADIATA PINE

Member	Species	Grade	Treatment
Rafters:	Radiata pine	SG8	H1.2
Trusses:	Radiata pine	SG8	H1.2
Purlins:	Radiata pine	SG8	H1.2
Ceiling joists and battens:	Radiata pine	SG8	H1.2
Valley boards:	Radiata pine	Merchantable	H1.2
Sarking:	Radiata pine	Merchantable	H1.2
Skillion roof framing:	Radiata pine	SG8	H1.2
Enclosed flat roof framing:	Radiata pine	SG8	H1.2

4.4 EXTERIOR EXPOSED TIMBERS

Member	Species	Grade	Treatment
Posts:	Radiata pine	SG8	H3.2 CCA
Joists:	Radiata pine	SG8	H3.2 CCA
Exterior stairs and steps:	Radiata pine	SG8	H3.2 CCA
Pergola:	Radiata pine	SG8	H3.2 CCA
Ground contact members	Radiata pine	SG8	H5 CCA

Note all CCA to be preservative code 01 or 02

4.5 INTERIOR FRAMING - RADIATA PINE

Member	Species	Grade	Treatment
Non structural walls:	Radiata pine	SG8	H1.2
Structural and braced walls:	Radiata pine	SG8	H1.2

3827E ECOPLY® PLYWOOD BRACING SYSTEM

1 GENERAL

This section relates to the use of **Ecoply®** sheets for structural wall bracing:

Documents

1 DOCUMENTS

Documents referred to in this section are:

NZBC B1/AS1	Structure
NZBC E2/AS1	External moisture
AS/NZS 1170.2:2011	Structural design actions - Wind actions
NZS 1170.5	Structural design actions - Earthquake actions - New Zealand
AS/NZS 1604.1	Preservative-treated wood-based products - Part 1: Products and treatment
AS/NZS 2269.0	Plywood - structural - specifications
NZS 3602	Timber and wood-based products for use in building
NZS 3603	Timber Structures Standard
NZS 3604	Timber-framed buildings
BRANZ Technical Paper P21	BRANZ Technical Paper P21: A wall bracing test and evaluation procedure (2010)

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 MANUFACTURER DOCUMENTS

CHH Woodproducts documents relating to work in this section are:

Ecoply® Specifications and Installation Guide
Ecoply® Technical Notes.
FSC Certificates on request for W8.1 Plywood FSC Mix
Carter Holt Harvey Tokoroa FSC-C012019 SCS-COC-001316 Controlled Wood SCS-CW-001316 (expires 5 Jun 2023)

Copies of the current product literature are available from Carter Holt Harvey Woodproducts Ltd
Web: www.chhwoodproducts.co.nz
Telephone: 0800 326 759

3 NO SUBSTITUTIONS

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

Performance

4 STRUCTURAL 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.

5 STRUCTURAL FIXINGS, EARTHQUAKE

Use fixings and methods capable of sustaining the loads appropriate to the area as set out in NZS 3604 and as required by NZS 1170.5.

6 BRACING SYSTEM

The Ecoply® bracing system provides bracing resistance for walls and subfloor foundations for light timber framed buildings under wind and earthquake loading to NZBC B1 Structure, and to NZS 3603 Timber Structures Standard. Refer to table for summary of P21 Ratings for 2.4m high **Ecoply®** wall element:
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.

Brace No.	Lining Requirements	Bus/m Wind	Bus/m Earthquake

	Minimum wall length			
EP1	0.4m	7-12mm Ecoply® one side	80	95
EP1	0.6m	7-12mm Ecoply® one side	95	105
EP1	1.2m	7-12mm Ecoply® one side	120	135
EPG	0.4m	7-12mm Ecoply® one side and 10mm Gib® Standard plasterboard other side	100	115
EPG	1.2m	7-12mm Ecoply® one side and 10mm Gib® Standard plasterboard other side	150	150

Note:

- Plywood must be at least taken up to within 300mm of top plate.
- Hold down connections required each end of bracing element.
- Maximum 120 Bus/m for any bracing element on timber framed floor ([NZS 3604](#))

PRODUCTS

Materials

FSC CERTIFIED TIMBER

Refer to SELECTIONS for details of amount, type, suppliers.
Certified responsibly sourced [FSC-COC](#) Certified timber from forest to installation. Contractor to obtain timber supplier's [FSC-COC](#) certificate, delivery notes and/or invoices showing [FSC-COC](#) code and [FSC](#) Claim identified against product item(s). Also include signed [FSC](#) outsourcing agreements between parties (eg [FSC](#) timber broker and non-[FSC](#) door joiner) if applicable.

ECOPLY® STRUCTURAL PLYWOOD

Radiata pine veneer ply to [AS/NZS 2269.0](#), DD face grade or better, 7mm minimum thick, H3.2 CCA treated to AS/NZS 1604.1.

Components

NAILS

Nail fixing for **Ecoply®** used as a structural bracing

Fixing type	Minimum nail length
Direct Fixed	50 x 2.8mm flat head hot dipped galvanized or stainless steel annular grooved nails
Cavity Fixed	60 x 2.8mm flat head hot dipped galvanized or stainless steel annular grooved nails

EXECUTION

Conditions

HANDLE

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

STORE

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

WALL FRAMING

Kiln dried timber framing sizes and set outs to [NZS 3604](#) with stud and nog centres and timber widths to **Ecoply®** Specification and Installation Guide. Treatment to [NZS 3602](#).

Application

BOTTOM PLATE FIXING

Use Gib HandiBrac® hold-down connections at each end of bracing element. Refer to the installation instructions supplied with connectors for correct bolt types to be used for either concrete or timber floors. Within the length the bracing element, bottom plates are fixed to the requirements of [NZS 3604](#).

3.5 CAVITY BATTENS

The bracing element may be fixed over cavity battens.

Fix 40 x 20mm minimum cavity battens, staggered nailed at 150mm centres to studs around the perimeter of the bracing element and nailed to the intermediate studs within the bracing element at 300mm centres with 50mm x 2.8mm flat head galvanized or stainless steel annular grooved nails.

3.6 SUPPORT EDGES AND JOINTS

Fully support edges and joints. Studs maximum 600mm centres and nogs maximum 800mm centres with the framing width of 45mm at each **Ecoply®** sheet joint.

3.7 NAIL FASTENERS TO BRACING ELEMENT

Place nail fasteners at 150mm centres around perimeter, 7mm from edge of the **Ecoply®** sheet and 300mm centres on intermediate supports of each **Ecoply®** sheet.

3.8 FIXING ECOPLY® STRUCTURAL PLYWOOD SHEETS

Fit and fix to [NZS 3604](#), [NZBC E2/AS1](#), 9.8 **Plywood sheet** and the manufacturer's bracing requirement with sheets and trim all in plumb, true alignment and face.

Fix **Ecoply®** sheets vertically. Allow 2-3mm expansion gap between sheets. Cut edges of sheet to be placed to the top. For EPGs bracing system the **Ecoply®** may terminate within a maximum of 300mm below the top plate, e.g. at soffit line, where solid nogging must be provided for the full length of the bracing element to provide fixing of the **Ecoply®**.

3.9 FIXING GIB® PLASTERBOARD SHEETS

Fix Gib® plasterboard sheets to Gib® Ezybrace system. Refer to the appropriate Gib® Plasterboard section.

Completion

3.10 PROTECTION

Protect work from the weather until it is covered, coated or sealed.

3.11 REPLACE

Replace damaged or marked elements.

3.12 LEAVE

Leave work to the standard required by following procedures.

3.13 REMOVE

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

SELECTIONS

4.1 ECOPLY® STRUCTURAL PLYWOOD

Location:	Refer to drawings and bracing calculations
Manufacturer:	CHH Woodproducts
Brand/grade:	Ecoply® DD or better A BOND
Stress grade:	F8
Thickness:	7mm
Treatment:	H3.2 CCA

4.2 BRACING SYSTEMS

Refer to Ecoply® Specification and Installation Guide for specific bracing details, and to Gib® Ezybrace system for bracing element fixing details. For location refer to drawn documentation and bracing calculations.

4161 UNDERLAYS, FOIL AND DPC

1 GENERAL

This section relates to the application of:

- DPC/DPM
- wall underlays includes Kraft based and synthetic wall underlays
- roofing underlays includes kraft based and synthetic roof underlays
- foils
- vapour barriers
- accessories

1.1 ABBREVIATIONS AND DEFINITIONS

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

The following abbreviations apply specifically to this section:

NZMRM	New Zealand Metal Roofing Manufacturers Inc.
W2	Wall underlay Kraft/bituminous based Heavy grade
W3	Wall underlay Synthetic based non-absorbent
W4	Wall underlay Synthetic based absorbent
R1	Roof underlay Kraft/bituminous based Heavy grade
R2	Roof underlay Kraft/bituminous based Self-supporting
R3	Roof underlay Synthetic based Heavy grade
R4	Roof underlay Synthetic based Self-supporting

The following definitions apply specifically to this section:

Wall underlay the same meaning as defined in [NZBC E2/AS1](#), covering kraft based and synthetic wall underlays, sometimes called, wall wraps, building wraps or building papers.

Documents

1.2 DOCUMENTS

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

NZBC E2/AS1	External moisture
NZS/AS 1530.2	Methods for fire tests on building materials, components and structures - Test for flammability of materials
NZS 2295	Pliable, permeable building underlays
AS/NZS 2904	Damp-proof courses and flashings
NZS 3604	Timber-framed buildings
AS/NZS 4200.1	Pliable building membranes and underlays
AS/NZS 4347.0	Damp-proof courses and flashings - Methods of test - General introduction, list of methods and test specimen requirements
AS/NZS 4389	Roof safety mesh
AS/NZS 4534	Zinc and zinc/aluminium-alloy coatings on steel wire
NZMRM CoP	NZ Metal Roof and Wall Cladding Code of Practice

Requirements

1.3 INSTALLATION SKILL LEVELS

Installers to be familiar with the manufacturer's technical literature and the [NZMRM CoP](#) NZ Metal Roof and Wall Cladding Code of Practice.

2 PRODUCTS

Materials

DPC

2.1 POLYETHYLENE DPC

Polyethylene film to [AS/NZS 2904](#) and to the appropriate test methods set out in [AS/NZS 4347.0](#). Thickness 500 microns minimum, manufactured for use as a damp-proof course and concealed flashings to doors and windows.

2.2 BITUMINOUS IMPREGNATED DPC

Heavy Kraft impregnated with high grade bitumen and coated with higher heat resistant bitumen to [AS/NZS 2904](#) and to the appropriate test methods set out in [AS/NZS 4347.0](#).

DPM

2.3 DAMP PROOF MEMBRANE - CONCRETE FLOOR

Polyethylene sheet with minimum thickness of 0.25mm to [NZS 3604](#), 7.5.6, **Polyethelene (polythene) sheet damp-proof membranes.**

Wall Underlays

2.4 ABSORBENT SYNTHETIC WALL UNDERLAY - POLYPROPYLENE - FIRE (W4)

Absorbent, breathable, fire retardant, non-woven, white soft spun-bonded polypropylene membrane. Designed for use as fire retardant membrane, with Flammability Index of 1, when tested to [NZS/AS 1530.2](#).

2.5 ABSORBENT SYNTHETIC WALL UNDERLAY - POLYOLEFIN - FIRE (W4)

Absorbent, breathable, fire retardant polyolefin (polyethylene) woven into sheet form with micro sized pores that allow the membrane to breathe with a fire retardant flammability index of 1, tested to [NZS/AS 1530.2](#).

2.6 ABSORBENT SYNTHETIC WALL UNDERLAY - POLYPROPYLENE (W4)

Absorbent, breathable spun bonded polypropylene type building membrane, coated with a breathable water resistant film.

Rigid Wall Underlays

2.7 BITUMINOUS HEAVY WEIGHT ROOFING UNDERLAY (R1)

Roofing underlay tested to [NZS 2295](#).

2.8 BITUMINOUS SELF-SUPPORTING ROOFING UNDERLAY (R2)

Self supporting roofing underlay tested to [NZS 2295](#).

2.9 BITUMINOUS FIRE RETARDANT SELF-SUPPORTING TWO WAY REINFORCED (R2)

Self supporting roofing underlay consisting of two layers of heavy weight Kraft underlay, surfaced coated with water repellence formula which is solvent free, two-way reinforced, and then laminated using a fire retardant adhesive tested to [NZS/AS 1530.2](#).

Accessories

2.10 WINDOW DOOR SEALING SYSTEM

Proprietary window and door flashing tape and accessories to E2/AS1, paragraph 4.3.11, **Flexible flashing tape**, paragraph 9.1.5, **Wall underlays to wall openings.**

2.11 STUD STRAPS

19mm wide polyethylene straps, for cavity construction with framing centres greater than 450mm.

2.12 GUTTER AND UNDER FLASHINGS

Bituminous breather type underlay cut to width by manufacturer for use under valley, apron flashing and internal gutters. Soffit liner cut to width from bituminous breather type underlay.

2.13 ADHESIVE TAPE

Adhesive tapes to compliment the underlay. Pressure sensitive tapes for joining foil insulation and vapour barriers.

3 EXECUTION

Conditions

3.1 GENERAL REQUIREMENTS

To [NZBC E2/AS1 Table 23 Properties of Roof Underlays and Wall Underlays](#); and manufacturers technical literature.

Note: Care should be taken not to expose the underlay to continuous wet and windy conditions.

3.2 STORAGE

Store wall and roofing 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 framing will allow work of the required standard. Carry out remedial work identified before laying underlay.

Application - DPC

3.4 POLYETHYLENE DPC TO TIMBER

Lay polyethylene DPC under treated and untreated timber, including LOSP treated timber, of all timber framed walls on concrete and concrete masonry, in a single layer with 50mm overlaps at joints to provide a waterproof barrier.

3.5 BITUMINOUS DPC TO TIMBER

Lay bituminous DPC under timber of all timber framed walls on concrete, in a single layer with 50mm overlaps at joints to provide a waterproof barrier.

NOTE: Do not use bituminous DPC under LOSP treated timber.

3.6 DPC TO MASONRY AND BRICK VENEER

Lay DPC along base of cavity and fix top edge to studs with galvanized clouts. Turn DPC out over concrete rebate under bottom course of veneer.

3.7 DPC BETWEEN DISSIMILAR MATERIALS

Lay DPC between dissimilar materials where required.

Application - DPM

3.8 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.

Application - Wall Underlay

3.9 WALL UNDERLAY

Fix horizontally to outside face of substrate in true alignment, with succeeding sheets overlapping 150mm to [NZBC E2/AS1, clause 9.1.7, Wall underlay](#) and refer to manufacturer for requirement for fastenings. Fix to manufacturers requirements. Scribe neatly around penetrations and openings to leave no gaps. Tape all penetrations. Keep clean, undamaged and without visible weather deterioration until closed in.

3.10 INSTALL STUD STRAPS

Over underlay, install 19mm wide polyethylene straps horizontally at 300mm centres, draw taut and fix to studs with stainless steel staples.

Application - Roofing Underlay

3.11 ROOF UNDERLAY

Lay vertically over purlins on wire netting with a 150mm side lap. Fix securely to purlins with galvanized fixing clips. Lay underlay to avoid excessive dishing between purlins. When used vertically limit individual runs to 10 metres for bituminous based roofing underlays, 7 metres for fire retardant underlays and 20 metres for synthetic roofing underlays. Do not lay vertically on roof pitches under 10°.

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. UV exposure to manufacturers requirements, maximum 7 days.

3.12 GUTTER AND UNDER FLASHINGS

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

Completion

3.13 CLEAN UP

Clean up as the work proceeds.

3.14 LEAVE

Leave work to the standard required by following procedures.

3.15 REMOVE

Remove debris, unused materials and elements from the site.

