G.J. Gardner. HOMES
"We're Great Together"

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PROJECT SPECIFICATION

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

Coles Dwelling

(project name)

Lot 208, Camrose Estate
Methven

(project address)

EDWARD COLES
AND
ANDREA COLES

(owners name)

Job Number
860742

DATE: November 2021

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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 VH (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 is: 2

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.

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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.

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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)

1.4 DEFINED WORDS

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

1.5 WORDS IMPORTING PLURAL AND SINGULAR

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

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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

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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

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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.

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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

1.1 QUALITY ASSURANCE

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

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

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

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

1.2 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

1.3 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.

1.4 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.

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1.5 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.

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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.

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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.

1.28 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

1.29 MOVING PARTS

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

1.30 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.

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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.

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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.

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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.

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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.

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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

3 EXECUTION

3.1 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).

3.2 SEPARATION

Separate all timber framing timbers from concrete, masonry and brick by: -

- a full length bituminous damp-proof membrane overlapping timber by at least 6mm; or
- a 12mm minimum free draining air space

3.3 ATTENDANCE

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

3.4 MOISTURE CONTENT

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

Framing at erection:	24% maximum
Framing at enclosure:	20% maximum
Framing at lining:	16% maximum

3.5 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.

3.6 FRAMING WALLS

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

3.7 FRAMING ROOFS

Frame to required loading and bracing complete with valley boards, ridge boards and purlins. Design and fit roof trusses complete with anchorage. All fabricated and fastened to NZS 3604, section 9, **Posts** and 10, **Roof framing**.

3.8 FRAMING CEILINGS

Frame to required loading and bracing complete with runners and battens set out to support ceiling lining. All fabricated and fastened to NZS 3604, section 13, **Ceilings**. Trim for openings in ceilings and hatches to NZS 3604 section 13.3, **Openings in ceilings**. Provide blocking for water tanks located in the ceiling space to NZS 3604, section 13.4, **Water tanks in roof space**.

3.9 INSTALLING WALL UNDERLAYS

Refer to 4161 UNDERLAYS, FOIL AND DPC section

3.10 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.).

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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

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3827E ECOPLY® PLYWOOD BRACING SYSTEM

1 GENERAL

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

Documents

1.1 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.

1.2 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

1.3 NO SUBSTITUTIONS

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

Performance

1.4 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.

1.5 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.

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1.6 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.	Minimum wall length	Lining Requirements	Bus/m Wind	Bus/m Earthquake
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)

2 PRODUCTS

Materials

2.1 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

2.2 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

3 EXECUTION

Conditions

3.1 HANDLE

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

3.2 STORE

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

3.3 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

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3.4 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.

4 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.

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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

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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

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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

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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.

4 SELECTIONS

4.1 WALL UNDERLAY

Location:	Throughout
Brand / type:	CHH Ecoply rigid air barrier / Fire retardant absorbent breathable composite non woven wall underlay
Jointing tape:	Thermakraft PVC tape

4.2 ROOFING UNDERLAYS

Location:	Throughout
Brand / type:	Thermakraft Covertek 401 / 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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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

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:

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

1.2 DOCUMENTS

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

NZBC E2/AS1	External moisture
NZBC 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

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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.

2 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 perpends.
- 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

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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.

3 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.

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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 perpends.
- 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**.

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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.

4 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)

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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:

- Gerard® 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 B1/AS1	Structure
NZBC B2/AS1	Durability
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 4680	Hot dip galvanised coatings on fabricated ferrous articles – galvanising of nails
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 – Brochures
Gerard – Specification manual
Gerard – Statement of Building Code Compliance
Gerard – Technical Note : "Aluminium Zinc Substrate performance"
Gerard – Technical Note :"Installation of Gerard Roofs in all wind zones including extra high wind zones"
Gerard – "Builders check-list"
AHI Roofing Ltd ISO 9001 Certificate
AHI Roofing Ltd ISO 14001 Certificate No. 188
NZGBC Certificate of Membership 2020-2021
Declare Certificate AHI 0001 Gerard Satin Tile expires 1st March 2021
Declare Certificate AHI 0002 Gerard Textured Tile expires 1st March 2021

Manufacturer/supplier contact details:

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

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Warranties

1.5 WARRANTY - MANUFACTURER/SUPPLIER - STANDARD WARRANTY

Provide a material manufacturer/supplier warranty:

Textured Finish Roof	
50 years, pro rata	For weatherproofing, with textured finish roof
20 years, pro rata	For surface coating, with textured finish roof
Smooth Finish Roof	
50 years, pro rata	For weatherproofing, with Smooth finish roof
15 years, pro rata	For surface coating, with Smooth finish roof

- 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

1.6 NO SUBSTITUTIONS

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

1.7 QUALIFICATIONS

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

Performance - Wind

1.8 FIXINGS, WIND - NON SPECIFIC DESIGN

Design and use the fixings appropriate to Gerard® systems – Specification 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® – Specification manual & Technical Note:"Installation of Gerard Roofs in all wind zones including extra high wind zones" for the selected profile, fixing requirements.

1.9 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® – "Builders check-list."

1.10 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**.

2 PRODUCTS

Materials

2.1 UNDERLAY

Self supporting, kraft-based roofing underlay or self supporting, synthetic roofing underlay to comply with NZS 2295. Refer to 4161 UNDERLAYS, FOILS AND DPC for details.

2.2 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, size, spacing and fixing to NZS 3604 table 10.12 **Tile Battens for all wind zones** or to Gerard® requirements for Wind -specific design.

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2.3 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

2.4 TILE FIXINGS

Hot-dipped galvanized steel flat head 50mm x 2.8mm painted tile nails to Gerard® specification.

2.5 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.

3 EXECUTION

Conditions

3.1 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

3.2 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

3.3 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.

3.4 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.

3.5 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.

3.6 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.

3.7 NAILING 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.

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3.8 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.

3.9 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.

3.10 EPDM FLASHINGS TO PENETRATIONS

Form to NZBC E2/AS1: 8.1.7 and 8.3.10 **Roof penetrations**, in accordance with Gerard® requirements and to the NZMRM CoP.
Install EPDM proprietary flexible sleeve/boot flashing in accordance with manufacturer's requirements, ensuring installed 45° to horizontal.

3.11 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.

3.12 INTERNAL GUTTERS

Fit internal gutters to project design and to NZMRM CoP, section 5.5 **Gutters** for internal gutters.

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.

4 SELECTIONS

For further details on selections go to https://designtech.gerardroofs.co.nz/DesignTech/
Substitutions are not permitted to the following, unless stated otherwise.

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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

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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/VM1	Energy efficiency
NZBC H1/AS1	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
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
BRANZ BU 636	Protecting Glass From Damage

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

1.4 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.

1.5 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.

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1.6 QUALIFICATIONS

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

1.7 COMPLIANCE

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

1.8 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

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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.

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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 ± 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 0011534A, or a one-part polyurethane moisture curing, elastic joint sealant of medium modulus (± 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

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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).

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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 scriber 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.

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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).

4 SELECTIONS

Performance

4.1 THERMAL PERFORMANCE

R-value: R0.26 (as determined from NZBC H1/VM1 or H1/AS1)

Performance - Wind (design by contractor)

4.2 WIND - NON SPECIFIC DESIGN

Building wind zone very high (refer to NZS 3604, table 5.4)

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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 F4/AS1	Safety from falling
NZBC F9/AS1	Means of restricting access to residential pools
NZBC H1/AS1	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 4218	Thermal insulation - Housing and Small Buildings
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 meet the energy requirements of NZS 4218 and NZBC H1/AS1 for housing small buildings.
Refer to SELECTIONS and schedules for location and type of glazing.

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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.

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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.

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4 SELECTIONS

Performance - wind

4.1 WIND ZONE - NON-SPECIFIC DESIGN

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

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4710P PINK® BATTS® & PINK® BATTS® SILENCER® INSULATION

1 GENERAL

This section relates to Tasman Insulation **Pink® Batts®** insulation materials installed into residential buildings.
It includes:
Thermal:

- **Pink® Batts® Ceiling Insulation** (**Pink® Batts® Classic** and **Pink® Batts® Ultra®**)
- **Pink® Batts® Skillion Roof Insulation**
- **Pink® Batts® Wall Insulation** (**Pink® Batts® Classic** and **Pink® Batts® Ultra®**)
- **Pink® Batts® Masonry Wall Insulation**
- **Pink® Batts® 140mm Wall Insulation**
- **Pink® Batts® Steel Wall Insulation**
- **Pink® Batts® Narrow Wall Insulation**
- **Pink® Batts® SnugFloor® Underfloor Insulation**

Acoustic:

- **Pink® Batts® Silencer®**
- **Pink® Batts® Silencer® Midfloor**

Documents

1.1 DOCUMENTS

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

NZBC C/AS1-AS2	Protection from fire
NZBC H1/AS1	Energy efficiency
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)
NZS 4218	Thermal insulation - Housing and small buildings
NZS 4220	Code of practice for energy conservation in non-residential buildings
NZS 4243.1	Energy Efficiency - Large buildings - Building thermal envelope
NZS 4246	Energy efficiency - Installing bulk thermal insulation in residential buildings
AS/NZS 60695.11.5	Fire hazard testing - Test flames - Needle-flame test method - Apparatus, conformity test arrangement and guidance

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:
Tasman Insulation New Zealand: Product Data Sheets and Installation Instructions
BRANZ Appraisal 238 - Pink® Batts® Insulation
BRANZ Appraisal 632 - Pink® Batts® SnugFloor® Underfloor Insulation
BRANZ Appraisal 767 - Pink® Batts® Skillion Roof Insulation

Manufacturer/supplier contact details

Company:	**Tasman Insulation New Zealand**
Web:	www.pinkbatts.co.nz
Telephone:	0800 746 522

Warranties

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1.3 WARRANTY - MANUFACTURER/SUPPLIER

Provide a material manufacturer/supplier warranty:

Lifetime Warranty	For **Pink® Batts®** insulation products

- Commence the warranty from the date of practical completion of the contract works.
- Provide this Warranty on the **Pink® Batts® Lifetime Warranty Certificate** form.

Refer to the general section 1237 WARRANTIES for additional requirements.

Requirements

1.4 QUALIFICATIONS, PINK® BATTS®

Installers to be **PinkFit® - Preferred Pink® Batts® installers**. A list of approved installers can be obtained from the web, by telephone or from the local building supplies merchant.

Web: www.pinkbatts.co.nz
Telephone: Freephone 0800 746 534

1.5 NO SUBSTITUTIONS

Substitutions are not permitted to any specified Tasman Insulation **Pink® Batts®** insulation or associated products, components or accessories.

2 PRODUCTS

Materials - thermal

2.1 PINK® BATTS® CEILING INSULATION

Pink® Batts® Ceiling Insulation (**Pink® Batts® Classic** and **Pink® Batts® Ultra®**) is a light weight flexible bio-soluble glass wool manufactured from up to 80% recycled glass, bonded with a thermosetting resin to form rectangular slabs. Refer to SELECTIONS for R values and thickness options.
NOTE: When insulation abutting or covering recessed downlights is intended to be in contact with IC, CA 80, CA 135 luminaires the insulation must withstand a 30s Needle Flame test to AS/NZS 60695.11.5. Pink® Batts® insulation meets this requirement.

2.2 PINK® BATTS® WALL INSULATION

Pink® Batts® Wall Insulation (**Pink® Batts® Classic** and **Pink® Batts® Ultra®**)is a light weight flexible bio-soluble glass wool manufactured from up to 80% recycled glass, bonded with a thermosetting resin to form rectangular slabs. Refer to SELECTIONS for R values and thickness options.

Components

2.3 FASTENERS

Insul anchors complete with retaining washer.

2.4 PLASTIC STRAPPING TAPES

Proprietary plastic strapping tape, stapled over framing to retain insulation in unlined wall, ceiling and underfloor locations.
For drained cavities where stud spaces are greater than 450mm and only flexible underlay is used, strapping required to NZBC E2/AS1 9.1.8.5 **Wall framing behind cavities**.

2.5 ADHESIVE TAPE

Pressure sensitive adhesive tape.

3 EXECUTION

3.1 DELIVERY, STORAGE & HANDLING OF PRODUCTS

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

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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 INSPECTION

Before starting installation of blankets and slabs, check that the location and framing are free from moisture, that the cavities are not interconnected and that mesh, wall underlays and vapour barriers are in place.

Application - general

3.4 INSTALL INSULATION - GENERAL

Lay, install, fit and fix to NZBC H1/AS1: Energy efficiency, 2.0 Building thermal envelope, and to manufacturer's requirements. Install in housing to NZS 4218 and NZS 4246. Install in large buildings to NZS 4243.1 and NZS 4220. Allow insulation to re-loft/relax prior to installation. Do not cover vents. Confirm with fireplace manufacturer for clearances; **Pink® Batts®** insulation 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 GENERALLY for clearances.

Application, thermal insulation

3.6 INSTALL PINK® BATTS® CEILING INSULATION

Ensure that the product is installed dry; if wet replace before installation. If cutting is required, cut oversize by 5-10mm to ensure a friction fit. Insulate around vents (not over them) to allow unhindered ventilation.
Fit **Pink® Batts® Ceiling Insulation** beneath electrical wiring and plumbing. Install to the outer edge of the top plate. Maintain a 25mm gap clearance between the **Pink® Batts®** insulation and roof underlay. Refer to NZS 4246 for installation guidelines and Pink® Batts® installation instructions for detailed information.

3.7 INSTALL PINK® BATTS® WALL INSULATION

Ensure the product is installed dry; if wet replace before installation. If cutting is required, cut oversize by 5-10mm to ensure a friction fit. Fill gaps around windows and doors with off-cuts. Insulate around vents (not over them) to allow unhindered ventilation.

Fit **Pink® Batts® Wall Insulation** behind electrical wiring and plumbing. Ensure there are no gaps, folds or undesirable compression at edges.

Refer to NZS 4246 for installation guidelines and Pink® Batts® installation instructions for detailed information.

Completion

3.8 COMPLETION MATTERS

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

4 SELECTIONS

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

Thermal insulation

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4.1 PINK® BATTS® CLASSIC CEILING INSULATION

Location:	Roof
Brand:	**Pink® Batts® Classic Ceiling**
R-value:	3.6
Thickness:	180mm

4.2 PINK® BATTS® CLASSIC WALL INSULATION

Location:	Walls as per plan
Brand:	**Pink® Batts® Classic Wall**
R-value:	2.6
Thickness:	90mm

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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.

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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.

3 EXECUTION

Conditions

3.1 DELIVERY

Keep flashings dry in transit. Take delivery of flashings in an undamaged condition. Reject all damaged materials.

3.2 STORAGE

Store materials and accessories on a level, firm base, in dry conditions, well ventilated, out of direct sunlight and completely protected from weather and damage. Ensure storage areas are away from current work areas. Cover to keep dry until fixed.

3.3 HANDLING

Avoid distortion and contact with potentially damaging surfaces/substances. Do not drag flashings across each other, or across other surfaces. Protect edges, corners and surfaces from damage.

3.4 SUBSTRATE

Do not commence work until the substrate is of the standard required by the installer for the specified flashings, level and in true alignment.

3.5 PROTECT

Protect surfaces, window and door joinery, and finishes already in place, from the possibility of damage during the installation process.

3.6 CONFIRM LAYOUT

Before commencing work confirm the proposed installation of the flashings and expansion joints and other visual considerations of the finished work.