SELECTIONS

4.1 WALL UNDERLAY

Location: Throughout
Brand / type: Masons UNI flexible air barrier / Fire retardant absorbent breathable composite non woven wall underlay
Jointing tape: MASONS 40 Below Flex

4.2 ROOFING UNDERLAYS

Location: Throughout
Brand / type: Thermakraft 215 / Thermakraft 407 / Bitumenous Heavy Weight Wall and Roof Underlay

Accessories

4.3 WINDOW/DOOR SEALING SYSTEM

Brand / type: Thermakraft Aluband / flashing tape

4.4 STUD STRAPS

Location: Throughout (where studs > 450mm centers)
Brand / type: Themastrap 201 / 19mm wide polyethylene strap

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4231HL JAMES HARDIE® LINEA™ CLADDING

1 GENERAL

This section relates to the supply and fixing of Linea™ Weatherboard cladding

Documents

1.1 DOCUMENTS

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

NZBC E2/AS1	External moisture
NZBC E2/VM1	External moisture
AS/NZS 1170.2:2011	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
CodeMark™GM-CM30018	James Hardie® Linea™ Weatherboard Direct fixed and Cavity Cladding

1.2 MANUFACTURER/SUPPLIER DOCUMENTS

James Hardie® documents relating to this part of the work:

Linea™ Weatherboard Technical Specification
 James Hardie® Technical Supplement - James Hardie® Claddings Installation to Steel Framing
 Fire and Acoustic Design Manual by James Hardie®
 Bracing Design Manual by James Hardie®
 James Hardie® Installation Checklist
[BRANZ Appraisal 446](#) - Linea™ Weatherboard Direct Fixed Cladding
[BRANZ Appraisal 447](#) - Linea™ Weatherboard Cavity Cladding

Manufacturer/supplier contact details

Company: James Hardie New Zealand Limited
 Web: www.jameshardie.co.nz
 Email: info@jameshardie.co.nz
 Telephone: Ask James Hardie™ on 0800 808 868

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 1237 WARRANTIES for additional requirements.

Requirements

1.4 NO SUBSTITUTIONS

Substitutions are not permitted to any of the specified systems, components and associated products listed in this section.

1.5 SAFE WORKING

To James Hardie® requirements for safe working practices with James Hardie® products, particularly with regards to cutting and drilling.

1.6 INFORMATION FOR OPERATION AND MAINTENANCE

Refer to the general section 1239 OPERATION & MAINTENANCE for provision of the following general operation and maintenance information as electronic PDF format documents:

Linea™ Weatherboard Care and Maintenance guide

Provide this information prior to practical completion.

2 PRODUCTS**Materials****2.1 GALVANIZED STEEL FACE NAILING - SED PROJECTS**

Hot-dipped galvanized, 90 x 3.55mm jolt head nails for Linea™ Weatherboard face nailing (with pre-drilling) over cavity battens over rigid air barrier into timber stud.

Accessories**2.2 SEALANT**

Silaflex AT-Facade sealant.

EXECUTION**Conditions****3.1 DELIVERY, STORAGE & HANDLING OF PRODUCTS**

Refer to 1270 CONSTRUCTION for requirements relating to delivery, storage and handling of products.

3.2 ROUTINE MATTERS

Refer to 1250 TEMPORARY WORKS & SERVICES for protection requirements.
Refer to 1270 CONSTRUCTION for requirements relating to defective or damaged work, removal of protection and cleaning.

Application - generally**3.3 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:

- Wall underlay appropriately incorporated with penetration and junction flashings.
- Materials lapped in a way that water tracks down to the exterior face of the wall underlay.
- Wall underlay to openings finished and dressed off ready for the installation of window and door frames and other penetrations.
- Required holes in cladding accurately formed and cut to James Hardie® requirements, ensure (if required) services penetration grommets/sleeves/seals/tapes are in place prior to cladding installation.
- Claddings neatly finished off to all sides of openings
- Installation of flashings (those required to be installed prior to installation of penetrating elements).

Completion & Commissioning**3.4 COMPLETION MATTERS**

Refer to 1270 CONSTRUCTION for completion requirements and if required commissioning requirements.

SELECTIONS

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

Finishing**4.1 PAINTING**

Refer to painting section(s) for details.

4261 BRICK VENEER CLADDING

1 GENERAL

This section relates to clay brickwork as a veneer cladding.
It includes:

- Standard brick veneer cladding
- Proprietary two storey brick veneer system
- Proprietary stack bonded brick veneer system

ABBREVIATIONS AND DEFINITIONS

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

The following abbreviations apply specifically to this section:

CB&PMA	New Zealand Clay Brick & Paver Manufacturer's Association
NZMTA	New Zealand Masonry Trades Association
BBFNZ	Brick and Blocklayers Federation of New Zealand

The following definitions apply specifically to this section:

Proprietary Two Storey Brick Veneer System	Proprietary system for two storey clay brick veneer construction as contained in BRANZ Appraisal 690 - Two Storey Brick Veneer System.
Proprietary Stack Bonded Brick Veneer System	Proprietary system for stack bonded clay brick veneer construction as contained in BRANZ Appraisal 1045 - Stack Bonded Brick Veneer System.

Documents

DOCUMENTS

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

NZBC E2/AS1	External moisture
NZBC B1/AS3	Structure
NZS 1170.5	Structural design actions - Earthquake actions - New Zealand
AS/NZS 2699.1	Built-in components for masonry construction - Wall ties
AS/NZS 2699.3	Built-in components for masonry construction - Lintels and shelf angles (durability requirements)
AS/NZS 2918:2001	Domestic solid fuel burning appliances - Installation
NZS 3103	Sands for mortars and plasters
NZS 3604	Timber-framed buildings
NZS 4210	Masonry construction: materials and workmanship
SNZ HB 4236	Masonry veneer wall cladding
AS/NZS 4455.1	Masonry units, pavers, flags and segmental retaining wall units - Masonry units
BRANZ Appraisal 690	Two Storey Brick Veneer System
BRANZ Appraisal 1045	Stack Bonded Brick Veneer System
BRANZ	Good practice guide: Masonry veneer
CB&PMA TB1	Design Note TB1 Two Storey Clay Brick Veneer Construction - Made Easy
CB&PMA TB2	Design Note TB2 Specification For The Stack Bond Brick Veneer System
ASTM D6134	ASTM D6134 / D6134M-07(2019)e1, Standard Specification for Vulcanized Rubber Sheets Used in Waterproofing Systems

Requirements

1.3 QUALIFICATIONS

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

All work to be installed or supervised by a Registered Master Mason or Licensed Building Practitioner (LBP): Licensed for Bricklaying and Blocklaying 1: Brick/masonry Veneer. RBW must be supervised by an LBP.

1.4 NO SUBSTITUTIONS

Substitutions are not permitted to any of the specified systems, components and associated products listed in this section.

Compliance information

1.5 INFORMATION REQUIRED FOR CODE COMPLIANCE

Provide the following compliance documentation:

- Producer Statement - Construction from the installer of proprietary brick veneer systems.
- Other information required by the BCA in the Building Consent Approval documents.

Performance

1.6 DESIGN PARAMETERS - NON SPECIFIC DESIGN - EARTHQUAKE

Design the installation to the seismic parameters of [NZS 4210](#) Masonry construction: materials and workmanship.

Refer to SELECTIONS for details.

1.7 COMPLIANCE - STANDARD BRICK VENEER SYSTEM

Brickwork to comply with [SNZ HB 4236](#) Masonry veneer wall cladding.

PRODUCTS

Materials

2.1 CLAY BRICKS

To [AS/NZS 4455.1](#).

2.2 SILLS

Refer to SELECTIONS for type.

2.3 LINTELS

Steel lintel angles over openings to [AS/NZS 2699.3](#).

2.4 VERMIN PROOFING

Either:

- Proprietary plastic weephole vents built into open perpend.
- Galvanized hexagon 10 mm mesh of 1 mm diameter steel wire 100 mm wide, complete with galvanized steel staples. Fix across base of cavity if gaps in veneer exceed 13 mm.

2.5 DAMP-PROOF COURSE (DPC)

To [NZBC E2/AS1](#) either:

- 2 coats bitumen-based paint to [AS/NZS 2904](#).
- 1.0 mm min. bituminous sheet or heavy kraft strip laminate (saturated and coated with bitumen) to [AS/NZS 2904](#).
- 1.0 mm min. butyl rubber to [ASTM D6134](#).

Components - standard brick veneer

2.6 WALL TIES

To [AS/NZS 2699.1](#). Metal ties screw fixed to framing.

2.7 REINFORCEMENT

Galvanized wire joint reinforcement. Refer to SELECTIONS for type.

Accessories

2.8 SAND FOR MORTAR

To [NZS 3103](#). Chloride levels not to exceed 0.04% by dry weight of sand.

2.9 MORTAR

Composed of Portland cement, sand and water with an admixture to the provisions of [NZS 4210: 2.2 Mortar](#). Obtain written approval of admixture being used. Obtain written approval if intending to use hydrated lime in the mortar.

2.10 MORTAR COLOUR

Add mineral oxide pigment conforming to requirements of [NZS 4210](#), clause 2.2.2.2(f).

2.11 ADMIXTURES

To [NZS 4210](#).

2.12 WATER

Clean, fresh and free from excess alkali, salt, silt and organic materials.

EXECUTION**Conditions****3.1 DELIVERY, STORAGE AND HANDLING**

To [NZS 4210](#) for aggregates, cement, bricks and reinforcement.
Take delivery of materials and goods and store on site and protect from weather or damage.
Protect finished surfaces, edges and corners from damage.
Move/handle goods in accordance with manufacturer's requirements.
Reject and replace goods that are damaged or will not provide the required finish.

3.2 PRE-INSTALLATION / APPLICATION REQUIREMENTS - CONCRETE BASE

Check vertical and horizontal alignment. Any discrepancies exceeding the permitted tolerances shall be corrected before units are laid.

3.3 TIMBER FRAMING - STANDARD BRICK VENEER

Check timber framing stud spacing is in accordance with [NZS 3604](#).

3.4 PENETRATIONS

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

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

3.5 MEASURE MATERIALS

Measure materials for mortar accurately by weight or volume using suitably calibrated equipment.

3.6 WET WEATHER

Keep bricks dry at all times prior to laying. Protect the top row of uncompleted brick walls. Protect freshly laid brickwork during interruption through rain and at completion of each day's work. Protect brickwork for a minimum of 6 hours.

3.7 COLD WEATHER CONSTRUCTION

When air temperature is below 5°C take the precautions required by [NZS 4210: 2.18 Cold weather construction](#).

3.8 HOT WEATHER CONSTRUCTION

When air temperature is above 25°C or there is a drying wind, or lower temperatures, take the precautions required by [NZS 4210: 2.19 Hot weather construction](#).

3.9 KEEP FACE WORK CLEAN

Keep clean during erection and until completion of the contract works. Turn back scaffold boards at night and during heavy rain. Do not rub face work to remove stains.

Installation - general

3.10 COLOUR MIXING

Check all bricks delivered to site for colour variation, prior to commencing work. Ensure bricks are thoroughly blended from several pallets to ensure an even colour spread throughout the work.

3.11 UNIFORMITY

Carry up work with no portion more than 1500 mm above another at any time, raking back between levels.

3.12 BONDING

Lay bricks to the required bonding in the various locations. Refer to SELECTIONS/drawings.

3.13 PROVIDE WEEPHOLES

Provide weepholes at the bottom of cavities and cells to [SNZ HB 4236](#) and [NZBC E2/AS1](#), 9.2.6, **Cavities**, and as necessary to drain moisture to the outside air. Provide vent gap at the top of the veneer.

3.14 INSTALL VERMIN PROOFING

Either:

- Proprietary plastic weephole vents built into open perpend.
- Fold and staple one edge of the mesh to the substrate, with the mesh sloping down towards the veneer. Set the other edge into the mortar joint by half the thickness of the veneer or 50 mm, whichever is less.

3.15 CAVITY VENTILATION

Ventilate to outside air with top and bottom openings to the requirements of [SNZ HB 4236](#) and [NZBC E2/AS1](#), 9.2.6, **Cavities**. Seal cavity off from roof space.

3.16 CAVITY BRICKWORK BELOW GROUND

Fill all cavities below finished grade with concrete. Place a continuous damp-proof course within the first three mortar joints above ground. Seal the face of all brickwork below ground.

3.17 FORM OPENINGS

Unless detailed otherwise form openings to typical details from BRANZ Masonry veneer - Good practice guide.

3.18 SEPARATION JOINTS

Provide for wall movements of veneer with control joints to [NZS 4210](#): 2.10 Methods of controlling wall movements. Weatherproof as necessary.

3.19 FORM REVEALS

Form lintels, jambs and sills as detailed complete with flashings and all ready for following work.

3.20 HEAD FLASHINGS

Provide a flexible flashing extending 200 mm beyond ends of the opening and sloping to weepholes over all openings in cavity walls, in accordance with E2/AS1, 9.2.4, **Flashings**.

3.21 JAMB FLASHINGS

Provide a flexible flashing to jambs of openings in cavity walls, fully lapped with horizontal damp-proof courses at head and sill, in accordance with E2/AS1, 9.2.4, **Flashings**.

3.22 SILL FLASHINGS

Provide a flexible flashing under jointed sills, turned up at back and ends, in accordance with E2/AS1, 9.2.4, **Flashings**.

3.23 REBATE DAMP PROOFING

Provide damp-proof course to stepped rebates supporting brick veneer in accordance with E2/AS1, 9.2.5, **Foundation support and damp-proofing**.

Installation - standard brick veneer

3.24 INSTALL LINTELS

Fit lintel angles to openings, sized to [NZBC E2/AS1](#), 9.2.9, **Openings in masonry veneer** Table 18E and placed to [NZBC E2/AS1](#), 9.2.9, **Openings in masonry veneer**.

3.25 CAVITY WIDTH

No cavity width less than 40 mm or more than 75 mm.

3.26 PLACE WALL TIES

Place wall ties to: -

- [NZS 4210](#): 2.9.5 Tie anchorage, cover and fixing; and
- [NZS 4210](#): 2.9.6 Placing of ties
- [NZS 4210](#): 2.9.7 Tie classification and spacing
- [NZBC E2/AS1](#), 9.2.7, **Wall ties**, for requirements, spacing, embedment, placement and materials

At unsupported edges and at all openings through veneered walls or non-grouted cavity walls, wall ties to be provided:

At the top and bottom of the opening:

- Not more than 300 mm or 2 courses, whichever is the smaller

At the sides of the opening or at an unsupported edge:

- Not more than 300 mm
- Where the veneer wall continues above or is interrupted by a damp-proof course or waterproof membrane, wall ties shall be provided in each of the first two courses above the membrane.

Installation - ancillary work

3 27 BUILD IN FIXINGS

Build in necessary fixing bricks or blocks for trims.

3 28 BUILD IN ELEMENTS

Build in sills, copings, lintels, steps and other elements using mortar similar to that in adjacent walls.

3 29 BUILD IN DOORS AND WINDOWS

Build in door and window frames as the work proceeds and bed in mortar similar to that in adjacent work.

Completion

3 30 ROUTINE CLEANING

Carry out routine trade cleaning of this part of the work including periodic removal all debris, unused and temporary materials and elements from the site.

3 31 EFFLORESCENCE, WATER CLEANING

To remove deposits, brush with a stiff-bristle broom and take away brushings from the locality. Remove remaining deposit with a damp sponge. Wash wall thoroughly with a plentiful supply of clean water. Repeat this process every 4 weeks from appearance through to the completion of the contract works.

3 32 DEFECTIVE OR DAMAGED WORK

Repair damaged or marked elements. Replace damaged or marked elements where repair is not possible or will not be acceptable. Leave work to the standard required for following procedures.

SELECTIONS

Substitutions are not permitted to the following, unless stated otherwise.

Performance - seismic

4 1 DESIGN PARAMETERS - NON SPECIFIC DESIGN - EARTHQUAKE

Building seismic zone: ~ (refer to [NZS 4210](#))

4323G GERARD® STEEL TILE ROOFING

1 GENERAL

This section relates to Gerard® interlocking pressed Steel roofing tiles complete with underlay, battens and accessories.

It includes:

- Steel roofing tiles
- Concealed Fastening (CF) steel roofing tiles
- Associated flashings and accessories

1.1 RELATED WORK

Refer to 4161 UNDERLAYS, FOIL AND DPC for underlays, foils and DPC
Refer to relevant timber framing section for timber battens

1.2 ABBREVIATIONS

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

NZMRM New Zealand Metal Roofing Manufacturers Inc

Documents

1.3 DOCUMENTS

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

NZBC E2/AS1	External moisture
NZBC G12/AS1	Water Supplies
AS/NZS 1170.2:2011	Structural design actions - Wind actions
AS 1397	Continuous hot-dip metallic coated steel sheet and strip – coatings of zinc and zinc alloyed with aluminium and magnesium
AS/NZS ISO9001	Quality management systems - requirements
NZS 2295	Pliable, permeable building underlays
NZS 3602	Timber and wood based products for use in building
NZS 3604	Timber-framed buildings
NZS 4217	Pressed metal tile roofs
NZMRM CoP	NZ Metal Roof and Wall Cladding Code of Practice

1.4 MANUFACTURER'S DOCUMENTS

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

Gerard® Product Brochures
Gerard® New Zealand installation manual
Gerard® Roof care and maintenance
Gerard® Product Technical Statements
Gerard® Technical Notes
Gerard® Technical data Sheets
Acoustic Research Group acoustic test reports No.70, 71, 72 and 73
Cyclonic Testing Station - Summary of test results sheet - TS943 Revision A
AHI Roofing Ltd ISO 14001 Certificate No. 188
[BRANZ Appraisal No.1089 \[2020\]](#) - Ross Roof Group Concealed Fastening Roofing Systems

Manufacturer/supplier contact details:

Company: RoofTG Pacific Limited
Web: www.gerardroofs.co.nz
Email: info@gerardroofs.co.nz
Telephone: 0800 100 244

Warranties

1.5 WARRANTY - MANUFACTURER/SUPPLIER - STANDARD WARRANTY

Provide a material manufacturer/supplier warranty:

Textured Finish Roof
 30 years For weather performance
 20 years For surface coating

Smooth Finish Roof
 30 years For weather performance
 15 years For surface coating

- Provide this warranty on the manufacturer/supplier standard form (if not available then use the standard form in the general section 1237WA WARRANTY AGREEMENT)
- Commence the warranty from the date of practical completion of the contract works.