3.7 CO-ORDINATE INSTALLATION

Co-ordinate installation of flashings with associated trades.

Application

3.8 INSTALLATION

Install flashings in accordance with 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.

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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.

4 SELECTIONS

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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

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

2 PRODUCTS

Materials

2.1 GIB® PLASTERBOARD

Gypsum plaster core encased in a face and backing paper formed for standard and water resistance use to AS/NZS 2588. Refer to SELECTIONS for location, type, thickness and finish.
GIB® Standard plasterboard
GIB Wideline® plasterboard
GIB Ultraline® high quality surface plasterboard
GIB Fyreline® fire resistant plasterboard
GIB Braceline® & GIB® Noiseline® dual purpose wall bracing & noise control plasterboard
GIB Aqualine® wet area plasterboard
GIB Toughline®
GIB Toughline® Aqua

2.2 GIB® COVING

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

Components

2.3 CEILING BATTENS

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

2.4 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.

2.5 TAPE ON TRIMS AND EDGES

GIB® Goldline™ tape-on trims
GIB® UltraFlex® high impact corner mould
GIB® Levelline® Tape on Trim

2.6 METAL ANGLE TRIMS

GIB® galvanized steel slim angle trims.

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2.7 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

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 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).

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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.

4 SELECTIONS

4.1 GIB® BRACING SYSTEMS

Refer to:

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

For bracing element location refer to drawn documentation.

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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.

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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.

2 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.

3 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.

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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.

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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

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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.

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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

3.40 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.

3.41 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.

3.42 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.

3.43 DEFECTIVE WORK

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

3.44 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

3.45 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.

3.46 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.

3.47 LEAVE

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

3.48 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.

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3.49 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.

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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.

2 PRODUCTS

2.1 PRODUCTS

Refer to 6700 PAINTING GENERAL for product clauses.

3 EXECUTION

3.1 EXECUTION

Refer to 6700 PAINTING GENERAL for execution clauses.

4 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.

2 PRODUCTS

2.1 PRODUCTS

Refer to 6700 PAINTING GENERAL for product clauses.

3 EXECUTION

3.1 EXECUTION

Refer to 6700 PAINTING GENERAL for execution clauses.

4 SELECTIONS

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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	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

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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

1.4 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.

1.5 HOT WATER TEMPERATURES

To NZBC G12/AS1, 6.14

Storage water heaters to store water at not less than 60ºC.

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:

- 45ºC - for early child hood centres, schools, elderly facilities, hospitals, psychiatric or disabled institutions.
- 55ºC - 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

1.6 TESTING - TO NZBC G12/AS1

Test to NZBC G12/AS1, 7.5, **Watertightness**, for hot and cold water.

- Test to a pressure of1500 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.

2 PRODUCTS

Materials

2.1 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.

2.2 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, table1. Protect from sunlight.

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2.3 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, table1. 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.

2.10 PROTECTIVE TAPE

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

3 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.

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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, crox 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.

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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 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)

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Pipework

4.2 POLYBUTYLENE PIPE

Manufacturer: dux
Brand: secura

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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 F2/AS1	Hazardous building materials
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 1730	Washbasins
AS/NZS 2023	Baths for ablutionary purposes
AS/NZS 3500.1: 2018	Plumbing and drainage - water services
AS/NZS 3500.2: 2018	Plumbing and drainage - sanitary plumbing and drainage
AS/NZS 3662	Performance of showers for bathing
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

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.

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

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Conditions - sanitary fixtures

3.1 DELIVERY

Only deliver to the site fixtures or fittings that can be immediately unloaded into suitable storage or be placed for direct installation.

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.

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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

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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.

4 SELECTIONS

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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.

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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:	Use:
SN4 - SN6	Domestic & light load areas
SN8 - SN10	Commercial & Industrial medium load areas
SN16	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**.

3 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.

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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.

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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

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7701 ELECTRICAL BASIC

1 GENERAL

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

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

1.1 ABBREVIATIONS AND DEFINITIONS

Refer to the general section 1232 INTERPRETATION & DEFINITIONS for abbreviations and definitions used throughout the specification.
The following abbreviations apply specifically to this section:

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

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1.2 DOCUMENTS

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

NZBC E2/AS1	External moisture
NZBC F6/AS1	Visibility in escape routes
NZBC F7/AS1	Warning systems
NZBC G4/AS1	Ventilation
NZBC G9/AS1	Electricity
AS/NZS 1125	Conductors in insulated electric cables and flexible cord
AS/NZS 1768	Lightning protection
AS/NZS 2201.1	Intruder alarm systems - Client's premises - Design, installation, commissioning and maintenance
AS 2293.1:2005	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

1.3 WARRANTY

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

1 year:	Warranty period

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

Requirements

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1.4 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.

1.5 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.

1.6 QUALIFICATIONS - SECURITY SYSTEM

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

1.7 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.

1.8 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.

1.9 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: 1.5mm² on 10 amp MCBs
Lighting circuits:	Commercial: 1.5mm² on 16 amp MCBs
Power circuits:	2.5mm² on 16 amp MCBs for domestic and unenclosed or unfilled cavity construction
	2.5mm² on 16 amp MCBs for domestic insulated construction, or filled cavity
	2.5mm² on 20 amp MCBs for unenclosed or unfilled cavity construction
	2.5mm² on 16 amp MCBs for insulated construction, or filled cavity, or lengths over 30 metres
Hot water cylinder circuits:	Single phase: 2.5mm² on 20 amp MCBs
Range/oven/hob circuits:	Single phase: 6mm² 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).

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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 ll surge protection devices fitted to the switchboard. For variable electronic equipment fit IEC 61643 Class lll 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.

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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.

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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 ll 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.

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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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Ramset™
CONCRETE NAILS

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| Quick Installation | Tamper Resistant |

Product Description

For fixing to concrete, brick and concrete blockwork.



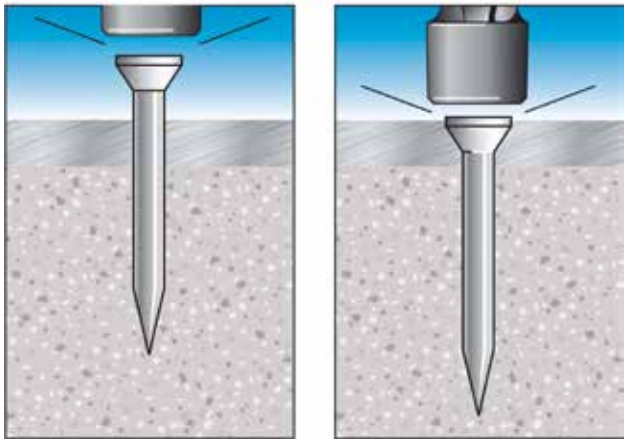
Principal Applications

- Formwork boards
- Timber batten
- Sheet metal signs
- Light gauge steelwork fixing to concrete

Features and Benefits

- High strength and ductile - will not easily break
- Available pre-assembled with washers to improve pullover strength
- Zinc electroplated with chromate conversion coating
- Carbon Steel

Installation



Concrete Nails

Anchor Size, d_b	Length, L (mm)	d_h Head Ø	Shank Style	Order No. Washer (Zn)	Order No. No Washer (Zn)
M2.4	25	4.5	Plain	CW425	CD425
	30	4.5	Plain	CW430	CD430
	40	4.5	Plain	CW440	CD440
M3.2	40	5.0	Plain	-	CD540
M3.8	50	6.0	Plain	-	CF650
	60	6.0	Plain	-	CF660
	75	6.0	Plain	-	CF675
	100	6.0	Plain	-	CF699
Road Survey Nails					
M6.5	70	14.0	Plain	-	CR970

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BOTTOM PLATE FIXING ANCHOR

COMPLIES WITH CLAUSE 7.5.12.2 NZS 3604:2011

- Eliminates the drilling of bottom plates
- Makes the fixing of timber easier and quicker
- Saves hand trowelling around cast-in anchor bolts or rods
- Use at 900mm centres max.

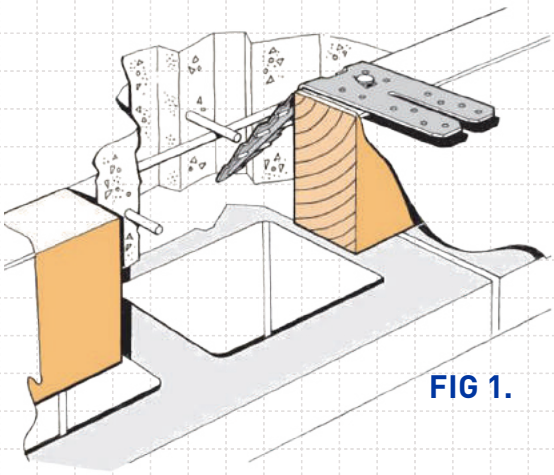
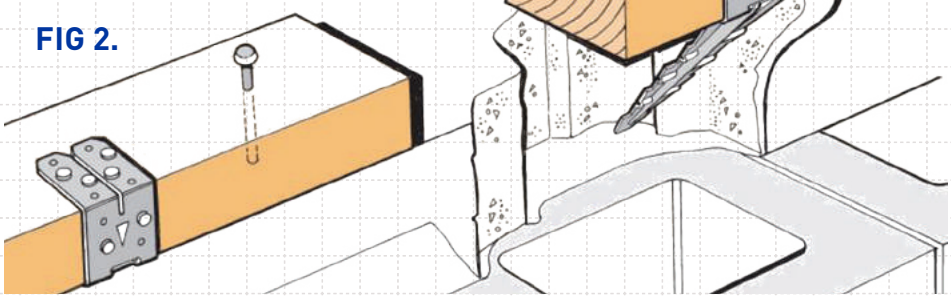


FIG 1.

1. Bottom Plate Fixing Anchors shall be fixed at 900mm centres max. to the boxing for concrete floor slabs, over a continuous vapour barrier. Each Fixing Anchor is nailed prior to concrete pour, and shall be left undisturbed until concrete has hardened ready for timber frames to be installed. Fig.1.

2. When timber framing is in place, the Fixing Anchors are folded up and over the bottom plate. Fig. 2.

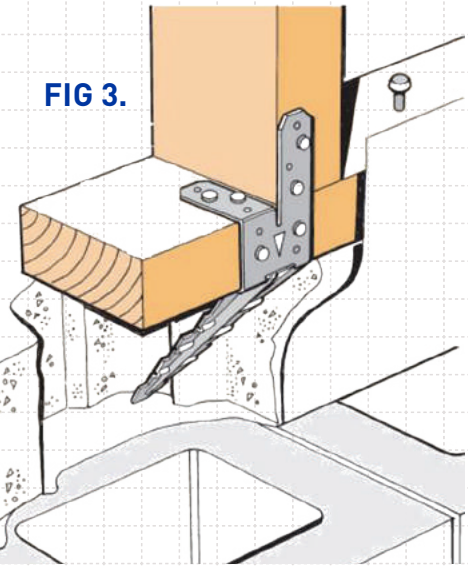
FIG 2.



3. Two LUMBERLOK Product Nails 30mm x 3.15 dia. shall then be driven into the side of the bottom plate and two additional nails applied through each of the lugs. Should a stud coincide with the position of a Fixing Anchor, nail as shown in Fig. 3.

4. A 75mm x 4 dia. concrete nail must be fixed adjacent to each Fixing Anchor, through the bottom plate into the concrete, at no less than 70mm from the concrete edge. When used as a Bracing Wall hold-down, a Fixing Anchor must be positioned within 150mm from the end of that wall. Bracing wall must not exceed 70 BU/m.

FIG 3.



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Timber Connectors

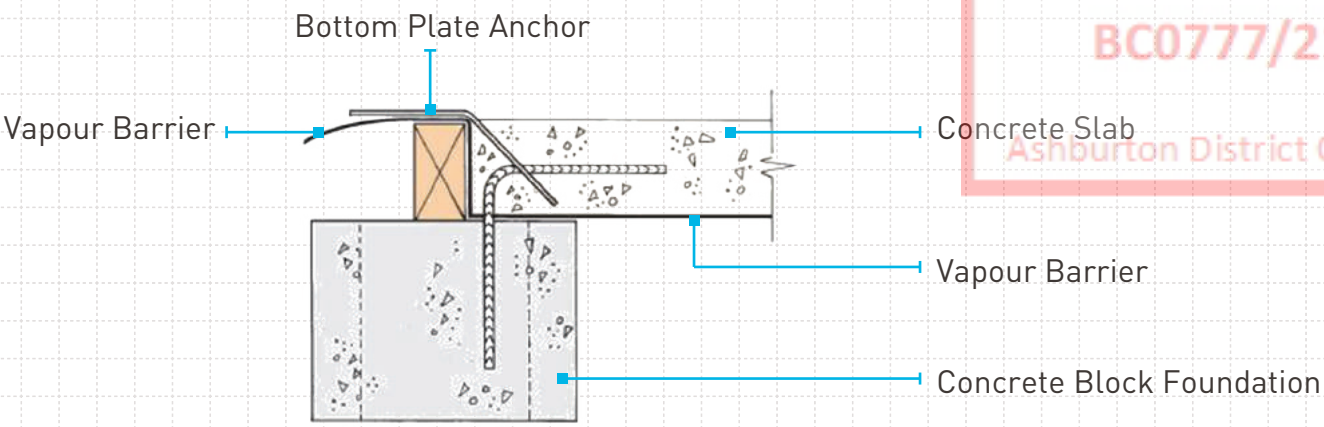
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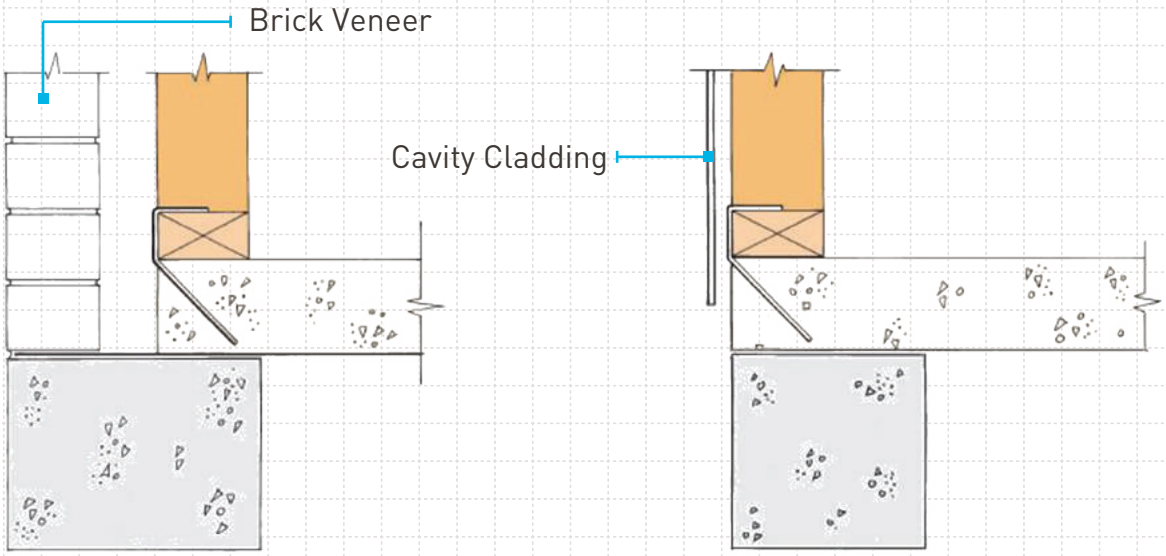
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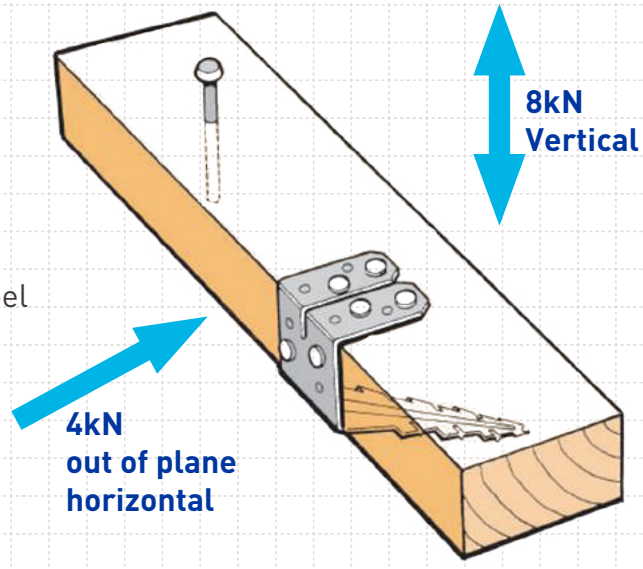
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BOTTOM PLATE FIXING ANCHOR