Refer to the general section 1237 WARRANTIES for additional requirements.

1.6 WARRANTY - INSTALLER /APPLICATOR

Provide an installer/applicator warranty:

5 years For installation of roof

- Provide this warranty on the installer/applicator standard form (if not available then use the standard form in the general section 1237WA WARRANTY AGREEMENT)
- Commence the warranty from the date of practical completion of the contract works.

Refer to the general section 1237 WARRANTIES for additional requirements.

Requirements

1.7 QUALIFICATIONS

Installers to be experienced in installation of Gerard® roofing tiles. If requested provide evidence of qualification / experience prior to commencing work.

1.8 NO SUBSTITUTIONS

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

Compliance Information

1.9 INFORMATION REQUIRED FOR CODE COMPLIANCE

Provide the following compliance documentation:

- Applicators approval certificate from the manufacturer / importer / distributor
- Manufacturer's / suppliers warranty
- Installer's warranty
- Producer Statement - Construction from the applicator / installer

Performance - Wind

1.10 DESIGN PARAMETERS - NON SPECIFIC DESIGN

Building wind zone:~ / ~ kPa ULS (refer to [NZS 3604](#), table 5.4)

1.11 FIXINGS, WIND - NON SPECIFIC DESIGN

Design and use the fixings appropriate to Gerard® New Zealand installation manual requirements and as appropriate for the project wind design stated above. To [NZS 3604](#), table 10.12 Tile Battens for all Wind Zones. Refer to Gerard® New Zealand instruction manual & Technical Note - "Installation of Gerard Roofs in all wind zones including extra high wind zones" and BRANZ Appraisal No.1089 [2020] - Ross Roof Group Concealed Fastening Roofing Systems for the selected profile, fixing requirements.

Performance - General

1.12 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. Complete Gerard® Technical Note - "Builders check-list."

1.13 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. Comply with [NZMRM CoP](#), for performance, loadings, design, flashings, penetrations and installation recommendations, and section 15.3, **Pressed Steel Tiles**.

1.14 DRINKING WATER

Rainwater collected from correctly installed Gerard® systems will meet the provisions of [NZBC G12/AS1](#).

PRODUCTS

Materials

UNDERLAY

Self supporting, synthetic roofing underlay or self supporting, synthetic roofing underlay to comply with [NZS 2295](#). Refer to 4161 UNDERLAYS, FOILS AND DPC for details.

BATTENS

To [NZS 3604](#), 10.2.1.16 **Purlins and tile battens**. Radiata Pine or Douglas Fir, SG6, treated H1.2. Moisture content to [NZS 3602](#).

PRESSED STEEL TILES

To [NZS 4217](#), and [NZBC E2/AS1](#), 8.3 Pressed Steel tiles. Aluminium/Zinc coated steel AZ 150, 0.39mm BMT to AS 1397. Tiles available in a range of profiles & may be finished either in a stone chip texture or Smooth acrylic finish. Refer to SELECTIONS for type.

Components

TILE FIXINGS - NAILS

Hot-dipped galvanized steel flat head 50mm x 2.8mm painted tile nails.

BATTEN FIXINGS

90x3.15mm gun nails or self drilling screws in accordance with [NZS 3604](#) table 10.12 Tile Battens for all wind zones and Gerard® Technical Note - "Installation of Gerard Roofs in all wind zones including extra high wind zones".

FLASHINGS, CAPPINGS AND COVERS

To NZS E2/AS1, 4.0 **Flashings**. Gerard® proprietary ridge, hip, gable, valley & wall flashings, cappings and trims manufactured from aluminium-zinc coated steel AZ 150, to AS 1397, coated to match adjacent roofing where required, as part of the selected Gerard® profile's roofing system.

Accessories

SEALANT

Neutral cure silicone or MS sealant in accordance with Gerard® requirements.

EXECUTION

Conditions

STORAGE AND HANDLING

Take delivery of materials and goods and store on-site and protect from damage. Stack tiles on ground no more than two pallets high, on a level, hard base, ventilated and protected from damage and weather.

Protect finished surfaces, edges and corners from damage. Move/handle goods in accordance with manufacturer's requirements without soiling, scratching, crushing or other damage.

Reject and replace goods that are damaged or will not provide the required finish.

3.2 INSPECTION

Inspect the roof framing and supporting structure and do not start work until it is complete and fully braced ready for tiling, all to the requirements of [NZS 3604](#) or specific design where required.

Ensure Gerard® – "Builders check-list" has been completed

3.3 COMPLY

Comply with the preparation, laying and fixing requirements of [NZS 4217](#), [NZBC E2/AS1 8.0 Roof claddings](#), and the Gerard® requirements where these are of a higher standard.

Application

3.4 SET-OUT

Carefully set out the roof with a measuring rod to position the battens accurately taking account of rafter lengths, overhangs into gutters and spoutings and verge overhangs, all to minimise tile cutting. Batten setout in accordance with requirements for selected Gerard® profile.

3.5 LAY UNDERLAY

Roof underlay to be installed horizontally with a minimum 75mm overlap, all vertical laps to be taken past rafters and lap by a minimum of 150mm to [NZBC E2/AS1: 8.1.5 Underlays](#), and Gerard® requirements. Roofing underlay is installed under the roofing battens but over the bottom batten over fascia into gutters, drawn tight over rafters from ridges and hips and into valleys. If damaged, make good with full lap inserts as the work proceeds.

3.6 FIX BATTENS

To [NZS 3604](#), table 10.12 and/or to Gerard® requirements for specific design wind loads. Fix battens over the underlays in straight courses, spanning at least 3 rafters, between fascia and ridge and elsewhere to Gerard® required details. Nail or screw as required at every crossing. Square cut ends to form butt joint over rafters with joints staggered.

3.7 FIX VALLEY

To [NZBC E2/AS1: 8.1.6.2 Valley Gutters & hidden gutters](#) and in accordance with Gerard® requirements. Valley overlaps to be at least 150mm, do not fix through valleys, tag top edge of valley join to eliminate valley creep.

3.8 LAYING

Do not take heavy equipment onto the roof. Plan work to minimise foot traffic. Work on the roof only using appropriate footwear. Interlock, lap and lay tiles to [NZBC E2/AS1: 8.3 Pressed Steel tiles](#), and Gerard® requirements. Finish ridge, hip, valley, barge and eaves to Gerard® required details if not detailed elsewhere.

3.9 NAIL FIX TILES

Nail tiles to battens generally through the upstand and downturn of the tile lap as well as all elements to Gerard® details and to [NZBC E2/AS1](#).

Bottom course of tiles are fixed driving vertical nails into face of tile, and into eaves batten. Eaves nails to Smooth finish tiles are sealed with a synthetic washer, textured tiles to be sealed with the touch-up kit base coat and stone chip.

Successive rows of tiles are fixed driving 50mm Gerard® approved nails into the face of battens.

3.10 CUTTING AND BENDING

Cut, bend and straighten tiles neatly to finish true to line and plane when in place, using installation equipment maintained in the proper condition, all to [NZS 4217](#) and to Gerard® details.

3.11 FIT FLASHINGS, COVERS AND CAPPINGS

Cut, fit and fix all elements true to line and plane, to [NZBC E2/AS1: 4.0 Flashings](#), [NZBC E2/AS1: 5.0 Roof/wall junctions](#) in accordance with Gerard® requirements and the [NZMRM CoP](#), section 15.3 **Pressed Steel Tiles**, if not detailed elsewhere.

Tiles must be turned up a minimum of 40mm and covered to prescribed cover by Gerard® factory produced flashings.

3.12 PENETRATIONS AND JUNCTIONS

Form to [NZBC E2/AS1: 8.1.7](#) and [8.3.10](#) Roof penetrations, in accordance with Gerard® requirements and to the [NZMRM CoP](#).

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 skylight, chimneys and other penetrations through the roof. Required work includes the following:

- underlay turned up at wall and parapet lines
- underlay finished and dressed off to all openings, ready for the installation of skylights and other penetrations
- roofing installation neatly finished to all sides of openings and to all wall and parapet junctions

- including proprietary Gerard® PVC stop ends.
- installation of flashings, either custom-made flashings made from Gerard® supplied sheet or a supported membrane flashing.
- install selected sealant between flashing and roofing tile to Gerard® requirements.
- where applicable, touch up membrane flashings where they overlap roofing tiles with Gerard® touch-up kit base coat and/or stone chip.

Completion

3 13 MAKE GOOD

Touch up all damaged coatings with Gerard® touch-up kit base coat and/or stone chip

3 14 LEAVE

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

3 15 REMOVE

Remove trade rubbish and unused materials from the roof and surrounds regularly during the work. Sweep down the completed roof and clean out spoutings, gutters and rainwater pipes. Remove debris, unused materials and elements from the site.

SELECTIONS

For further details on selections go to www.gerardroofs.co.nz.

Substitutions are not permitted to the following, unless stated otherwise.

Materials

4 1 UNDERLAY

Refer to 4161 UNDERLAYS, FOILS AND DPC.

4521 ALUMINIUM WINDOWS AND DOORS

1 GENERAL

This section relates to the manufacture, supply, and installation of:

- aluminium windows
- aluminium doors and frames
- hardware and furniture
- overhead glazing
- flashings

1.1 RELATED WORK

Refer to glazing sections for glass types

1.2 ABBREVIATIONS AND TERMS

SLS	Serviceability limit state
ULS	Ultimate limit state
WGANZ	Window & Glass Association NZ
PQAS	Powder Coating Quality Assurance System

Documents

1.3 DOCUMENTS

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

NZBC E2/AS1	External moisture
NZBC F4/AS1	Safety from falling
NZBC H1/AS1-AS2	Energy efficiency
NZBC H1/VM1-VM2	Energy efficiency
AS/NZS 1170.2:2011	Structural design actions - Wind actions
NZS 1170.5	Structural design actions - Earthquake actions - New Zealand
AS/NZS 1580.108.1	Methods of test for paints and related materials - Determination of dry film thickness on metallic substrates - Non destructive methods
AS/NZS 1734	Aluminium and aluminium alloys - flat sheets, coiled sheet and plate
AS/NZS 1866	Aluminium and aluminium alloys - Extruded rod, bar, solid and hollow shapes
NZS 3604	Timber-framed buildings
AS 3715	Metal finishing - Thermoset powder coatings for architectural applications
NZS 4211	Specification for performance of windows
NZS 4223.3	Glazing in buildings - Human impact safety requirements
AS/NZS 4680	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles
BS EN 673	Glass in building - Determination of thermal transmittance (U-value) - Calculation method
AAMA 2603	Voluntary specification, performance requirements, and test procedures for pigmented organic coatings on aluminium extrusions and panels (with coil coating appendix)
AAMA 2604	Voluntary specification, performance requirements and test procedures for high performance organic coatings on aluminium extrusions and panels.
AAMA 2605	Voluntary specification, performance requirements and test procedures for superior performing organic coatings on aluminium extrusions and panels.
BS 3900	Methods of tests for paints, Part C5: Determination of film thickness
ISO 10077-1	Thermal performance of windows, doors and shutters - Calculation of thermal transmittance - General
ISO 10077-2	Thermal performance of windows, doors and shutters - Calculation of thermal transmittance - Numerical method for frames
BRANZ BU 636	Protecting Glass From Damage

SDC - Approved Building Consent Document - BC231907 - Pg 40 of 87 - 21/03/2024 - helen.fowler

Window & Glass Association NZ ([WGANZ](#)) documents:

Window Installation Guide	Guide to Window Installation as described in E2/AS1 Amendment 7
PQAS	Powder Coating Quality Assurance System
SFA 3503-03	Anodic Oxide coatings on wrought aluminium for external architectural application (2005)

US Federal Specification:

TT-S-001543A	Sealing compound, silicone rubber base (for caulking, sealing and glazing in buildings and other structures)
TT-S-00230C	Sealing compound, elastomeric type, single component (for caulking, sealing and glazing in buildings and other structures)

Warranties

WARRANTY - MANUFACTURER / SUPPLIER

Provide a material manufacturer/supplier warranty:

5 years: For fabrication

Refer to the general section for the required form of 1237WA WARRANTY AGREEMENT and details of when completed warranty must be submitted.

WARRANTY - INSTALLER / APPLICATOR

Provide an installer/applicator warranty:

2 years: For installation

- Provide this warranty in the installer/applicator standard form.

Refer to the general section 1237 WARRANTIES for additional requirements.

QUALIFICATIONS

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

COMPLIANCE

Windows and doors to be manufactured and installed to [NZBC E2/AS1](#).

SHOP DRAWINGS

Shop drawings to show the general arrangement of the aluminium joining including, but not be limited to:

Construction details (minimum scale 1:5) showing the interface between joinery elements and the building structure including: -

- Jointing details and method of fixing between individual elements and between this installation and adjacent work
- Interaction between claddings and linings
- Flashing details
- Sealants and air seals
- Non standard fixing details including bracketing

And where required the following:

- Design calculations
- Producer Statement in the form PS1 Producer Statement Design
- Rebate sizes
- Dimensions of all typical elements and of any special sizes and shapes
- Provision for the exclusion and/or drainage of moisture
- Provision for adjustment of fixings to ensure true alignment of windows and doors
- Sealant types and full size sections of all sealants and backing rods
- Provision for thermal movement
- Provision for seismic movement and movement under wind loads
- Sequence of installation
- Glazing specification and details

Where requested provide the following additional information

- Information of Professional Indemnity Insurance held by the person providing the shop drawings

Refer to the general section 1235 SHOP DRAWINGS for the requirements for submission and review and the provision of final shop drawings.

Complete shop drawing review before commencing fabrication.

1.9 CERTIFICATION

Provide evidence of a certificate by a laboratory accredited by International Accreditation of New Zealand that the windows and doors offered comply with the requirements of [NZS 4211](#).

Performance

1 10 PERFORMANCE - WINDOWS AND DOORS

To [NZS 4211](#), including:

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

Refer to SELECTIONS.

1 11 PERFORMANCE - STRUCTURAL/WEATHER-TIGHTNESS

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

Performance - Wind (design by contractor)

1 12 WIND - NON SPECIFIC DESIGN

Design the installation to the wind zone parameters of [NZS 3604](#), table 5.4.

Refer to SELECTIONS for wind zone.

Finishes

1 13 CERTIFY COATINGS - POWDER COATING

Certify on request, compliance with this specification and support with control and sampling records. Test for film thickness to BS 3900, part C5, method No. 4, using method (b) or to AS/NZ 1580.108.1 for certifying thickness and method (a) where any dispute arises as to the thickness provided. The coating should be applied by an applicator who can certify that the coating has been applied in accordance with the specification.

2 PRODUCTS

Materials

2 1 WINDOWS

Refer to SELECTIONS for type and finish.

2 2 DOORS

Refer to SELECTIONS for type and finish.

2 3 ALUMINIUM EXTRUSIONS

Alloy designation to comply with [AS/NZS 1866](#). Branded and extruded for anodising or powder coating.

2 4 ALUMINIUM SHEET AND STRIP

Complying with [AS/NZS 1734](#) of suitable thickness. Rolled for anodising or powder coating. Alloy designation: 5251 - H16 or 5005 - H16

2 5 STAINLESS STEEL SHEET AND STRIP

Type: 316 austenitic steel
Finish grade: 2B (satin lustre)

2 6 GLASS

Refer to the glazing section for glass types and installation.

2 7 REVEALS - TIMBER PAINTED

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

2.8 FLASHINGS GENERALLY

To [NZBC E2/AS1](#), 9.1.10 **Windows and Doors**. Material, grade and colour of head flashings to match the window frames. Ensure that materials used for head, jamb and sill flashings are compatible with the window frame materials and fixings and cladding materials.