DESIGN LOADS
Concrete compressive strength 20MPa min.



Code:	BPA
Material:	0.95mm G300 Z450 Galvanised Steel
Code:	SSBPA
Material	0.9mm Stainless Steel 304-2B
Packed:	50 per carton

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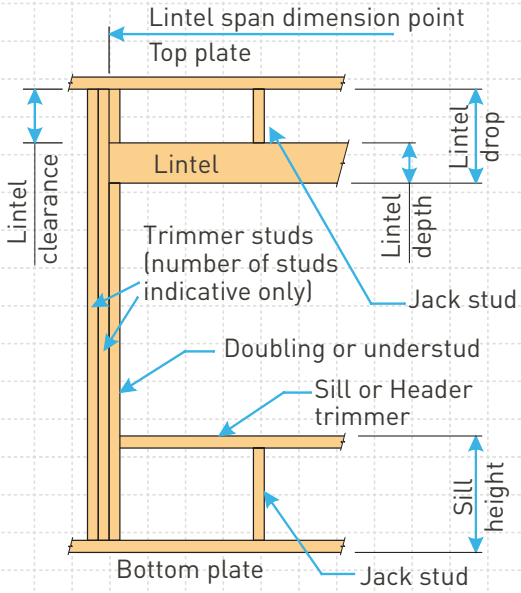
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LUMBERLOK® LINTEL FIXING SCHEDULE

ALTERNATIVE TO TABLE 8.14 & FIGURE 8.12 NZS 3604:2011

- All fixings are designed for vertical loads only. Dead loads include the roof weight and standard ceiling weight of 0.20kPa
- Refer to Table 8.19 NZS 3604:2011 for nailing schedule to resist horizontal loads
- These fixings assume the correct choice of rafter/truss to top plate connections have been made
- All fixings assume bottom plate thickness of 45mm maximum. Note: Tylok options on timber species
- Wall framing arrangements under girder trusses are not covered in this schedule
- All timber selections are as per NZS 3604:2011



LINTEL SUPPORTING GIRDER TRUSSES

	Light Roof			Heavy Roof		
	Wind Zone			Wind Zone		
Roof Tributary Area	Low, Medium, High	Very High	Extra High	Low, Medium, High	Very High	Extra High
8.6m²	G	G	H	G	G	H
11.6m²	G	H	H	G	G	H
12.1m²	G	H	H	G	H	H
15.3m²	H	H	-	G	H	H
19.1m²	H	-	-	G	H	-
20.9m²	H	-	-	H	H	-
21.8m²	H	-	-	H	-	-
34.3m²	-	-	-	H	-	-

NOTES:

1. Roof Tributary Area = approx. 1/2 x (total roof area on girder and rafter trusses supported by lintel)
2. Assumed girder truss is at mid-span or middle third span of lintel
3. Use similar fixings for both ends of lintel
4. All other cases require specific engineering design

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LUMBERLOK® LINTEL FIXING SCHEDULE

ALTERNATIVE TO TABLE 8.14 & FIGURE 8.12 NZS 3604:2011

Lintel Span (m)	Loaded Dimension (m)	Light Roof					Heavy Roof				
		Wind Zone					Wind Zone				
		Low	Medium	High	Very High	Extra High	Low	Medium	High	Very High	Extra High
1.0	2.0	E	E	E	F	F	E	E	E	E	F
	3.0	E	E	F	F	F	E	E	E	F	F
	4.0	E	F	F	F	G	E	E	F	F	F
	5.0	E	F	F	G	G	E	E	F	F	G
	6.0	E	F	F	G	G	E	E	F	F	G
1.2	2.0	E	E	F	F	F	E	E	E	F	F
	3.0	E	E	F	F	F	E	E	F	F	F
	4.0	E	F	F	G	G	E	E	F	F	G
	5.0	E	F	F	G	G	E	E	F	F	G
	6.0	F	F	G	G	H	E	E	F	G	G
1.5	2.0	E	E	F	F	F	E	E	E	F	F
	3.0	E	F	F	F	G	E	E	F	F	F
	4.0	E	F	F	G	G	E	E	F	F	G
	5.0	F	F	G	G	H	E	E	F	G	G
	6.0	F	F	G	H	H	E	E	F	G	H
2.0	2.0	E	F	F	F	G	E	E	F	F	F
	3.0	E	F	F	G	G	E	E	F	F	G
	4.0	F	F	G	G	H	E	E	F	G	G
	5.0	F	F	G	H	H	E	E	F	G	H
	6.0	F	G	G	H	H	E	F	G	H	H
2.4	2.0	E	F	F	G	G	E	E	F	F	G
	3.0	F	F	G	G	H	E	E	F	G	G
	4.0	F	F	G	H	H	E	E	F	G	H
	5.0	F	G	G	H	H	E	F	G	H	H
	6.0	F	G	H	H	-	E	F	G	H	H
3.0	2.0	E	F	F	G	G	E	E	F	F	G
	3.0	F	F	G	H	H	E	E	F	G	H
	4.0	F	G	G	H	H	E	F	G	H	H
	5.0	F	G	H	H	-	E	F	G	H	H
	6.0	F	G	H	-	-	E	F	G	H	-
3.6	2.0	F	F	G	G	H	E	E	F	G	G
	3.0	F	F	G	H	H	E	F	G	G	H
	4.0	F	G	H	H	-	E	F	G	H	H
	5.0	F	G	H	-	-	E	F	G	H	-
	6.0	G	H	H	-	-	E	F	H	-	-
4.2	2.0	F	F	G	G	H	E	E	F	G	G
	3.0	F	G	H	H	-	E	F	G	H	H
	4.0	F	G	H	-	-	E	F	G	H	-
	5.0	G	H	H	-	-	E	F	H	-	-
	6.0	G	H	-	-	-	E	F	H	-	-
4.5	2.0	F	F	G	H	H	E	E	F	G	H
	3.0	F	G	H	H	-	E	F	G	H	H
	3.4	F	G	H	H	-	E	F	G	H	H
	4.0	F	G	H	-	-	E	F	G	H	-
	5.0	G	H	-	-	-	E	F	H	-	-
	6.0	G	H	-	-	-	E	F	H	-	-
4.8	2.0	F	F	G	H	H	E	E	F	G	H
	3.0	F	G	H	H	-	E	F	G	H	H
	3.2	F	G	H	H	-	E	F	G	H	H
	4.0	F	G	H	-	-	E	F	H	H	-
	5.0	G	H	-	-	-	E	F	H	-	-
	6.0	G	H	-	-	-	E	F	H	-	-
5.1	2.0	F	F	G	H	H	E	F	G	G	H
	3.0	F	G	H	H	-	E	F	G	H	H
	3.5	F	G	H	-	-	E	F	G	H	-
	4.0	G	G	H	-	-	E	F	H	H	-
	5.0	G	H	-	-	-	E	F	H	-	-
	6.0	G	H	-	-	-	E	G	H	-	-
5.4	2.0	F	F	G	H	H	E	F	G	G	H
	2.8	F	G	H	H	-	E	F	G	H	H
	3.0	F	G	H	-	-	E	F	G	H	-
	4.0	G	H	H	-	-	E	F	H	-	-
	5.0	G	H	-	-	-	E	F	H	-	-
	6.0	G	H	-	-	-	E	G	H	-	-

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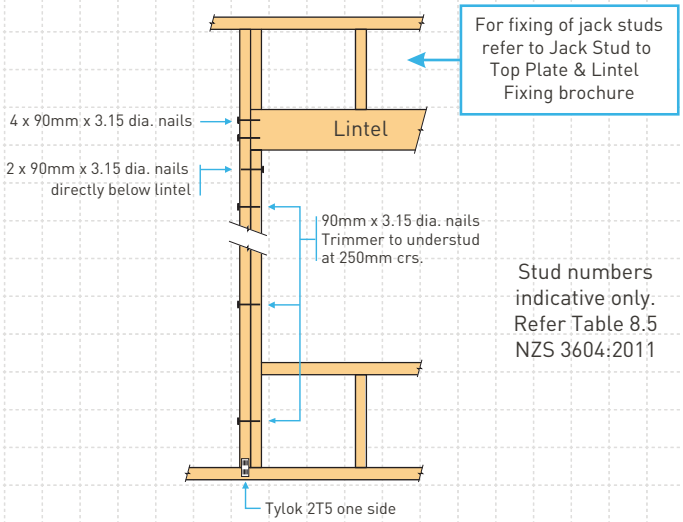
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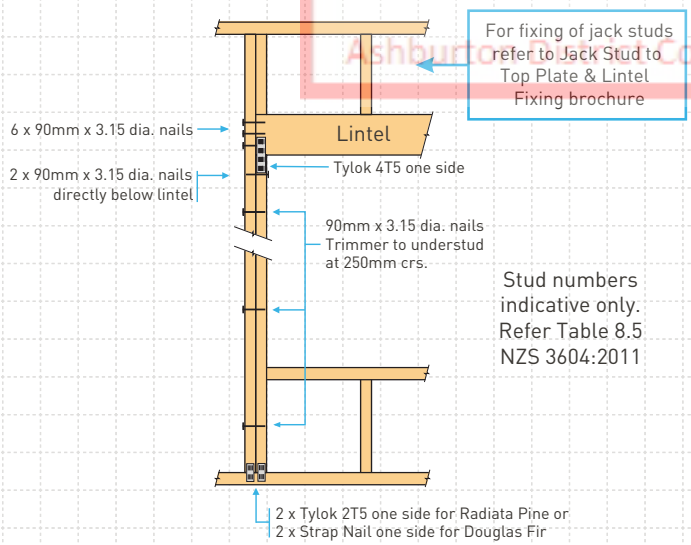
LUMBERLOK® LINTEL FIXING OPTIONS