Components - for cavity systems

2.9 STANDARD CAVITY CLOSER

A perforated device constructed from either aluminium or PVC to close the cavity above the window or door unit, between the cladding and head flashing, to provide ventilation in accordance with [NZBC E2/AS1](#) to the spaces above the window or door.

2.10 SUPPORT BAR

[WGANZ](#) extruded aluminium support bar with built in drainage and ventilation to [NZBC E2/AS1](#), to provide continuous support to the window unit. Size to suit cladding type.

Components

2.11 GLAZING GASKETS

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

2.12 HARDWARE AND FURNITURE

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

2.13 SAFETY STAYS

Stainless steel non releasable restrictors to limit window opening to [NZBC F4/AS1](#), Section 2.0, **Opening windows**.

Sealants

2.14 STRUCTURAL SEALANT

Silicone chemically curing sealant specifically formulated and tested or approved equivalent with not less than a $\pm 40\%$ movement factor complying with US Federal Specification TT-S-001543A.

2.15 WEATHERING / INSTALLATION SEALANT

Building sealant used in accordance with manufacturer's instructions for weather sealing aluminium frames to the cladding, complying with US Federal Specification TT-S-001543A, or a one-part polyurethane moisture curing, elastic joint sealant of medium modulus ($\pm 25\%$ movement) to US Federal Specification [TT-S-00230C](#).

2.16 FOAM TAPE

Foam tape to [NZBC E2/AS1](#), 9.1.10.7 **Closed cell foam tape**.

Finishes

2.17 POWDER COATED ALUMINIUM - EXTRA-DURABLE POLYESTER

Polyester powder organic coating in accordance with [WGANZ PQAS](#), AS 3715, and AAMA 2603

2.18 POWDER COATED ALUMINIUM - HIGH-DURABILITY POLYESTER

High-performance polyester powder coating in accordance with [WGANZ PQAS](#), and AAMA 2604.

3 EXECUTION

Conditions - generally

3.1 DO NOT DELIVER

Do not deliver to site any elements which cannot be unloaded immediately into suitable conditions of storage.

3.2 UNLOAD WINDOW JOINERY

Unload, handle and store elements in accordance with the window manufacturer's requirements.

3.3 AVOID DISTORTION

Avoid distortion of elements during transit, storage and handling.

3.4 PREVENT DAMAGE

Prevent prefinished surfaces rubbing together, and contact with mud, plaster and cement. Keep paper and cardboard wrappings dry.

3.5 PROPRIETARY ELEMENTS

Fix in accordance with the window manufacturer's requirements.

3.6 PROTECTIVE COVERINGS

Retain protective coverings and coatings to BRANZ BU 636 and keep in place during the fixing process. Provide protective coverings and coatings where required to prevent marking of surfaces visible in the completed work and to protect aluminium joinery from following trades. Remove protection on completion.

3.7 ADDITIONAL PROTECTION

Supply and fix additional protection as necessary to prevent marking of surfaces which will be visible on completed work.

Conditions - fixings and fastenings

3.8 SUPPLY OF FIXINGS

Use only fixings and fastenings recommended by the manufacturer of the component being fixed and to comply with the ULS wind pressure stated in SELECTIONS. Ensure fixings and fastenings exposed to the weather are of aluminium, or Type 316 stainless steel or if not exposed to the weather may they be hot-dip galvanized steel with a coating weight of 610 g/m² complying with [AS/NZS 4680](#).

3.9 INSTALLATION FIXING

To [NZBC E2/AS1, 9.1.10.8, Attachments for windows and doors](#). Fix windows/doors through reveal to frame with a pair of 75 x 3.15mm minimum galvanised jolt head nails or a pair of 8 gauge x 65mm minimum stainless steel screws. Fix at a maximum of 450 centres along all reveals and a maximum of 150mm from reveal ends. Ensure fixings do not penetrate metal flashings. Install packers between reveals and framing at fixing points, except at the head.

Assembly

3.10 FABRICATION

Fabricate frames as detailed on shop drawings. Install glazing, hinges, stays and running gear as scheduled. Provide temporary bracing and protection. Temporarily secure all opening elements for transportation.

3.11 TIMBER / PVC REVEALS

Before fixing to aluminium frames, ensure that timber reveals which are being painted have been primed on all surfaces.

3.12 HARDWARE GENERALLY

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

3.13 SAFETY STAYS

Factory fit safety stays to all windows scheduled for safety stays and to all windows where safety stays are required to comply with [NZBC F4/AS1 4.0](#), Opening windows.

Installation - windows and doors

3.14 CORROSION PROTECTION

Before fixing, apply suitable barriers of bituminous coatings, stops or underlays between dissimilar metals in contact, or between aluminium in contact with concrete.

3.15 CONFIRM PREPARATION OF EXTERIOR WALL OPENINGS

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

Required preparatory work includes the following:

- wall underlay/building wrap to openings finished and dressed off ready for the installation of window and door frames to [NZBC E2/AS1:9.1.5](#) **Wall underlays to wall openings**.
- Full height 20mm jamb battens to [NZBC E2/AS1](#) figure 72A (direct fix only)
- claddings neatly finished off to all sides of openings
- installation of flashings (those which are required to be installed prior to frames).

3.16 INSTALLATION

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

3.17 INSTALLATION CAVITY CONSTRUCTION

Install to [WGANZ Window Installation Guide](#) details and drawings including [WGANZ](#) sill support bars.

For thresholds with support bars fixed through membranes, pre-fill support bar screw holes with silicone sealant to [NZBC E2/AS1](#), figure 62(d).

3.18 INSTALL FLASHINGS

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

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

Except where window/door frames are recessed, ensure that head flashings over-sail unit by 20mm minimum plus any jamb scribe width at each end.

3.19 COMPLETE AIR SEAL

To [NZBC E2/AS1:9.1.6](#) Air seals. Form an air-tight seal by means of a proprietary expanding foam or sealants used with backing rods, applied between the window / door reveal and structural framing to a depth of 10 - 20mm, to provide a continuous air tight seal to the perimeter of the window or door.

3.20 FIX HARDWARE

Fix all sash and door hardware and furniture as scheduled.

Application - jointing and sealing

3.21 SEAL FRAMES ON SITE

Seal frames to each other and to adjoining structure and finishes, all as required by the window manufacturer and to make the installation weathertight. In very high and extra high or greater wind zones, seal between the window head and the head flashing. Do not seal the junction between the sill member and the cladding or sill flashing which must remain open.

3.22 PREPARE JOINTS

Ensure joints are dry. Remove loose material, dust and grease. Prepare joints in accordance with the sealant manufacturer's requirements, using required solvents and primers where necessary.

Mask adjoining surfaces which would be difficult to clean if smeared with sealant.

3.23 BACK UP

When using back-up materials do not reduce depth of joint for sealant to less than the minimum required by the manufacturer of the sealant. Insert polyethylene rod or tape back-up behind joints being pointed with sealant.

3.24 SEALANT FINISH

Tool sealant to form a smooth fillet with a profile and dimensions required by the sealant manufacturer. Remove excess sealant from adjoining surfaces, using the cleaning materials nominated by the sealant manufacturer and leave clean.

Completion - cleaning

3.25 REMOVE TRADE DEBRIS

Remove trade debris by appropriate means on a floor by floor basis as each floor is completed and again before any work is covered up by others. Arrange for general removal.

3.26 TRADE CLEAN

Trade clean window frames, operable windows and doors, glass and other related surfaces inside and out at the time of installation to remove marks, dust and dirt, to enable a visual inspection of all surfaces.

Completion

3.27 PROTECTIVE COVERINGS

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

3.28 SAFETY

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

3.29 IN SITU TOUCH-UP TO POWDER COATED ALUMINIUM

In situ touch-up of polyester or fluoropolymer coated aluminium is only permitted only to minor surface scratching. Otherwise replace all damaged material.

3.30 REMOVE

At the appropriate stage of the project, remove safety indicators and protective coverings and wipe down all joinery thoroughly.

3.31 REPLACE

Replace damaged, cracked or marked elements.

3.32 MANIFESTATIONS

To [NZS 4223.3](#), 2.2 Manifestation (making glass visible).

SELECTIONS

Performance

4.1 THERMAL PERFORMANCE

R-value: R0.50 (as determined from [NZBC H1/VM1](#) or [H1/AS1](#))

Performance - Wind (design by contractor)

4.2 WIND - NON SPECIFIC DESIGN

Building wind zone high (refer to [NZS 3604](#), table 5.4)

4610 GLAZING RESIDENTIAL

1 GENERAL

This section relates to the supply and fixing of glass products for external and internal joinery in residential type buildings and includes:

- windows and doors
- frameless shower and bath screens
- splashbacks, wall linings
- balustrade systems, pool fences
- mirrors and mirror frames

1.1 ABBREVIATIONS AND DEFINITIONS

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

The following abbreviations apply specifically to this section:

PVB Polyvinyl Butyral

CIP Cast in place

Documents

1.2 DOCUMENTS

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

NZBC B2/AS1	Durability
NZBC F4/AS1	Safety from falling
NZBC F9/AS1	Means of restricting access to residential pools
NZBC H1/AS1-AS2	Energy Efficiency
NZBC H1/VM1-VM2	Energy Efficiency
AS/NZS 1170.2: 2011	Structural design actions - Wind actions
NZS 3604	Timber-framed buildings
NZS 4211	Specification for performance of windows
NZS 4223.1	Glazing in buildings - Glass selection and glazing
NZS 4223.Supp1	Glazing in buildings - Supplement 1 to NZS 4223.1:2008 and NZS 4223.4:2008
NZS 4223.2	Glazing in buildings - Insulating glass units
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 buildings
AS/NZS 4666	Insulating glass units
BRANZ BU 636	Protecting Glass From Damage

Warranties

1.3 WARRANTY - MANUFACTURER/SUPPLIER

Warrant glass under normal environmental and use conditions against failure of materials.

10 years:	for insulating glass units
10 years:	for laminated glass
10 years:	for toughened glass

Refer to the general section for the required form of 1237WA WARRANTY AGREEMENT and details of when completed warranty must be submitted.

Performance

1.4 ENERGY EFFICIENCY

Provide glazing to comply with H1 Energy efficiency requirements of NZBC H1/AS1-AS2 and NZBC H1/VM1-VM2.

2 PRODUCTS

Materials

2.1 CLEAR FLOAT GLASS

Clear ordinary annealed transparent float glass for general window glazing. Thickness to [NZS 4223.1](#) and [NZS 4223](#). Supp 1.

2.2 TEXTURED, PATTERNED OR OBSCURE GLASS

Translucent, annealed, rolled glass with a decorative pattern on one surface.

2.3 TOUGHENED GLASS

Grade A Safety Glass to [AS/NZS 2208](#).

Heat soaked toughened glass to [NZS 4223.1](#), Appendix E required for critical areas. Refer to SELECTIONS.

2.4 INSULATING GLASS UNITS (IGU'S)

To [AS/NZS 4666](#), [NZS 4223.2](#) and the IGU Manufacturers Association (IGUMA) requirements. Marking to [NZS 4223.2](#) as modified by [NZBC B2/AS1](#), 3.5.

Refer to SELECTIONS for specified surfaces of the IGU.

Surface numbering order for glass panes in an IGU are #1, #2, #3, and #4 as follows:

- Surface #1 - outer face of exterior pane
- Surface #2 - cavity face of the exterior pane
- Surface #3 - cavity face of the interior pane
- Surface #4 - outer face of the interior pane

Components, aluminium and uPVC glazing

2.5 GLAZING TAPE AND GASKETS

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

2.6 SETTING BLOCKS

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

3 EXECUTION

Conditions

3.1 GENERAL REQUIREMENTS

To [NZS 4223.1](#), [NZS 4223.3](#), [NZS 4223.4](#). All external glazing to be wind and watertight on completion.

3.2 DELIVERY

Keep glass dry and clean during delivery and bring on to site when ready to glaze directly into place. Comply also with the storage requirements set out in BRANZ BU 636.

3.3 GLASS CONDITION

All glass to have undamaged edges and surfaces.

3.4 GLASS THICKNESS

If not specifically stated in the glazing schedule determine the minimum thickness of glass for each sheet as required by [NZS 4223.1](#), [NZS 4223.3](#), [NZS 4223.4](#) and [NZS 4223](#). Supp 1. For windows tested to [NZS 4211](#), ensure glass meets the requirements of the window testing.

Determine the final glass thickness based on whether wind loading or human impact considerations govern.

3.5 REBATE DIMENSIONS

Provide rebates for glazing to the widths and depths necessary for each situation including minimum glass edge cover to [NZS 4223.1](#), Section 4 Glazing.

3.6 JOINTING, PUTTY AND SEALING MATERIAL COMPATIBILITY

Ensure jointing, putty and sealing materials are compatible with glass substrates. Confirm compatibility with laminated glass, IGUs and coatings.

Conditions - human impact safety requirements

3.7 SAFETY GLAZING, GENERAL REQUIREMENTS

Glazing of doors, side panels, low level and window seat glazing, bathrooms, stairwell landings and similar locations, to [NZS 4223.3](#) for thickness and maximum areas of safety glass.

3.8 SAFETY GLAZING MATERIAL

Use only safety glazing materials defined in [NZS 4223.3](#), that also comply with the relevant requirements of [AS/NZS 2208](#). Ensure material is permanently marked and if cut by the distributor or installer mark each piece to [NZS 4223.3](#), 2.8 Identification.

3.9 CONTAINMENT

Edge cover to comply with [NZS 4223.1](#), Section 4 Glazing, table 5. Otherwise to [NZS 4223.3](#), 2.3 Edge cover.

Assembly

3.10 WORKING OF GLASS

All working of glass as required in [NZS 4223.1](#).

3.11 EDGE WORK AND BEVELLING

Edgework other than a clean cut. Refer to SELECTIONS/drawings for type.

3.12 SURFACE TREATMENT

Refer to SELECTIONS/drawings for finish.

3.13 SURFACE CUTTING

Refer to SELECTIONS/drawings for finish.

3.14 INSTALL SAFETY GLASS

To [NZS 4223.3](#).

Application aluminium

3.15 INSTALL GLASS TO ALUMINIUM FRAMES

Install glass to [NZS4223.1](#).

- Bead glaze to Section 4 Glazing.
- Channel glaze to Section 4 Glazing, and Section 5 for Framed, Unframed, Partly Framed Glass Assemblies.

Finishing

3.16 SAFETY

Indicate the presence of transparent glass for the remainder of the construction period, with whiting, tape or signs compatible with the glass type.

Completion

3.17 TRADE CLEAN

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

3.18 REPLACE

Replace damaged, cracked or marked glass.

3.19 LEAVE

Leave work to the standard required by following procedures.

3.20 REMOVE

Remove debris, unused materials and elements from the site.

4 SELECTIONS

Performance - wind

4.1 WIND ZONE - NON-SPECIFIC DESIGN

Building wind zone: high (as determined from [NZS 3604](#), [NZS 4223.4](#))

4710P PINK® BATTS® THERMAL & ACOUSTIC INSULATION

1 GENERAL

This section relates to Comfortech Building Performance Solutions™ Pink® Batts® thermal and acoustic insulation materials for walls, floors, ceilings and roofs.

Documents

1.1 DOCUMENTS

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

NZBC H1/AS1-AS2	Energy efficiency
NZBC G6/AS1	Airborne and impact sound
NZBC G6/VM1	Airborne and impact sound
NZS/AS 1530.1	Methods for fire tests on building materials, components and structures - Combustibility test for materials
AS/NZS 3000	Electrical installations (Known as the Australian/ New Zealand Wiring Rules)
AS/NZS 60695.11.5	Fire hazard testing - Test flames - Needle-flame test method - Apparatus, conformity test arrangement and guidance
NZS 4246	Energy efficiency - Installing bulk thermal insulation in residential 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/SUPPLIER DOCUMENTS

Manufacturer and supplier documents related to this section are:

Comfortech H1. Done - Insulation Guide
 Comfortech Pink® Batts® Insulation - Safety Data Sheet.
 Comfortech Pink® Batts® Thermal Solutions - Product Guide
 Comfortech Pink® Superbatts® Thermal Solutions - Installation Guide
 Comfortech Pink® Batts® - Product Data Sheets
 Comfortech Pink® Batts® - Installation Instructions
[BRANZ Appraisal 238](#) - Pink® Batts® Insulation
[BRANZ Appraisal 632](#) - Pink® Batts® SnugFloor® Insulation
[BRANZ Appraisal 767](#) - Pink® Batts® Skillion Roof Insulation

Manufacturer/supplier contact details

Company: Tasman Insulation NZ Ltd
 Trading as: Comfortech Building Performance Solutions™
 Web: www.pinkbatts.co.nz
 Telephone: 0800 746 522

Warranties

1.3 WARRANTY - MANUFACTURER/SUPPLIER

Provide a material manufacturer/supplier warranty:

50 years	For Pink® Batts® thermal insulation products
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- Provide this warranty on the manufacturer/ supplier standard form (if not available then use the standard form in the general section 1237WA WARRANTY AGREEMENT)
- Commence the warranty from the date of practical completion of the contract works.