ALTERNATIVE TO TABLE 8.14 & FIGURE 8.12 NZS 3604:2011

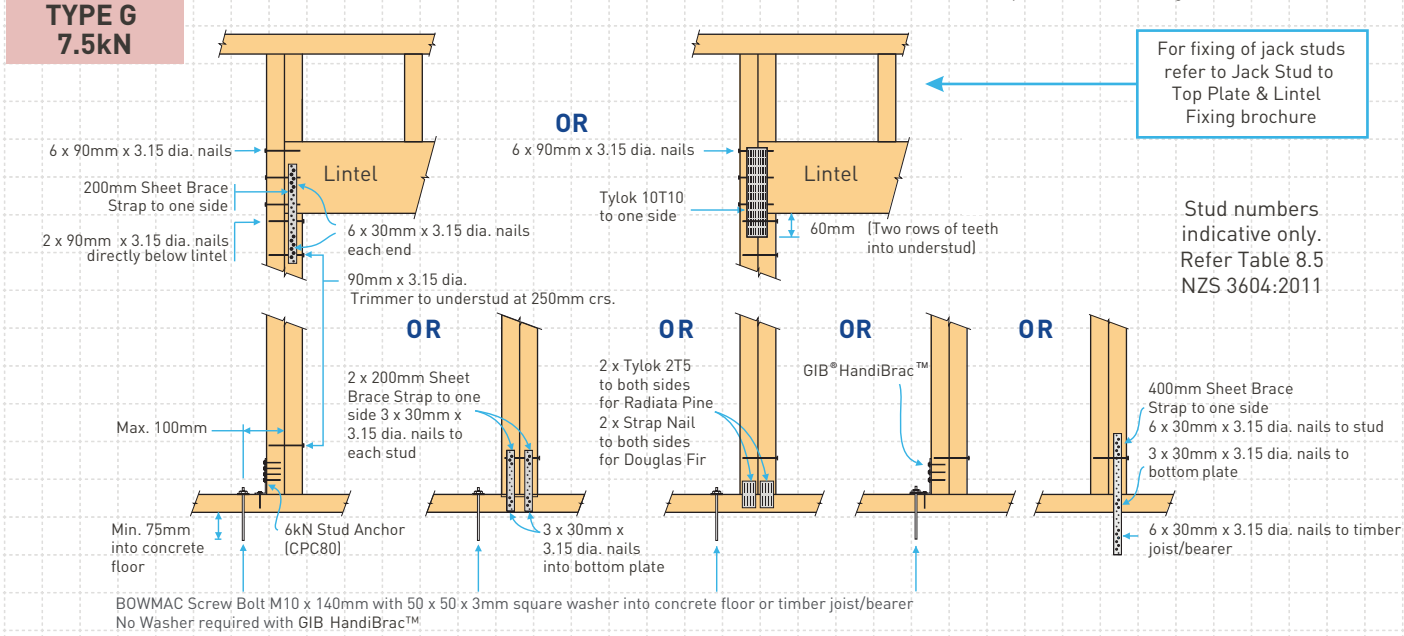
TYPE E 1.4kN



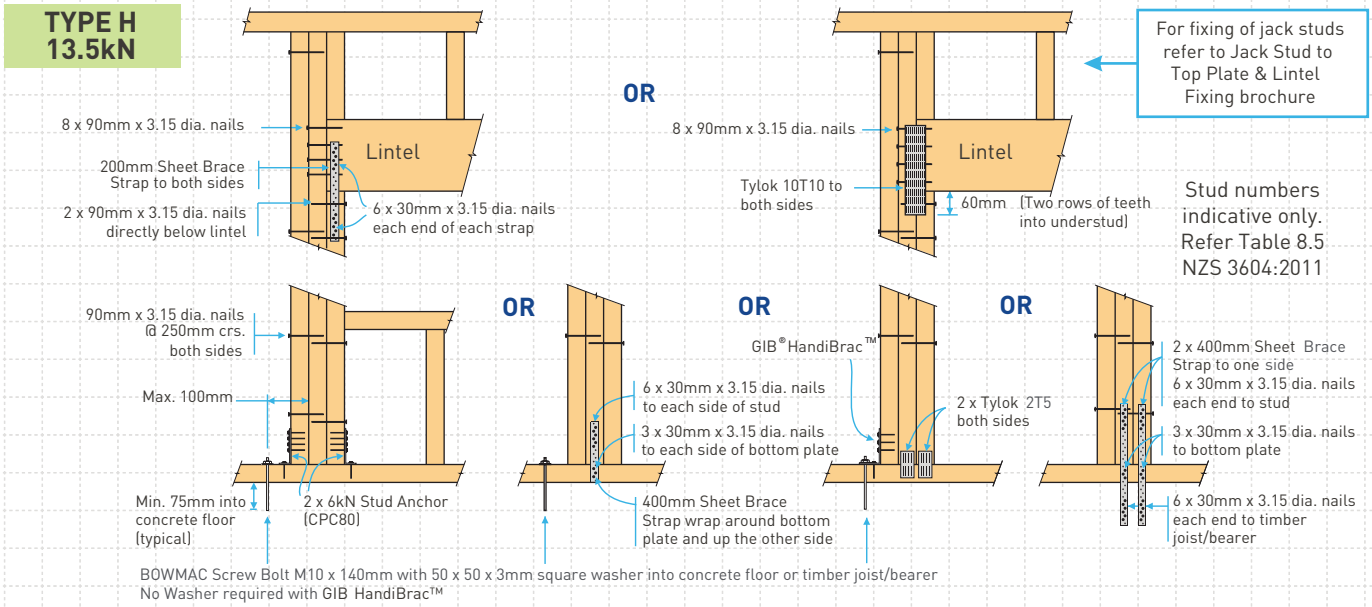
TYPE F 4.0kN



TYPE G 7.5kN



TYPE H 13.5kN



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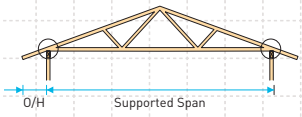
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STUD TO TOP PLATE FIXING SCHEDULE

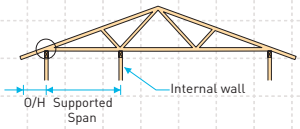
ALTERNATIVE TO TABLE 8.18 NZS 3604:2011

- Fixings are designed to resist vertical loads only. Dead loads include roof weight and standard ceiling weight of .20kPa
- Refer to Table 8.19 NZS 3604:2011 for nailing schedule to resist lateral loads
- These fixings assume the correct choice of rafter/truss to top plate connections have been made
- For gable end walls where the adjacent rafter/truss is located within 1200mm and with a maximum verge overhang of 750mm, select stud to top plate fixing using a loaded dimension of 1.5m
- All fixings assume top plate thickness of 45mm maximum
- Wall framing arrangements under girder trusses are not covered in this schedule
- All timber selections are as per NZS 3604:2011

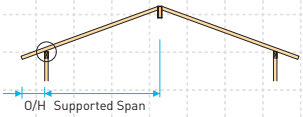
LOADED DIMENSION DEFINITION



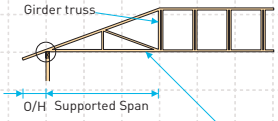
External wall
Standard truss



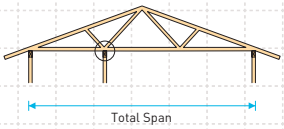
External wall
Internally supported truss



External wall
Rafter roof



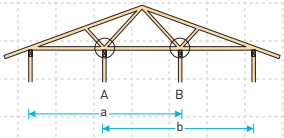
External wall
Jack truss



Internal wall
Internally supported truss
(overhang dimension does not apply)

EXTERNAL WALL
LOADED DIMENSION =
$\frac{\text{SUPPORTED SPAN}}{2}$ + O/H

INTERNAL WALL
LOADED DIMENSION =
$\frac{\text{TOTAL SPAN}}{2}$



Multiple internal walls
(overhang dimension does not apply)

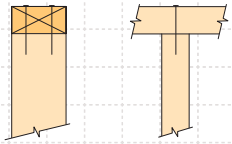
MULTIPLE INTERNAL WALL
LOADED DIMENSION FOR
WALL A = $\frac{a}{2}$
WALL B = $\frac{b}{2}$

For Fixing Selection Chart refer chart on reverse page

FIXING OPTIONS

FIXING TYPE A 0.7kN

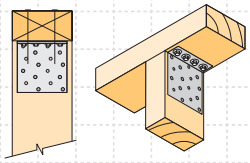
2 x 90mm x 3.15 dia. plain steel wire nails driven vertically into stud.



FIXING TYPE B 4.7kN

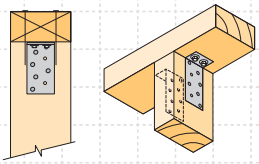
CHOOSE ANY OF THE 3 OPTIONS BELOW

2 x 90mm x 3.15 dia. plain steel wire nails driven vertically into stud.



Plus
LUMBERLOK
6kN Stud Anchor
(CPC80)

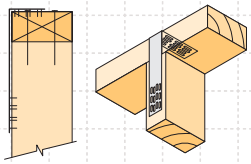
2 x 90mm x 3.15 dia. plain steel wire nails driven vertically into stud.



Plus
2 x LUMBERLOK
CPC40

Recommended for internal wall options to avoid lining issues

2 x 90mm x 3.15 dia. plain steel wire nails driven vertically into stud.



Plus
LUMBERLOK
Stud Strap
(one face only)

Note:
To calculate the number of B type fixings required, divide the wall length by the stud centres, add 1 to this figure and locate this number of fixings as evenly as possible along the wall length. This figure includes the start and end studs in each wall length.

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STUD TO TOP PLATE FIXING SCHEDULE

FIXING SELECTION CHART

(Suitable for walls supporting roof members at 600, 900 or 1200mm crs.)

Wind Zones L, M, H, VH, EH, as per NZS 3604:2011

LOADED DIMENSIONS (M) STUD CENTRES			LIGHT ROOF WIND ZONE					HEAVY ROOF WIND ZONE				
300MM	400MM	600MM	L	M	H	VH	EH	L	M	H	VH	EH
3.0	2.3	1.5	A	A	B	B	B	A	A	B	B	B
4.0	3.0	2.0	A	A	B	B	B	A	A	B	B	B
5.0	3.8	2.5	A	B	B	B	B	A	A	B	B	B
6.0	4.5	3.0	A	B	B	B	B	A	A	B	B	B
7.0	5.3	3.5	A	B	B	B	B	A	A	B	B	B
8.0	6.0	4.0	A	B	B	B	B	A	A	B	B	B
9.0	6.8	4.5	B	B	B	B	B	A	A	B	B	B
10.0	7.5	5.0	B	B	B	B	B	A	A	B	B	B
11.0	8.3	5.5	B	B	B	B	B	A	A	B	B	B
12.0	9.0	6.0	B	B	B	B	B	A	A	B	B	B