Refer to the general section 1237 WARRANTIES for additional requirements.

Requirements

1.4 QUALIFICATIONS GENERALLY

Refer to 1270 CONSTRUCTION for requirements relating to qualifications.

1.5 NO SUBSTITUTIONS

Substitutions are not permitted to any of the specified systems, components and associated products listed in this section.

2 PRODUCTS

Materials - thermal insulation

2.1 PINK® BATTs® CEILING INSULATION

Pink® Batts® Ceiling Insulation (Pink® Batts® Classic, Pink® Batts® Ultra® and Pink® Superbatts®) rectangular bio-soluble fibrous glass wool slabs manufactured from up to 80% recycled window glass and bonded with thermosetting resin. Coloured Pink for identification. Available in different R-values, sizes and thicknesses. Refer to SELECTIONS.

2.2 PINK® BATTs® WALL INSULATION

Pink® Batts® Wall Insulation (Pink® Batts® Classic, Pink® Batts® Narrow, Pink® Batts® Ultra®, Pink® Batts® Ultra® 140mm Wall, Pink® Batts® Ultra® 140mm Narrow Wall) rectangular bio-soluble fibrous glass wool slabs manufactured from up to 80% recycled window glass and bonded with thermosetting resin. Coloured Pink for identification. Available in different R-values, sizes and thicknesses. Refer to SELECTIONS.

Components

2.3 FASTENERS

Insulation anchors complete with retaining washer.

2.4 PLASTIC STRAPPING TAPES

Proprietary plastic strapping tape, stapled over framing to retain insulation in unlined wall and ceiling locations.

2.5 ADHESIVE TAPE

Pressure sensitive adhesive tape.

EXECUTION

3.1 DELIVERY, STORAGE & HANDLING OF PRODUCTS

Refer to 1270 CONSTRUCTION for requirements relating to delivery, storage and handling of products.

3.2 ROUTINE MATTERS

Refer to 1250 TEMPORARY WORKS & SERVICES for protection requirements.
Refer to 1270 CONSTRUCTION for requirements relating to defective or damaged work, removal of protection and cleaning.

3.3 PRE-INSTALLATION REQUIREMENTS

Check work previously carried out and confirm it is of the required standard for this part of the work. Check that framing is free from moisture. Check cavities are not interconnected. Check required wire netting, roof/ underlays are in place and are dry, clean and homogeneous before installing insulation. Ensure main power is isolated and tagged prior to installation.

Installation - general

3.4 INSTALL THERMAL INSULATION - GENERALLY

Install Pink® Batts® insulation in a dry protected environment. Lay, fit and fix insulation without gaps, tucks, folds and over compaction to [NZBC H1/AS1-AS2](#) and Pink® Batts® installation requirements. For all housing and buildings up to 300m², install in accordance to [NZS 4246](#) sections 5 Walls, 6 Ceilings & Roofs, 7 Underfloor - Suspended Framed Floors and 10 Concrete Slab-on-Ground Insulation, for residential light timber or steel framed buildings. Insulate around vents (not over them) to allow unhindered ventilation. Confirm with fireplace manufacturer for clearances; Pink® Batts® insulation is non-combustible and need not be separated except if used in conjunction with, or attached to other heat sensitive materials. Lift up electrical wires, lighting transformers/ controllers and lay the insulation underneath.

3.5 RECESSED LIGHT FITTINGS - NON-RESIDENTIAL

Non-residential recessed light fittings to [AS/NZS 3000](#), 4.5.2.3.5;

- Existing fittings or retrofit situations, fittings maybe unmarked
- New fittings can only be labelled - CA 80, CA 90, CA 135, IC, IC-F, IC-4, NON-IC or Do-not Cover

Refer to clause INSULATION CLEARANCES for clearances.

Installation - thermal insulation

3.6 INSTALL PINK® BATTS® CEILING INSULATION

Friction fit Pink® Batts® Ceiling Insulation slabs between framing. If cutting is required, cut oversize by 5-10mm to ensure a friction fit. Insulate around vents (not over them) to allow unhindered ventilation. Fit insulation slabs beneath electrical wiring and plumbing. Install to the outer edge of the top plate. Maintain a 25mm gap clearance between the insulation slabs and roof underlay.

Pink® Superbatts® Single Layer Installation:

Friction fit Pink® Superbatts® slabs between truss framing. Notch out the underside of the first slab to the same size as the truss cord. Fit notched side above the truss cord. Fit the second slab next to the first slab and butt up against the side of the next truss under slight compression.

Pink® Superbatts® Double layer Installation:

Friction fit Pink® Superbatts® slabs at the top layer first, with the bottom layer being installed underneath it. Fit the top layer of insulation slabs butt up across the trusses, and fit the bottom layer in between the trusses.

3.7 INSTALL PINK® BATTS® WALL INSULATION

Friction fit Pink® Batts® Wall Insulation slabs between framing. 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 insulation slabs behind electrical wiring and plumbing. Ensure there are no gaps, folds or undesirable compression at edges.

Completion

3.8 COMPLETION MATTERS

Refer to 1270 CONSTRUCTION for completion requirements and if required commissioning requirements.

SELECTIONS

For further details on selections go to www.pinkbatts.co.nz.

Substitutions are not permitted to the following, unless stated otherwise.

Materials - thermal insulation

4.1 PINK® BATTS® CLASSIC CEILING INSULATION

Location: Roof
Brand: **Pink® Batts® Classic Ceiling**
R-value: 2 Layers of 3.6

Thickness: 360mm

4.2 PINK® BATTS® CLASSIC WALL INSULATION

Location: Walls as per plan
Brand: **Pink® Batts® Classic Wall**
R-value: 2.4
Thickness: 90mm

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

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

NZBC B2/AS1	Durability
NZBC E2/AS1	External moisture
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
NZMRM CoP	NZ Metal Roof and Wall Cladding Code of Practice

Requirements

1.2 QUALIFICATIONS

Work to be carried out by trades people 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](#). The Building Code B2, 3.2 requires that all hidden elements have at least the same durability as that of the element that covers it. Refer to [NZBC 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 [NZBC E2/AS1](#) table 22.

1.6 PROTOTYPES - REVIEW

Refer to the general section 1270 CONSTRUCTION for details of how prototypes will be reviewed and how instructions to proceed will be given. For flashings where there are no specific details or drawings, provide full size prototypes of the flashings to integrate components into the weathertight system. Co-ordinate with the trades affected by the installation. Provide the prototype flashings to the contract administrator for review.

2 PRODUCTS

2.1 FLASHING MATERIALS

Acceptable materials for flashings are described in [NZBC E2/AS1](#), 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.

2.2 FLASHING FABRICATION

Fabricate flashings generally to [NZBC E2/AS1](#), 4.0, 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. Provide all hooks, hems, kick outs, bird's beaks, stop ends, soft edges and turn downs etc. to [NZBC E2/AS1](#), 4.0, or as shown on the drawings.

2.3 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.

2.4 JOINTS - SEALANTS

Neutral Curing silicone or MS polymer sealant as required, with low resistance to compression and be-able to withstand large temperature variations. MS polymer sealant to be used where the sealant is exposed and the surrounding surfaces are to be subsequently painted or coated.

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 [NZMRM CoP](#) and in compliance with [NZBC E2/AS1, 4.0](#) Flashings. For very high wind zones and where the pitch of the roof is below 15° the flashing joint laps shall be sealed with sealant at each end of the lap to prevent the ingress of water.

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 zinc or AZ coated steel. Monel and stainless steel rivets can be used to fix galvanized steel flashings. 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 [NZMRM CoP](#) 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.

SELECTIONS

5113G GIB® PLASTERBOARD LININGS

1 GENERAL

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

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

1.1 ABBREVIATIONS AND DEFINITIONS

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

The following abbreviations apply specifically to this section:

AWCINZ Association of Wall and Ceiling Industries New Zealand

Documents

1.2 DOCUMENTS

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

NZBC C/AS2	Protection from fire
NZBC E2/AS1	External moisture
AS 1397	Continuous hot-dip metallic coated steel sheet and strip - Coatings of zinc and zinc alloyed with aluminium and magnesium
AS/NZS 2588	Gypsum plasterboard
AS/NZS 2589	Gypsum linings - Application and finishing
NZS 3604	Timber-framed buildings
AS/NZS 4600:2005	Cold-formed steel structures
ISO 5660.1	Reaction-to-fire tests - Heat release, smoke production and mass loss rate - Part 1: Heat release rate (cone calorimeter method)
ISO 5660.2	Reaction-to-fire tests - Heat release, smoke production and mass loss rate - Part 2: Smoke production rate (dynamic measurement)
BRANZ Technical Paper P21	BRANZ Technical Paper P21: A wall bracing test and evaluation procedure (2010)
NASH	Residential and Low-Rise Steel Framing Part 1 2010 Design Criteria

Requirements

1.3 NO SUBSTITUTIONS

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

1.4 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

1.5 INSPECTIONS AND ACCEPTANCE

Allow for inspection of the finished plasterboard surface:

- before applying sealer and
- before applying finish coatings or decorative papers,

so that after assessment of the type and/or angle of illumination and its effect on the completed decorative treatment, group approval and acceptance of the surface can be given.

1.6 BRACING REQUIREMENTS

Braced wall systems to [NZS 3604](#) when tested to BRANZ Technical Paper P21, using:

- GIB Ezybrace® Systems (2016) and/or GIB Ezybrace® Bracing Design Software
- GIB Ezybrace® Bracing Supplement Document (December 2016)
- GIB Ezybrace® for Steel Frame Housing (NASH) Software 2011 (to NASH Residential and Low-Rise Steel Framing Part 1 2010 Design Criteria)

Refer to drawings for location and type.

PRODUCTS

Materials

GIB® PLASTERBOARD

Gypsum plaster core encased in a face and backing paper formed for standard and water resistance use to [AS/NZS 2588](#). Refer to SELECTIONS for location, type, thickness and finish.

GIB® Standard plasterboard

GIB Wideline® plasterboard

GIB Ultraline® high quality surface plasterboard

GIB Fyrelime® fire resistant plasterboard

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

GIB Aqualine® wet area plasterboard

GIB Toughline®

GIB Toughline® Aqua

GIB® COVING

GIB-Cove® plasterboard coving. Refer to SELECTIONS for profile and size.

Components

CEILING BATTENS

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

SCREWS

GIB® Grabber® drywall type screws as follows:

Grabber® type	Used for fixing:
High Thread	GIB Ezybrace® or Standard systems to timber
Self Tapping	Standard systems to light gauge steel or timber
Dual Thread Screws	GIBFix®, GIB Ezybrace®, or Standard systems, to light gauge steel or timber
Wafer Head Needle Tip	Light gauge metal to timber not directly under plasterboard
Pancake Head Drill Tip	Light gauge metal to light gauge metal directly under plasterboard

Refer to GIB® requirements for appropriate details.

TAPE ON TRIMS AND EDGES

GIB® Goldline™ tape-on trims

GIB® UltraFlex® high impact corner mould

GIB® Levelline® Tape on Trim

METAL ANGLE TRIMS

GIB® galvanized steel slim angle trims.

CONTROL JOINTS

GIB® Rondo® P35 control joints.

GIB® Goldline™ tape-on trims

GIB® plastic W-profile control joints.

Accessories

2.8 ADHESIVE

Timber frame and/or steel frame:

GIBFix® One ultra low VOC water based wallboard adhesive

GIBFix® All-Bond solvent based wallboard adhesive

2.9 JOINTING COMPOUND

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

2.10 JOINTING TAPE

GIB® jointing tape.

2.11 GAP FILLER

GIB® Gap Filler ultra low VOC multi-purpose acrylic flexible filler

EXECUTION

Conditions

3.1 DELIVERY, STORAGE & HANDLING OF PRODUCTS

Refer to 1270 CONSTRUCTION for requirements relating to delivery, storage and handling of products.

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 (September 2018).

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 (Sept 2018).

3.6 METAL FRAMING

Metal framing, to which gypsum lining is fixed, shall comply with AS 1397, [AS/NZS 4600](#), or NASH Residential and Low-Rise Steel Framing Part 1 2010 Design Criteria as applicable. Where adhesion of gypsum linings is required, surfaces shall be free of oil, grease, dust and other foreign materials. Refer to the metal framing manufacturers specifications where high density gypsum linings (>800 kg/m³) such as GIB Braceline® and GIB Noiseline® are specified for fixing to light gauge steel framing.

3.7 PROTECTION

Protect surfaces; cabinetwork, fittings, equipment and finishes already in place from the possibility of water staining and stopping damage. Refer to GIB® Site Guide (Sept 2018).

Application

3.8 INSTALL CEILING BATTENS

Install to GIB® Rondo® Ceiling Batten Systems requirements.

3.9 LINING WALLS AND CEILINGS GENERALLY

Form to GIB® Site Guide (September 2018). Ensure bulk insulation thickness shall not exceed that of the wall framing.

3.10 BOARD ORIENTATION

Minimise joints by careful sheet layout using the largest sheet sizes possible, and generally fixing horizontally. Where part sheets are required for various stud heights they should be positioned so the cut sheet is as low as possible to keep joints below eye level.

3.11 FORM WET AREA SYSTEMS

Form to GIB Aqualine® Wet Area Systems requirements.

3.12 FORM BRACING SYSTEMS

Form bracing systems to:

- GIB Ezybrace® Systems (2016)

3.13 FORM CONTROL JOINTS

Form control joints to GIB® Site Guide (September 2018) requirements.

3.14 INSTALL COVES

Install to GIB-Cove® literature using GIB-Cove® Bond.

3.15 INSTALL TAPE-ON TRIMS

Install to GIB® Goldline™ Tape-on trims literature and/or GIB® Ultraflex high impact corner mould literature.

Finishing**3.16 FINISHING GENERALLY**

To GIB® Site Guide (September 2018) and [AS/NZS 2589](#).

Completion & Commissioning**3.17 COMPLETION MATTERS**

Refer to 1270 CONSTRUCTION for completion requirements and if required commissioning requirements.

SELECTIONS**4.1 GIB® BRACING SYSTEMS**

Refer to:

- GIB Ezybrace® Systems (2016)
- GIB Ezybrace® Systems (2011)

For bracing element location refer to drawn documentation.

6700 PAINTING GENERAL

1 GENERAL

This section relates to the general matters related to painting work

1.1 RELATED WORK

Refer to 6711 PAINTING EXTERIOR for exterior paint systems.
Refer to 6721 PAINTING INTERIOR for interior paint systems.

1.2 ABBREVIATIONS

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

APAS	Australian Paint Approval Scheme
MPNZA	Master Painters New Zealand Association Inc.
VOC	Volatile organic compound

Documents

1.3 DOCUMENTS

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

NZBC C/AS2	Protection from fire
AS/NZS 2311	Guide to the painting of buildings
AS/NZS 2312.1	Guide to the protection of structural steel against exterior atmospheric corrosion by the use of protective coatings - Paint Coatings
AS/NZS 5131	Structural steelwork - Fabrication and erection
AS/NZS ISO 9001	Quality management systems - requirements
SNZ TS 3404	Durability requirements for steel structures and components
WorkSafe	Guidelines for the provision of facilities and general safety in the construction industry
WorkSafe	Guidelines for the management of lead-based paint
MPNZA	Specification manual
MPNZA	Health and Safety Programme
Health and Safety at Work Act 2015	

Requirements

1.4 NO SUBSTITUTIONS

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

1.5 QUALIFICATIONS

Painters to be a member of MPNZA and experienced competent workers, familiar with the materials and the techniques specified.

1.6 HEALTH AND SAFETY

Refer to the requirements of the [Health and Safety at Work Act 2015](#) and [WorkSafe: 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 Health and Safety Programme. Supply protective clothing and equipment. Inform employees and others on site of the hazards and put in place procedures for dealing with emergencies.

Refer to [WorkSafe: Guidelines for the management of lead-based paint](#) for the required procedures and precautions when:

- treating/removing lead-based paint
- burning off paint
- sanding off paint
- using solvent based paint removers.

1.7 MATERIAL SAFETY DATA SHEET

Obtain from each paint manufacturer the material safety sheet for each product used. Keep sheets on site and comply with the required safety procedures.

Warranties

1.8 WARRANTY

Warrant this work under normal environmental and use conditions against failure.
2 years: Warranty period

Refer to the general section 1237WA WARRANTY AGREEMENT for the required format and details of when completed warranty must be submitted.

Performance

1.9 MANUFACTURER'S INSPECTION

Allow the paint manufacturers to inspect the work in progress and to take samples of their products from site if requested.

1.10 INSPECTION OF WORK

Inspection of the whole of the work at each of the stages scheduled may be made. Agree a programme that will facilitate such inspection, including notification when each part and stage of the work is ready for inspection.

PRODUCTS

Materials

2.1 PAINT TYPES

Use the manufacturer's complete system and only the products specified.

2.2 MATERIALS GENERALLY

Use only the Manufacturer's products which are guaranteed for their consistency and performance under [AS/NZS ISO 9001](#) and APAS approval, prepared, mixed and applied as directed in the Manufacturer's specification sheets, specification manuals and product data sheets.

2.3 THINNERS AND ADDITIVES

Only use thinners or additives within the stated limits for the particular situations specified.

Accessories

2.4 FILLERS

For recommendations on; fillers, stopping, paint strippers, cleaning agents, etching solutions, mould inhibitors, rust inhibitors, knotting and other commodities used for the surface preparation, refer to the manufacturer of the specified coating.

EXECUTION

Conditions

3.1 EXECUTION

To conform to manufacturer's requirements and those methods, practices and techniques contained in [AS/NZS 2311](#), the MPNZA Specification manual, and [WorkSafe: Guidelines for the provision of facilities and general safety in the construction industry](#).

3.2 PREPARE

Prepare surfaces to the coating manufacturer's requirements.

3.3 COATED SURFACES

Ensure that substrate surfaces are able to achieve the specified finish.

3.4 PRE-PRIMED SURFACES

Sand down any breakdown or damage of the primer to a sound surface and immediately re-prime.

3.5 BRUSH DOWN

Brush down surfaces immediately before application, to remove dust, dirt and loose material.

3.6 COMPATIBILITY

Check that materials are as required by the paint manufacturers for the particular surface and conditions of exposure, and that they are compatible with each other. Use paint from the same manufacturer for each paint system. If not compatible, obtain instructions before proceeding.

3.7 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.

3.8 ANCILLARY SURFACES

The coatings listed 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 instructions before proceeding.

3.9 HARDWARE

Do not paint hinges or hardware that cannot be removed. If items can be removed, carefully remove hardware, fixtures and fittings before commencing work. Set aside where they cannot be damaged or misplaced and replace on completion.

3.10 PROTECTION

Use dropsheets, coverings and masking necessary to protect adjoining fixtures, fittings and spaces from paint drops, spots, spray and damage.

Preparation - unpainted and pre-primed timber and wood based products

3.11 MOISTURE CONTENT

Ensure moisture content at the time of application is near to the equilibrium moisture content pertaining to the particular locality in which the timber is used, without any excessive moisture content gradient between core and surface.

3.12 PREPARING DRESSED TIMBER

Ensure dressed timber is smooth, free from raised or woolly grain, planing burrs or other machining defects. Slightly round or ease sharp edges to ensure they can be properly coated. Sand timber to bring up to a smooth finish along the direction of the grain. Sand timber back to new condition timber that has been weathered.

3.13 PREPARING ROUGH SAWN TIMBER

Thoroughly brush along the direction of the grain to remove dust and dirt.

3.14 PREPARING PRE-PRIMED TIMBER

Check pre-prime coat for damage, powdering, weathering or loss of adhesion. Where primer is sound, thoroughly brush along the direction of the grain to remove dust and dirt. If there is doubt, sand back and re-prime.

3.15 TIMBER SPECIES

Check that the preparation and paint system is suitable for the timber species.

3.16 PREPARING DAMAGE AND DEFECTS

Scrape clean loose or soft material holes, depressions, resin or gum pockets, knot holes, surface splits, checks, or any localised decay. Apply primer and/or sealer specified and fill these areas with linseed oil putty or other appropriate filler.

3.17 FIXINGS

Take timber fixings below the painted or clear finished surface. Leave corrosion resistant timber fixings flush with clear finished surfaces.

3.18 CLEANING

Remove grease and oil by wiping down with solvent or water-based degreasing agent. Remove resin by wiping down with solvent or water-based degreasing agent or heating and scraping.

Remove sanding dust. Bad staining may be untreatable and require replacement of timber, discuss with paint manufacturer and main contractor.

Preparation - unpainted masonry**3.19 PREPARING BRICKS**

Remove loose dirt, sand, aggregate and mortar by brushing down or blocking-off surface with a flat stone, hose with clean water. Fill holes with mortar/acrylic based filler. Remove efflorescence by dry brushing with a stiff bristle brush. Brickwork that has been acid cleaned shall have the pH tested to ensure it is neutralized before painting.

3.20 PREPARING CONCRETE

Remove grease and formwork oil with solvent or water and household detergent. Wash with clean water and allow to dry. Fill unwanted holes with cement grouting and allow to cure. Remove loose surface material and surface projections with a flat stone. Roughen slightly dense or glazed surfaces with light (30 mesh) sandblasting, rubbing with coarse abrasive stones, or by wetting the surface and treating with 10% commercial hydrochloric acid solution. Allow to react for 5 minutes, scour surface with a stiff bristle brush, wash off with clean water and allow to dry. Remove efflorescence by dry brushing or by wetting the surface and treating with 10% commercial hydrochloric acid solution as above.

Remove dust and dirt by brushing, air blast, hosing, or scrubbing as may be necessary.

3.21 PREPARING CEMENT PLASTER

Ensure surface is adequately cured and dry. Treat mould with one part sodium hypochlorite household bleach to three parts clean water solution or a proprietary anti-mould solution, and allow to dry. Remove efflorescence by brushing only.

3.22 PREPARING CONCRETE MASONRY

Remove loose dirt, sand, aggregate and mortar by brushing down or blocking-off the surface with a flat stone or hardwood block. Fill holes with mortar or acrylic based filler. Treat mould with one part sodium hypochlorite household bleach to three parts clean water solution, or a proprietary anti-mould solution, and allow to dry.

Remove efflorescence by dry brushing or by wetting the surface and treating with 10% commercial hydrochloric acid solution. Allow to react for 5 minutes, scour the surface with a stiff bristle brush, wash off with clean water and allow to dry.

Remove dust and dirt by brushing, air blast, hosing or scrubbing.

Preparation - gypsum plaster**3.23 PREPARING GYPSUM PLASTER**

Fill and sand small crevices and cracks. Surface moisture content not to exceed 12% at time of coating.

Preparation - unpainted linings**3.24 PREPARING FIBROUS PLASTER**

Check for and remove release agents and other contaminants by washing with clean water or solvent and allow to dry. Fill cracks and surface imperfections with patching plaster and lightly sand smooth. Remove dust.

3.25 PREPARING PLASTERBOARD

Check that joints are prepared to a smooth level surface finish. Fill cracks and surface imperfections with the sheet manufacturer's required stopping compound and lightly sand smooth. Remove dust.

Preparation - painted surfaces generally**3.26 SURFACE PREPARATION**

Refer to the Manufacturer's specification sheets and product data sheets. Carry out the preparatory work required by them for each of the substrates.

For interior surfaces such as paper faced plasterboard use the Manufacturer's recommended finishing compound as an aid to achieving a Level 5 finish.

3.27 MOULD

Sterilise surface mould by washing or sponging the whole surface with a one part sodium hypochlorite household bleach to three parts clean water solution. Allow bleach to act for 30 minutes and wash off with clean water. Wash cloths and sponges regularly in clean water.

Reapplication may be necessary. Treat with anti-mould solution to the treatment manufacturer's requirements.

3.28 GAP FILLING

Fill cracks, holes, indented and damaged surfaces with putty, plaster filler, wood filler, or plastic wood, as appropriate and in accordance with the paint manufacturer's requirements. Allow to dry or set before sanding back level with the surface. Prime coat or seal the timber before using putty.

Wet cement or gypsum base plasters before applying filler. Use only Portland cement base types, or water-insoluble organic-based gap fillers in exterior or wet areas.

Application - before applying final coatings

3.29 OFF-SITE WORK

Carry out off-site preparation and coating under cover, in a suitable environment and with adequate 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 permit air circulation and to prevent sticking of surfaces.

3.30 PRIMING JOINERY

Before priming preservative treated timber ensure that any cut surfaces have been retreated.

Liberally coat end grain, allow to soak in and then recoat. Ensure LOSP. treated joinery has dried sufficiently to lose odour.

3.31 CONCEALED JOINERY SURFACES

Apply off-site coatings to all surfaces including those which will be concealed when incorporated into the building.

3.32 CONCEALED METAL SURFACES

Apply primer to suit the coating system to all metal surfaces which will be concealed when incorporated into the building.

3.33 DOORS

Prime or seal and paint all six faces of doors before hanging.

3.34 BEAD GLAZING

Before glazing apply the first two coats, or the primer and one undercoat, to rebates of stained, varnished or painted joinery and beads.

3.35 PUTTY GLAZING

Follow putty manufacturers recommendations for application, drying, and painting. Ensure that the putty is fully protected by the coating system as soon as it is sufficiently hard.

Application - generally

3.36 PAINTING GENERALLY

Comply with the paint manufacturer's requirements and any additional requirements in this specification.

3.37 MIXING

Thoroughly mix paints. Lift any settled pigment and ensure the paint is homogenous.

3.38 ENVIRONMENT

Paint exterior surfaces only in favourable weather conditions:

- 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
- do not paint if temperatures fall outside the range of 10°C and 35°C unless paints with the necessary temperature tolerance have been specified
- do not apply solvent borne paint if moisture is present on the surface

3.39 SEQUENCE OF OPERATIONS

Painting work to generally follow the following sequences:

- back painting and pre-installation painting, then post-installation exposed-face painting
- complete surface preparation before commencing painting
- apply paint in the specified sequence using the specified paint
- allow full drying time between coats to the paint manufacturer's requirements
- do not expose primers, undercoats and intermediate coats beyond manufacturers stated instructions 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

PAINT APPLICATIONS

Select brush, roller, or pad and apply paint to the requirements of the paint manufacturer and to obtain a smooth even coating of correct thickness, uniform gloss and colour.

DRYING TIME

Before handling or applying the next coat of paint, give each coat the full drying time as required by the paint manufacturer. Ensure that surfaces are dry and that condensation does not occur before the paint reaches surface-dry condition.

LIGHTLY SAND

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

DEFECTIVE WORK

Correct defective work immediately and re-coat as required, following precisely the paint system specified.

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
- the specified 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

CLEAN

Clean adjoining surfaces, glass and fittings of any paint contamination. Clean off glass indicators at completion of the building works. Clean glass inside and out to a shining finish.

CLEAN EQUIPMENT

Use the Manufacturer's environmental wash system for the cleaning of water-based paint and plasters from brushes, rollers, plastering or spray equipment to separate the solids from the water component for safe disposal.

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.

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.

REPLACE HARDWARE

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

4 SELECTIONS

4.1 SELECTIONS

Refer to 6711 PAINTING EXTERIOR and 6721 PAINTING INTERIOR for selections.

6711 PAINTING EXTERIOR

1 GENERAL

This section relates to the preparation of exterior unpainted and pre-painted surfaces, and the application of exterior:

- decorative paint coatings
- protective paint coatings
- sealers
- stains
- clear finishes

Related work

1.1 RELATED SECTIONS

Refer to 6700 PAINTING GENERAL for general painting matters.
Refer to 6721 PAINTING INTERIOR for interior paint systems.

Warranties

1.2 WARRANTY

Warrant this work under normal environmental and use conditions against failure.
2 years: Warranty period

Refer to the general section for the required form of 1237WA WARRANTY AGREEMENT and details of when completed warranty must be submitted.

PRODUCTS

2.1 PRODUCTS

Refer to 6700 PAINTING GENERAL for product clauses.

EXECUTION

3.1 EXECUTION

Refer to 6700 PAINTING GENERAL for execution clauses.

SELECTIONS

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6721 PAINTING INTERIOR

1 GENERAL

This section relates to the preparation of interior unpainted and pre-painted surfaces, and the application of interior:

- decorative paint coatings
- protective paint coatings
- sealers
- stains
- clear finishes

Related work

1.1 RELATED SECTIONS

Refer to 6700 PAINTING GENERAL for general painting matters.
Refer to 6711 PAINTING EXTERIOR for exterior paint systems.

Warranties

1.2 WARRANTY

Warrant this work under normal environmental and use conditions against failure.
2 years: Warranty period

Refer to the general section for the required form of 1237WA WARRANTY AGREEMENT and details of when completed warranty must be submitted.

PRODUCTS

2.1 PRODUCTS

Refer to 6700 PAINTING GENERAL for product clauses.

EXECUTION

3.1 EXECUTION

Refer to 6700 PAINTING GENERAL for execution clauses.

SELECTIONS

7120 HOT & COLD WATER SYSTEM

1 GENERAL

This section relates to piped potable water supply systems from the network utility supply authority water main to designated points and appliances, the installation of hot water heating appliances, distributing piped hot water to other appliances, and the installation of valves.

1.1 RELATED WORK

Refer to 7151 SANITARY FIXTURES, TAPWARE & ACCESSORIES for sanitary fixtures and tapware selections.

Documents

1.2 DOCUMENTS

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

NZBC B2/AS1	Durability
NZBC C/AS1-AS2	Protection from fire
NZBC G4/AS1	Ventilation
NZBC G12/VM1	Water supplies
NZBC G12/AS1	Water supplies
NZBC H1/AS1-AS2	Energy Efficiency
AS/NZS 2492	Cross Linked Polyethylene (PE-X) pipe for pressure applications
AS/NZS 2537.2	Mechanical joining fittings for use with crosslinked Polyethylene (PE-X) for pressure applications - Plastics piping systems for hot and cold water installations - Crosslinked Polyethylene (PE-X) - Fittings
AS/NZS 2642.1	Polybutylene pipe systems - Polybutylene (PB) pipe extrusion compounds
AS/NZS 2642.2	Polybutylene pipe systems - Polybutylene (PB) pipe for hot and cold water applications
AS/NZS 2642.3	Polybutylene pipe systems - Mechanical jointing fittings for use with polybutylene (PB) pipes for hot and cold water applications
AS/NZS 2845.1	Water supply - Backflow prevention devices - Materials, design and performance requirements
AS 2845.3	Water supply - Backflow prevention devices - Field testing and maintenance
AS/NZS 3500.1: 2018	Plumbing and drainage - Water services
AS/NZS 3500.4: 2018	Plumbing and drainage - Heated water services
NZS 3501	Specification for copper tubes for water, gas and sanitation
AS/NZS 4130	Polyethylene (PE) pipes for pressure applications
NZS 4305	Energy efficiency domestic type hot water systems
NZS 4602	Low pressure copper thermal storage electric water heaters
NZS 4607	Installation of thermal storage electric water heaters: valve-vented systems
NZS 4617	Tempering (3-port mixing) valves
AS/NZS 5601.1	Gas installations - general installations
DIN 8077	Polypropylene (PP) Pipes - PP-H, PP-B, PP-R, PP-RCT - Dimensions
DIN 8078	Polypropylene (PP) Pipes - PP-H, PP-B, PP-R, PP-RCT - General quality requirements and testing.
Gas (Safety and Measurement) Regulations 2010	
Plumbers, Gasfitters and Drainlayers Act 2006	
NZ Backflow Testing Standard: NZ Backflow Testing Standard 2011, Field testing of backflow prevention devices and verification of air gaps	

Warranties

1.3 WARRANTY

Provide warranty for:

2 years: For the supply and installation of the plumbing system and fixtures

- Provide the warranty in the standard form in the general section 1237WA WARRANTY AGREEMENT.
- Commence the warranty from the date of practical completion of the contract works.

Requirements

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 certifying plumber under the [Plumbers, Gasfitters and Drainlayers Act 2006](#).

HOT WATER TEMPERATURES

To [NZBC G12/AS1](#), 6.14

Storage water heaters to store water at not less than 60°C.

Hot water piping system, with temperature controls where necessary (tempering valve etc), to provide water at the outlet at the following temperatures:

For personal hygiene fixtures (showers, baths, wash hand basins etc) temperatures to be close to but not to exceed:

- 45°C - for early child hood centres, schools, elderly facilities, hospitals, psychiatric or disabled institutions.
- 55°C - for personal hygiene fixtures in all other buildings.

For non-personal hygiene fixtures (kitchen sinks and equipment, laundry tubs, cleaners sinks, industrial fixtures etc) temperatures are:

- Unrestricted - direct from water heater, approx. 60°C, must be less than 65°C (for kitchen sinks and equipment, laundry tubs, cleaners sinks etc) - in all buildings.
- Unrestricted - direct from water heater not tempered (for industrial fixtures and specific items etc) - in all buildings.

This clause excludes boiling units.

Performance

TESTING - TO NZBC G12/AS1

Test to [NZBC G12/AS1](#), 7.5, **Watertightness**, for hot and cold water.

- Test to a pressure of 1500 kpa for period not less than 15 minutes.

Confirm the timing before carrying out any tests. Supply potable water and the apparatus needed. Slowly fill service pipes with water to exclude air. Test and ensure there is no measurable loss of pressure for the minimum period. Slowly fill distribution pipes with water to exclude air. Ensure that with draw-off taps closed the system must remain water-tight.

PRODUCTS

Materials

COPPER PIPE

To [NZS 3501](#) complete with copper-alloy compression fittings or crox type joints and seal ring compression joints complete with fittings and accessories brand matched to the pipe manufacturer's requirements with durability to [NZBC B2/AS1](#), Table 1 and [NZBC G12/AS1](#), Table 1.

POLYBUTYLENE PIPE

Polybutylene tubing to [AS/NZS 2642.1](#), [AS/NZS 2642.2](#) and [AS/NZS 2642.3](#) complete with fittings and accessories brand-matched with durability to [NZBC B2/AS1](#) Durability, table 1 and [NZBC G12/AS1](#), table 1. Protect from sunlight.

POLYETHYLENE PIPE

To [AS/NZS 4130](#) Series 1 complete with fittings and accessories brand matched to the pipe manufacturer's requirements with durability to [NZBC B2/AS1](#), table 1 and [NZBC G12/AS1](#), table 1. Except for solid black PE, protect from sunlight.

2.4 WATER METER

To the requirements of the network utility operator.

2.5 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](#).

2.6 BACKFLOW PREVENTION DEVICES

Provide backflow prevention devices to [AS/NZS 2845.1](#) where it is possible for water or contaminants to backflow into the potable water supply. Refer to [NZBC G12/AS1](#) 3.4 Backflow protection, and [NZBC G12/AS1](#), table 2, Selection of Backflow Protection.

2.7 TEMPERING VALVE

Tempering valve to [NZS 4617](#) to [NZBC G12/AS1](#).

Materials - Hot water heating appliances

2.8 ELECTRIC HOT WATER CYLINDER, MAINS PRESSURE

To [NZS 4305](#), ceramic-coated steel thermal storage cylinder, insulated and complete with required fittings.

Components

2.9 INSULATION

Pre-formed pipe sections complete with bends and fittings, with fixing tape to the manufacturer's requirements and to [NZBC H1/AS1-AS2](#) and [AS/NZS 3500.4](#).

2.10 PROTECTIVE TAPE

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

EXECUTION

3.1 EXECUTION GENERALLY

Generally carry out the whole of this work and tests to [NZBC G12/VM1](#) or [NZBC G12/AS1](#).

3.2 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.

3.3 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 [NZBC G12/AS1](#), table 3, Acceptable flow rates to sanitary fixtures. Pipe size as determined in [NZBC G12/AS1](#), 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 COPPER PIPE**

Braze pipe, fit alloy compression fittings, cross type joints and seal ring compression joints to [NZBC G12/AS1](#).

3.11 JOINTING POLYBUTYLENE PIPE

Aluminium clamped, seal ring compression or push fit "O" ring seal jointing to pipe system manufacturer's requirements.

3.12 JOINTING POLYETHYLENE PIPE

Seal ring compression joints and electrofusion to [NZBC G12/AS1](#).

Application - Pipework installation**3.13 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](#).

3.14 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 [NZBC G12/AS1](#), 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.

3.15 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 [NZBC G12/AS1](#), 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.

3.16 EQUIPOTENTIAL BONDING METALLIC WATER SUPPLY PIPES

If it is an electrical requirement, before enclosing, ensure metallic water supply pipes and metallic sanitary fixtures are equipotential bonded (or at least conductor cable attached) to [NZBC G12/AS1](#), 9.0.

3.17 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**3.18 HOT WATER CYLINDER INSTALLATION GENERALLY**

Install hot water cylinders complete to the manufacturer's requirements and to [NZBC G12/AS1](#), 6.11, Water heater installation. Valve-vented systems to [NZS 4607](#).

3.19 SEISMIC RESTRAINTS - NON-GAS WATER HEATING APPLIANCES

Non-gas (electric, wet-back, solar etc) water heating appliances (storage water heaters) to be restrained to manufacturer's requirements and [NZBC G12/AS1](#), 6.11, Water Heater Installation.

3.20 INSTALLING HOT WATER PIPE INSULATION

Insulate all hot water pipes to [NZBC H1/AS1-AS2 Energy Efficiency](#), [AS/NZS 3500.4](#), section 8.2 Thermal insulation, and to the insulation manufacturer's instructions. Cut insulation sections tight between timber framing and tight between the webs of steel studs.

3.21 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](#).

3.22 INSTALL STORAGE HOT WATER CYLINDER OVERFLOW TRAY

Install drained overflow tray to storage hot water cylinder to [NZBC G12/AS1](#).

3.23 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.

3.24 PENETRATIONS

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

Installation - Valves

3.25 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.

3.26 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.

3.27 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 2845.3 or [NZ Backflow Testing Standard](#).

Completion

3.28 LABEL

Label all pipework with permanent adhesive markers at 3 metre minimum intervals.

3.29 CLEAN IN-LINE FILTER

Clean all in-line filters on completion of works.

3.30 REPLACE

Replace damaged or marked elements.

3.31 LEAVE

Leave work to the standard required by following procedures.

3.32 REMOVE

Remove debris, unused materials and elements from the site.

4 SELECTIONS

Water main

4.1 POLYETHYLENE WATER MAIN

Size: 25mm outside diameter (i.e. DN 25 in [AS/NZS 4130](#))

Pipework

4.2 POLYBUTYLENE PIPE

Manufacturer: dux

Brand: segura

7151 SANITARY FIXTURES, TAPWARE & ACCESSORIES

1 GENERAL

This section relates to the supply and installation of sanitary fixtures, tapware and sanitary accessories.

1.1 RELATED WORK

Refer to 7120 or 7123 HOT AND COLD WATER SYSTEM for hot water cylinders.
Refer to 7420 or 7421 SANITARY SYSTEMS for the supply and fitting of waste disposal pipework
Refer to the electrical section/s for electrical connection of accessories.

Documents

1.2 DOCUMENTS

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

NZBC E3/AS1	Internal moisture
NZBC G1/AS1	Personal hygiene
NZBC G12/VM1	Water supplies
NZBC G12/AS1	Water supplies
NZBC G13/AS1	Foul water
NZBC G13/AS3	Plumbing and drainage
AS/NZS 3000	Electrical installations (known as the Australian/New Zealand Wiring Rules)
AS/NZS 3500.1:	2018 Plumbing and drainage - water services
AS/NZS 3500.2:	2018 Plumbing and drainage - sanitary plumbing and drainage
NZS 4223.3	Glazing in buildings - Human impact safety requirements
Plumbers, Gasfitters and Drainlayers Act 2006	

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

1.3 QUALIFICATIONS GENERALLY

Refer to 1270 CONSTRUCTION for requirements relating to qualifications.

2 PRODUCTS

2.1 SANITARY FIXTURES

Refer to SELECTIONS for product selection.

2.2 TAPWARE

Refer to SELECTIONS for product selection.

2.3 SANITARY APPLIANCES

Refer to SELECTIONS for product selection.

2.4 SANITARY ACCESSORIES

Refer to SELECTIONS for product selection.

2.5 ELECTRICAL SANITARY ACCESSORIES

Refer to SELECTIONS for product selection.

3 EXECUTION

Conditions

3.1 DELIVERY, STORAGE & HANDLING OF PRODUCTS

Refer to 1270 CONSTRUCTION for requirements relating to delivery, storage and handling of products.

3.2 STORAGE AND HANDLING

Take delivery of and store components complete with protective casings and coverings in areas that are enclosed, clean and dry and where no work is being done. Remove protection only to the extent that will allow installation.

3.3 QUALITY STANDARDS INCLUDING NZBC G13/AS1

Installation work to comply with [NZBC G1/AS1](#), [NZBC G12/VM1](#), [NZBC G12/AS1](#), [NZBC G13/AS1](#) and the fixture manufacturer's requirements.

3.4 SUBSTRATE

Ensure substrate and fixings will allow work of the specified standard.

3.5 CO-ORDINATION

Do not proceed if the points of supply and drainage services do not match the points of the fixtures without force or distortion.

3.6 INSTALLATION REQUIREMENTS INCLUDING NZBC G13/AS1

Install to [NZBC G1/AS1](#), [NZBC G12/VM1](#), [NZBC G12/AS1](#), [NZBC G13/AS1](#), [NZBC E3/AS1](#) and to the fixture manufacturer's installation requirements for each component. Carry out preparatory and assembly work, including connections to supply and drainage services and the application of slurries and sealants in sequence.

Seal between all sanitary fixtures and floors, wall linings, fixtures and the tops they are in, the tops and wall linings, to [NZBC E3/AS1](#), 3.2. Fixtures include toilets, urinals, baths, basins, tubs or sinks. Tops include, vanities, bath surrounds, sink benches, etc, and there upstands.

3.7 PROVIDE SUPPORT

Confirm fixing points needed for each unit and provide solid blocking at each fixing bracket location.

Conditions - tapware

3.8 RETAIN

Retain tapware in the manufacturer's original packaging and ensure that units are complete with fixings and installation instructions. Label each unit separately with its fitting name and space number.

3.9 STORE

Store tapware packages in a shelved, dry and securely locked area. Provide supervision when the secure area is unlocked and packages and cartons are being distributed; signing off each package from the schedule as released.

Conditions - sanitary accessories

3.10 RETAIN

Retain fixtures, fittings and hardware in the manufacturer's original packaging and ensure that units are complete with associated fixings and installation instructions. Label each unit separately to match the submitted and approved schedule.

3.11 PACKAGE

Package fixtures, fittings and hardware units required in clear plastic and label each to match the drawings and the submitted schedule. Place packages in cartons selected for 'level', 'location', and/or 'sector' and label the packages and the cartons similarly.

3.12 STORE

Store items in a shelved, dry and securely locked area. Provide supervision when the secure area is unlocked and packages and cartons are being distributed; signing off each package from the schedule as released.

3.13 INSPECTION

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

Installation - sanitary fixtures**3.14 INSTALLING TOILET PAN**

Carry out preparatory and assembly work, including connections to supply and drainage services and the application of slurries/bedding and sealants in sequence. Fit the toilet pan in position, plumb, level, flush and rigid without stressing the attachment points of the component. Fixings to be corrosive resistant. Fit seat.

3.15 INSTALLING CISTERNS

Fit firmly in place and connect the specified cisterns from the supply services through the flush pipes to the relative fixtures in the positions as detailed all plumb and level.

3.16 INSTALLING URINALS - WALL HUNG

Carry out preparatory and assembly work, including connections to supply and drainage services and the application of sealants in sequence. Fit and fix the urinal in position plumb, level, flush and rigid without stressing the attachment points of the component. Connect units to drainage pipework through trap and complete screw fixing of units to wall. Fixings to be corrosive resistant. Seal perimeter of each unit to wall surface, using a compatible silicone sealant.

Installation - Basins**3.17 INSTALLING WASHBASINS**

Install to [NZBC G1/AS1](#), [AS/NZS 1730](#). Set basins firmly to walls or vanities as detailed and to comply with [NZBC E3/AS1](#). Connect to supply and drains through trap to the drainage system.

3.18 INSTALLING VANITIES - BLANK TOP

Install in accordance with the manufacturer's requirements. Cut out basin profile to basin manufacturer's template. Make penetrations for supply and drainage. Fix securely with corrosive resistant fixings. Seal top and upstand to wall surface to comply with [NZBC E3/AS1](#).

Installation - Showers**3.19 INSTALLING SHOWER FITTINGS**

Shower waste, mixer and rose to be install to [NZBC G1/AS1](#) and to [AS/NZS 3662](#). Seal shower wall lining penetrations (shower head, shower hose, mixer, taps etc) to [NZBC E3/AS1](#), Fig. 6.

3.20 INSTALLING PROPRIETARY SHOWER ENCLOSURES AND WALL LININGS

Install in accordance with [NZBC E3/AS1](#). Sit tray firmly in place as detailed, to levels shown and connect to drainage service, ready for following work. Fit screen and door unit to manufacturer's details. Lining materials and finishes to comply with [NZBC E3/AS1](#).

3.21 INSTALLING SHOWER DOOR AND SCREEN

To [NZS 4223.3](#) and to the product manufacturer's requirements. Set units level, plumb and true to line and required location, with moving parts and actions freely and easily operating.

Installation - Baths**3.22 INSTALLING BATHS**

Install to [NZBC G1/AS1](#). Set firmly in cradle with required points fully supported, level and flush. Connect to supply and drainage services.

3.23 INSTALLING BATH SCREEN / DOOR

To [NZS 4223.3](#) and to the product manufacturer's requirements. Set units level, plumb and true to line and required location, with moving parts and actions freely and easily operating. Do not make any modifications to supplied units.

Installation - Sinks**3.24 INSTALLING SINK BENCHES**

Install in accordance with manufacturer's/supplier's requirements. Connect to supply and drainage services.

3.25 INSTALLING CLEANERS SINKS AND TUB UNITS

Install in accordance with manufacturer's requirements. Connect to supply and drainage services.

Installation - Miscellaneous**3.26 INSTALLING STAINLESS STEEL FIXTURES**

Carry out preparatory work and fit elements in position plumb, level, flush and rigid without stressing the attachment points in sequence. Connect to supply and drainage services.

3.27 INSTALLING SANITARY FIXTURES & ACCESSORIES - PEOPLE WITH DISABILITIES

Install fixtures to [NZBC G1/AS1](#): Part 3 and Part 4 and to comply with the relevant layouts shown in Figures 5,6,7,8 and 9. Provide number of facilities in accordance with [NZBC G1/AS1](#) tables 1, and 2.

Application - tapware**3.28 GENERAL**

To [AS/NZS 3500.1](#): 2018 and in accordance with the manufacturer's requirements. Maintain safe water temperatures to comply with [NZBC G12/AS1](#).

Application - sanitary accessories**3.29 INSTALLING ACCESSORIES**

Fit specified fittings firmly in place at required dimensions relative to floor and adjoining sanitaryware fittings, all plumb and level.

3.30 LOCATE

Locate units at heights and/or locations shown on the drawings, or as required to comply with [NZBC G1/AS1](#). For any dimension not shown or known, request direction before proceeding.

3.31 CUTTING AND FITTING

Where cutting and fitting of the substrate is necessary for installing any unit, carry out this work before the painting or finishing of that surface. Remove any hardware when required for painting, placing it in the packaging or carton originally supplied and returning it to the secure store until ready for re-installation.

3.32 INSTALLING UNITS

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

Completion**3.33 REPLACE**

Replace damaged or marked elements.

3.34 PROTECTIVE COVERINGS

Leave fixtures, fittings and accessories clean and unblemished with stickers and protective coverings removed, with supply and drainage connections and all parts fully operating and working. Leave the whole of this work free of blemishes, undamaged and to the standard of finish required for following work.

3.35 REMOVE

Remove debris, unused materials and elements from the site.

SELECTIONS

7430 DRAINAGE

1 GENERAL

This section relates to the supply and laying of gravity foul water (sewage), stormwater and groundwater drainage.

1.1 DOCUMENTS REFERRED TO

Documents referred to in this section are:

NZBC B1/AS1	Structure
NZBC E1/AS1	Surface water
NZBC E1/AS2	Surface water
NZBC E1/VM1	Surface water
NZBC G1/AS1	Personal hygiene
NZBC G13/AS1	Foul water - sanitary plumbing
NZBC G13/AS2	Foul water - drainage
NZBC G13/AS3	Foul water - sanitary plumbing and drainage
AS/NZS 1254	PVC-U pipes and fittings for Stormwater and Surface Water applications
AS/NZS 1260	PVC-U 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 2439.1	Perforated Plastics Drainage and Effluent Pipes and Fittings - Perforated drainage pipe and associated fittings
AS/NZS 2566.1	Buried Flexible Pipelines - Structural Design
AS/NZS 2566.2	Buried Flexible Pipelines - Installation
AS/NZS 3500.3: 2018	Plumbing and drainage - Stormwater drainage
NZS 3104	Specification for concrete production
NZS 3111	Method of test for water and aggregate for concrete
AS/NZS 3500.2: 2018	Plumbing and drainage - sanitary plumbing and drainage
NZS 3604	Timber-framed buildings
NZS 4229	Concrete masonry buildings not requiring specific engineering design
NZS 4402 (set)	Method of testing soils for civil engineering purposes
AS/NZS 4671	Steel reinforcing materials
AS/NZS 5065	Polyethylene and polypropylene pipes and fittings for drainage and sewerage applications
NZCMM	NZ Concrete Masonry Manual section 6.1 Masonry Retaining Walls
NZTA F2	Specification for pipe subsoil drain construction
Plumbers, Gasfitters and Drainlayers Act 2006	

1.2 AS BUILT DOCUMENTS

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 be experienced, competent and familiar with the materials and techniques specified. Carry out all work under the direct supervision of a certifying drainlayer under the [Plumbers, Gasfitters and Drainlayers Act 2006](#).

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 PVC-U PIPES

PVC-U pipes bends, junctions, fittings and joints to [AS/NZS 1254](#) and [AS/NZS 1260](#). Underground PVC-U pipe to be classified as follows:

Classification:

SN4 - SN6
SN8 - SN10
SN16

Use:

Domestic & light load areas
Commercial & Industrial medium load areas
Public roads & high load areas

2.4 POLYETHYLENE PIPES

Polyethylene pipes and fittings to [AS/NZS 5065](#).

2.5 PERFORATED PIPE - SUBSOIL DRAINAGE

Perforated corrugated coil high density polyethylene subsoil drainage pipe to AS 2439.1 with polypropylene filter sock over, for groundwater drainage.

2.6 GULLY TRAPS - NZBC G13/AS2

To [NZBC G13/AS2](#): 3.3 Gully traps, complete with grating.

2.7 SURFACE WATER SUMP GRATINGS

Cast iron frame with lift-up grating.

2.8 STRIP DRAIN CHANNEL

Proprietary, modular, variable invert, plastic, steel (various types), or polymer concrete drainage channel sections and drainage sump, embedded in site concrete and fitted with selected metal gratings.

2.9 INSPECTION COVERS

Cast iron frame with screw-down cover.

2.10 TRENCH BACKFILLING MATERIAL, FOUL WATER - NZBC G13/AS2

Bedding and backfilling material to [NZBC G13/AS2](#), 2.0 **Materials**, for methods shown in [NZBC G13/AS2](#), figure 7, **Bedding and backfilling**.

EXECUTION

3.1 EXCAVATE

Excavate for drains to a firm even base with correct gradients set in straight runs. Trenches running parallel, below and close to foundations of buildings to [NZS 3604](#) or [NZS 4229](#) to be separated to:

- [NZBC E1/AS1](#), 3.9.7, **Proximity of Trench to Building**, for stormwater and subsoil drains.
- [AS/NZS 3500.3](#): 2018, 6.2.8, **Installation near and under buildings**, as modified by [NZBC E1/AS2](#).
- [NZBC G13/AS2](#), 5.6, **Proximity of Trench to Building**, for foul water drains.

3.2 MANUFACTURER'S REQUIREMENTS

All drainage installations to the pipe and fitting manufacturer's requirements.

3.3 FOUL WATER DRAINAGE GENERALLY - NZBC G13/AS2

Carry out foul water drainage work to [NZBC G13/AS2](#) and [NZBC G1/AS1](#) and complete all tests to [NZBC G13/AS1](#), 7.1 Test Methods.

Lay uPVC pipe systems to relevant sections of [AS/NZS 2032](#), [AS/NZS 2566.1](#) and [AS/NZS 2566.2](#).

Lay polyethylene pipes and fittings to relevant sections of [AS/NZS 2033](#) and [AS/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 CONSTRUCT GULLY TRAPS - NZBC G13/AS2

Set in a minimum 75mm thick concrete with top surround 25mm above paving and 100mm above other surfaces, to [NZBC G13/AS2](#), 3.3 Gully traps.

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 PERFORATED PIPING - SUBSOIL DRAINAGE

Lay perforated groundwater drainage piping with filter sock, firmly on a bed of drainage material screeded to the required gradient. Lay in straight runs to discharge into surface water drainage system. The pipe must not excessively elongate during installation. Carry drainage material up and over the pipes without disturbing them. Extend the high end of all lines up to the surface in capped, solid pipe to provide for flushing out.

3.8 LAY PERFORATED PIPING TO BASEMENT WALLS - SUBSOIL DRAINAGE

Ensure any required waterproofing and protection sheets are in place before starting work.

Lay perforated groundwater drainage piping with filter sock, firmly on a bed of drainage material screeded to the required gradient. The pipe must not excessively elongate during installation. Lay in straight runs to 1:150 gradients with invert of the highest horizontal point 50 mm minimum below floor slab level, discharging into surface water drainage system. Carry drainage material up and over the pipes without disturbing them. Fill with drainage material to full height of wall. Carry the high end of all lines up to the surface in capped, solid pipe to provide for flushing out.

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 SURFACE WATER SUMP

To [NZBC E1/AS1](#) or to [AS/NZS 3500.3](#): 2018 section 7 as modified by [NZBC E1/AS2](#), complete with ceramic half-siphon pipe and cast iron frame with a lift out grating.

3.11 INSTALL STORMWATER INSPECTION CHAMBERS

Construct as detailed on a poured concrete footing to [NZBC E1/AS1](#), 3.7, **Access for maintenance**, or to [AS/NZS 3500.3](#): 2018 section 7 as modified by [NZBC E1/AS2](#). Provide all necessary haunching to channels. Fit a cast iron cover and frame.

3.12 INSTALL FOUL WATER INSPECTION CHAMBERS - NZBC G13/AS2

Construct as detailed on a poured concrete footing to [NZBC G13/AS2](#), 5.7 **Access points**. Provide all necessary haunching to channels. Fit a cast iron cover and frame.

3.13 SOAKHOLES OR TRENCHES

Dispose of stormwater on site as shown on the drawings, by soakage, to suit local geology and soil structure; all as directed by the territorial authority.

3.14 CONCRETE ENCASEMENT

Concrete encase shallow drains and drains under driveways, on a 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.

3.15 TESTING - FOUL WATER

Confirm timing before carrying out any tests. Supply potable water and apparatus needed.

Test to [NZBC G13/AS1](#) or [AS/NZS 3500.2](#): 2018, 15 as required. Carry out and record a visual inspection that each joint showed no evidence of leaks.

3.16 TRENCH BACKFILLING GENERALLY - FOUL WATER

Granular bedding and selected fill shall be placed in layers no greater than 100 mm loose thickness and compacted. Base bedding (beneath the pipe) shall be placed and compacted before pipes are laid. Up to 300mm above the pipe, compaction shall be by tamping by hand tool over the entire surface of each layer to produce a compact layer without obvious voids, without disturbing or distorting the drain. Run marker tape along line of the pipe on top of the bedding.

Up to 300mm above the pipe, compaction shall be by tamping by hand using a rod with a pad foot (having an area of 75 ± 25 mm by 75 ± 25 mm) over the entire surface of each layer to produce a compact layer without obvious voids, without disturbing the drains.

More than 300 mm above the pipe, compaction shall be by at least four passes of a mechanical tamping foot compactor (whacker type) with a minimum weight of 75 kg. For plastic based pipes, ensure care taken to avoid impact loading of the pipe.

4 SELECTIONS

7701 ELECTRICAL BASIC

1 GENERAL

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

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

ABBREVIATIONS AND DEFINITIONS

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

The following abbreviations apply specifically to this section:

AFDD	Arc Fault Detection Device
ELV	Extra Low Voltage
GLS	general lighting service
IP	international (ingress) protection classification
NUO	Network Utility Operator
PCB	printed circuit board
PIR	passive infrared
SIA	security integration architecture
TPS	tough plastic sheathed
TCF	Telecommunications Carriers' Forum

Documents

DOCUMENTS

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

NZBC E2/AS1	External moisture
NZBC F6/AS1	Visibility in escape routes
NZBC F7/AS1	Warning systems
NZBC G4/AS1	Ventilation
NZBC G9/AS1	Electricity
AS/NZS 1125	Conductors in insulated electric cables and flexible cord
AS/NZS 1768	Lightning protection
AS/NZS 2201.1	Intruder alarm systems - Client's premises - Design, installation, commissioning and maintenance
AS 2293.1:2005	Emergency escape lighting and exit signs for buildings - System design, installation and operation
AS 2293.3:2005	Emergency escape lighting and exit signs for buildings - Emergency escape luminaires and exit signs
AS/NZS 3000	Electrical installations (known as the Australian/New Zealand Wiring Rules)
AS/NZS 3008.1.2	Electrical installations - Selection of cables - Cables for alternating voltages up to and including 0.6/1 kV - Typical New Zealand installation conditions
AS/NZS 3100	Approval and test specification-general requirements for electrical equipment
AS/NZS 3112	Approval and test specification - Plugs and socket-outlets
AS/NZS 3113	Approval and test specification - Ceiling roses
AS/NZS 3190	Approval and test specification - Residual current devices (current-operated earth-leakage devices)
AS/NZS 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 using scattered light, transmitted light or ionization
NZS 4514:2009	Interconnected smoke alarms for houses
NZS 4246	Energy Efficiency - Installing bulking thermal insulation in residential buildings
AS/NZS 5000.2	Electric cables - Polymeric insulated - for working voltages up to and including 450/750v
AS/NZS 60335.1	Household and similar electrical appliances - Safety - General requirements
AS/NZS 60695.11.5	Fire hazard testing - Test flames - Needle-flame test method - Apparatus, conformity test arrangement and guidance.
AS/NZS 61439.3	Low-voltage switchgear and controlgear assemblies - Part 3: Distribution boards intended to be operated by ordinary persons (DBO).
IEC 61643	Components for low voltage surge protection devices
Electricity (Safety) Regulations 2010	(Reprint as at 21 January 2019).
TCF Premises Wiring Cable Installers Guidelines for Telecommunication Services	

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.

Warranties

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 1237WA WARRANTY AGREEMENT and details of when completed warranty must be submitted.

Requirements

COMPLY

Comply with the Electricity (Safety) Regulations 2010, [AS/NZS 3000](#), [AS/NZS 3008.1.2](#), and [TCF Premises Wiring Cable Installers Guidelines for Telecommunication Services](#) 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.

QUALIFICATIONS WORKERS – LICENSED UNDER STATUTE

Workers and supervisors to be appropriately qualified to applicable legislative requirements. Refer to 1270 CONSTRUCTION for additional requirements relating to qualifications.

QUALIFICATIONS - SECURITY SYSTEM

Installation by an installer licensed under the Private Investigators and Security Guards Act. Installation of all security equipment to comply with [AS/NZS 2201.1](#) Intruder alarm systems - Client's premises - Design, installation, commissioning and maintenance.

SAFETY OF INSTALLATION - DESIGN BY ELECTRICAL ENGINEER

Before installation work commences obtain from the electrical engineer a Certified Design. The Certified Design is to comply with the Electricity (Safety) Regulations (2010), regulation 58.

SAFETY OF INSTALLATION - DESIGN BY ELECTRICIAN

Before installation work commences provide a Certified Design. The Certified Design is to comply with the Electricity (Safety) Regulations (2010), regulations 58. It must be signed by the designer of the installation.

ELECTRICAL CERTIFICATE OF COMPLIANCE

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

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

1.10 ELECTRICAL SAFETY CERTIFICATE

Provide an Electrical Safety Certificate (ESC), as required by the Electricity (Safety) Regulations 2010, Reg 74A, to the owner and when required the BCA. To be provided no later than 20 working days after connection and prior to Practical Completion.

2 PRODUCTS

2.1 MAINS SUPPLY

Tough plastic sheathed neutral screened cable to [AS/NZS 5000.2](#) 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
Lighting circuits:	Commercial: 1.5mm ² on 16 amp MCBs
Power circuits:	2.5mm ² on 16 amp MCBs for domestic and unenclosed or unfilled cavity construction
	2.5mm ² on 16 amp MCBs for domestic insulated construction, or filled cavity
	2.5mm ² on 20 amp MCBs for unenclosed or unfilled cavity construction
	2.5mm ² on 16 amp MCBs for insulated construction, or filled cavity, or lengths over 30 metres
Hot water cylinder circuits:	Single phase: 2.5mm ² on 20 amp MCBs
Range/oven/hob circuits:	Single phase: 6mm ² high temperature cable 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 (roof spaces above insulation etc).

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](#), or AS/NZS 61439.3, 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. Label all switch units that control electrical equipment or special lighting circuits by proprietary engraved switch mechanisms where applicable. Refer to drawings/schedules for number of switches per unit, dimmer units, neon (indicator or toggle) units and 2 way units. Refer to SELECTIONS.

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 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; integral/non-integral LEDs, reflectors, lenses, heatsinks and drivers - 3,000K to 4,000K, CRI >80, L70.

2.13 EXHAUST FANS

Ceiling, wall or duct mounted exhaust fans for ventilation to [NZBC G4/AS1](#), and compliant with [AS/NZS 60335.1](#).

2.14 HEATED TOWEL RAILS

Fixed wired heated towel warmers, double insulated, IPX4 splash-proof, compliant with [AS/NZS 60335.1](#), scratch resistant powdercoated or chrome finish.

Security system

2.15 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.

2.16 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.

2.17 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.

2.18 CABLING

Security alarm wiring to NZS/AS 1125 for cables.

Security alarm wiring to be multi stranded and not single stranded, minimum 0.5mm².

2.19 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.

2.20 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 and Electricity Retailer 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 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/NZS 3000](#) to protect each final sub circuit.

3.5 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.

3.6 EARTH LEAKAGE PROTECTION

Install RCD protection to [AS/NZS 3000](#).

3.7 RCD - RESIDENTIAL INSTALLATIONS

Install 30mA RCD protection at the switchboard for all final sub circuits to control outlets and lighting except for fixed or stationary cooking equipment, to [AS/NZS 3000](#).

3.8 RCD - SPECIFIC INSTALLATIONS

Install fixed wired RCD protected outlets (SRCD) in the following higher risk areas:

- Wet areas: bathrooms, laundries, kitchens.
- Near pools and water features.
- Where intended for use with cleaning equipment.
- Hand-held tools subject to movement in use, i.e. work-shops, garages.

3.9 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.

3.10 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.

3.11 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.

3.12 LIGHT FITTINGS

Install light fittings in locations and at heights specified and confirmed by the owner, in accordance with the fitting manufacturer requirements.

3.13 EXTRA LOW VOLTAGE LIGHTING

Use electronic, transformers (halogen) or drivers (LED) for ELV lamps, one transformer/driver per lamp. Locate to manufacturer requirements and as close as practicable to the lamp. Ensure transformers/drivers and rear of light fittings are adequately ventilated and appropriately clear of any building elements, to [AS/NZS 3000](#).

3.14 ELECTRIC HOT WATER SYSTEM

For storage heaters, 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 the hot and cold water system section.

3.15 SMOKE ALARMS

Install Type 1 domestic smoke alarm system to [NZBC F7/AS1 3.0 Domestic smoke alarms, NZS 4514](#) and to the alarm manufacturer requirements. Fit neatly and without damage to the surrounding finish.

3.16 SURGE PROTECTION

Install surge protection devices to manufacturer 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.

3.17 ELECTRIC POWERED FITTINGS AND EQUIPMENT

Install and wire fittings and equipment to individual fittings and equipment manufacturer requirements. Refer to the drawings for required layouts and locations for equipment. Refer to SELECTIONS for schedules of fittings.

3.18 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](#)
- Mirror demisters: Locate centrally above the wash hand basin(s). Connect wiring to room lighting unless specified otherwise.
- Exhaust fans: Install exhaust fans to manufacturer requirements. Installed in accordance with [AS/NZS 3000](#) and [NZBC G4/AS1](#).

3.19 OUTDOOR/EXTERIOR SERVICES

Install all wiring systems in accordance with [AS/NZS 3000](#) and in accordance with the manufacturer 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 and sockets to IP56. Install to manufacturer 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.

3.20 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

3.21 SECURITY SYSTEM

Install to the system manufacturer requirements, control panel, detectors and associated equipment fitted neatly and without damage to surrounding finishes. Installation of security equipment to [AS/NZS 2201.1](#) Intruder alarm systems - Client's premises - Design, installation, commissioning and maintenance. 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.

Completion & Commissioning

3.22 COMPLETION MATTERS

Refer to 1270 CONSTRUCTION for completion requirements and if required commissioning requirements.

4 SELECTIONS

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