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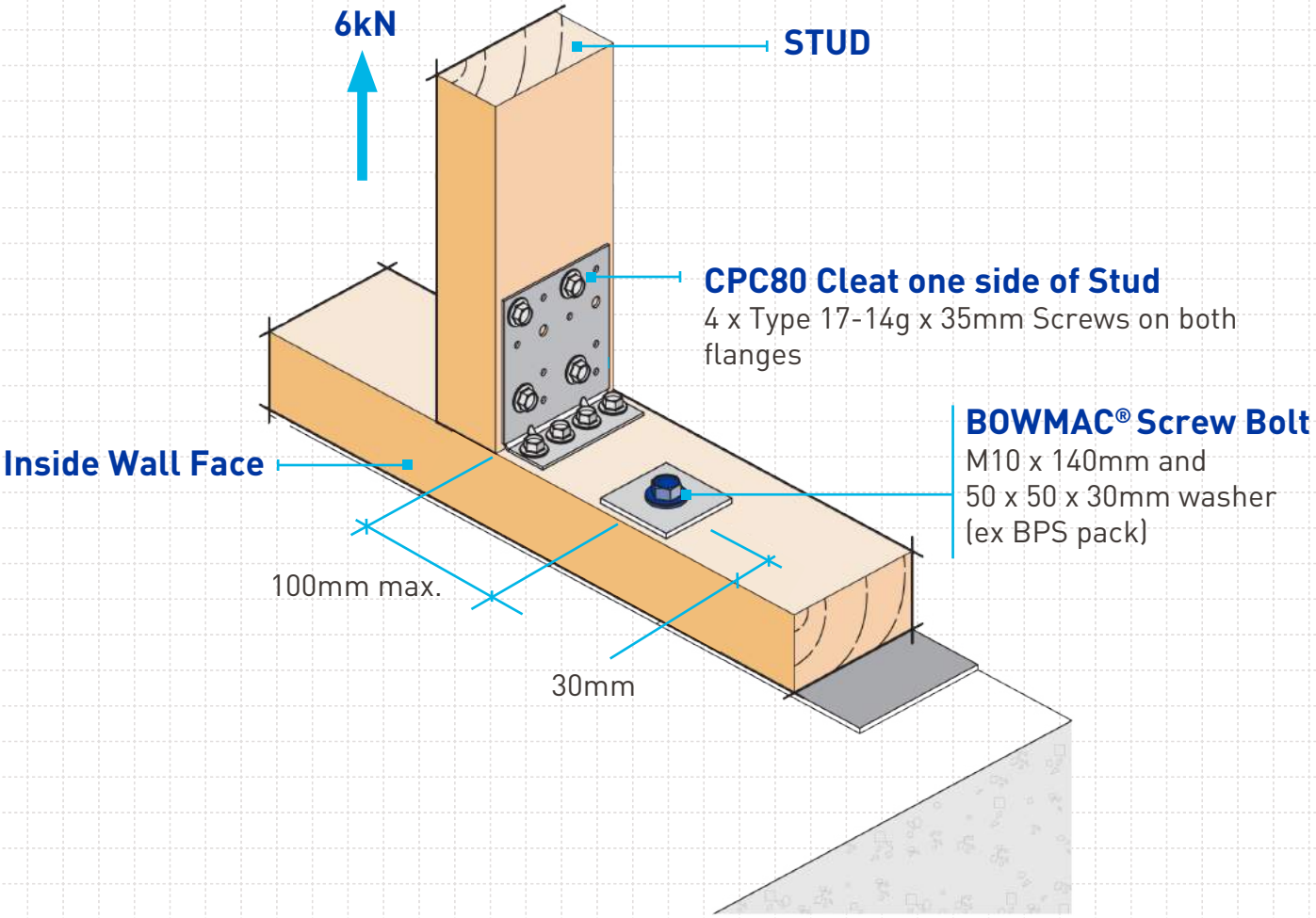
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6kN STUD TO BOTTOM PLATE FIXING

IDEAL AS RETRO FIT FIXING AFTER LINING/CLADDING INSTALLED

FOR CONCRETE FLOOR SLABS



CODE: SBP
MATERIAL: CPC80 1.55mm G300 Z275 Galzanised Steel
PACKED: 2 x CPC80 Cleats
16 x Type 17-14g x 35mm Hex Head Galvanised Screws

AVAILABLE FROM LEADING BUILDERS SUPPLY MERCHANTS THROUGHOUT NEW ZEALAND

MiTek® LUMBERLOK® Timber Connectors

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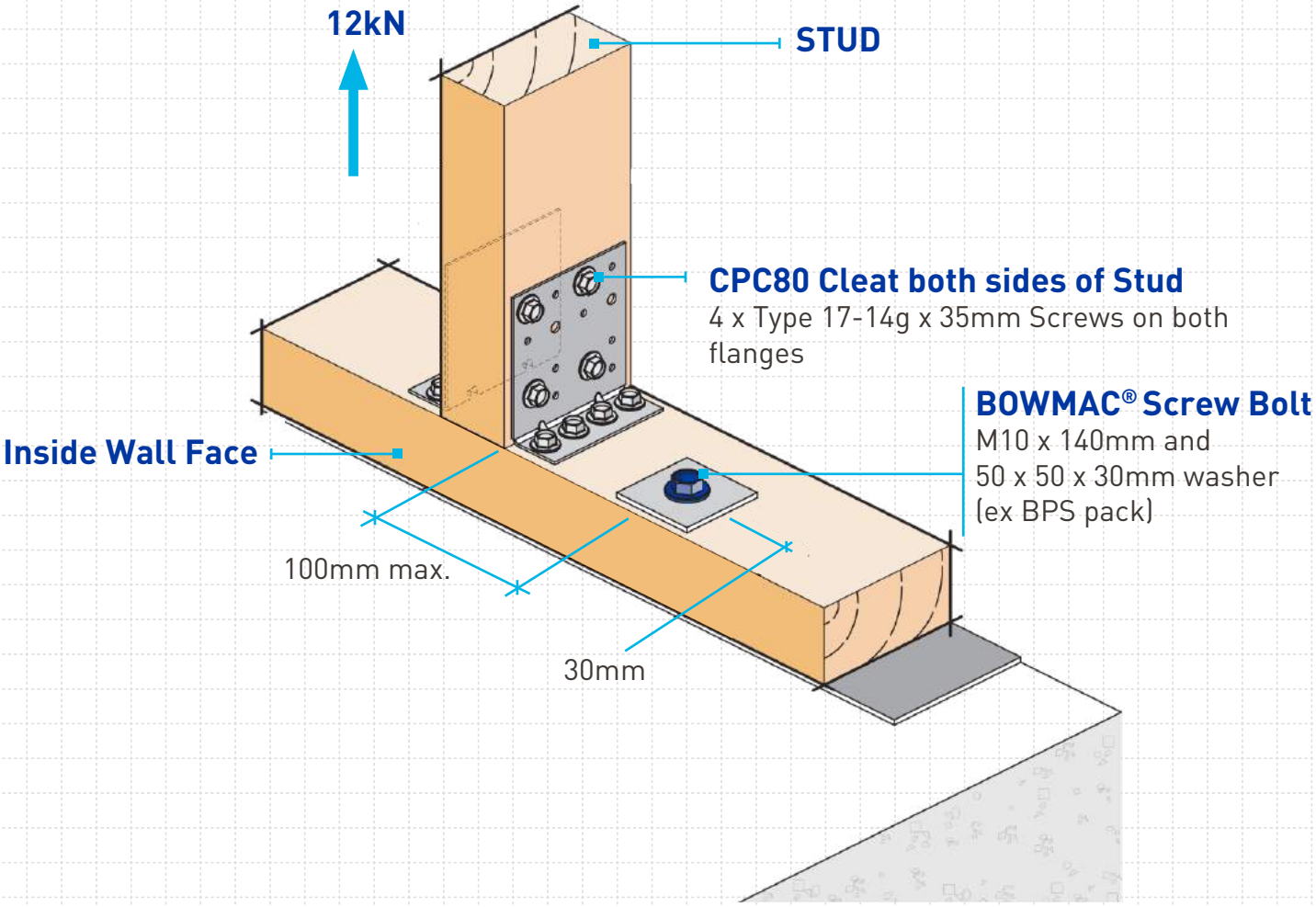
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12kN STUD TO BOTTOM PLATE FIXING

IDEAL AS RETRO FIT FIXING AFTER LINING/CLADDING INSTALLED

FOR CONCRETE FLOOR SLABS



CODE: SBP
MATERIAL: CPC80 1.55mm G300 Z275 Galzanised Steel
PACKED: 2 x CPC80 Cleats
16 x Type 17-14g x 35mm Hex Head Galvanised Screws

AVAILABLE FROM LEADING BUILDERS SUPPLY MERCHANTS THROUGHOUT NEW ZEALAND

MiTek® LUMBERLOK® Timber Connectors

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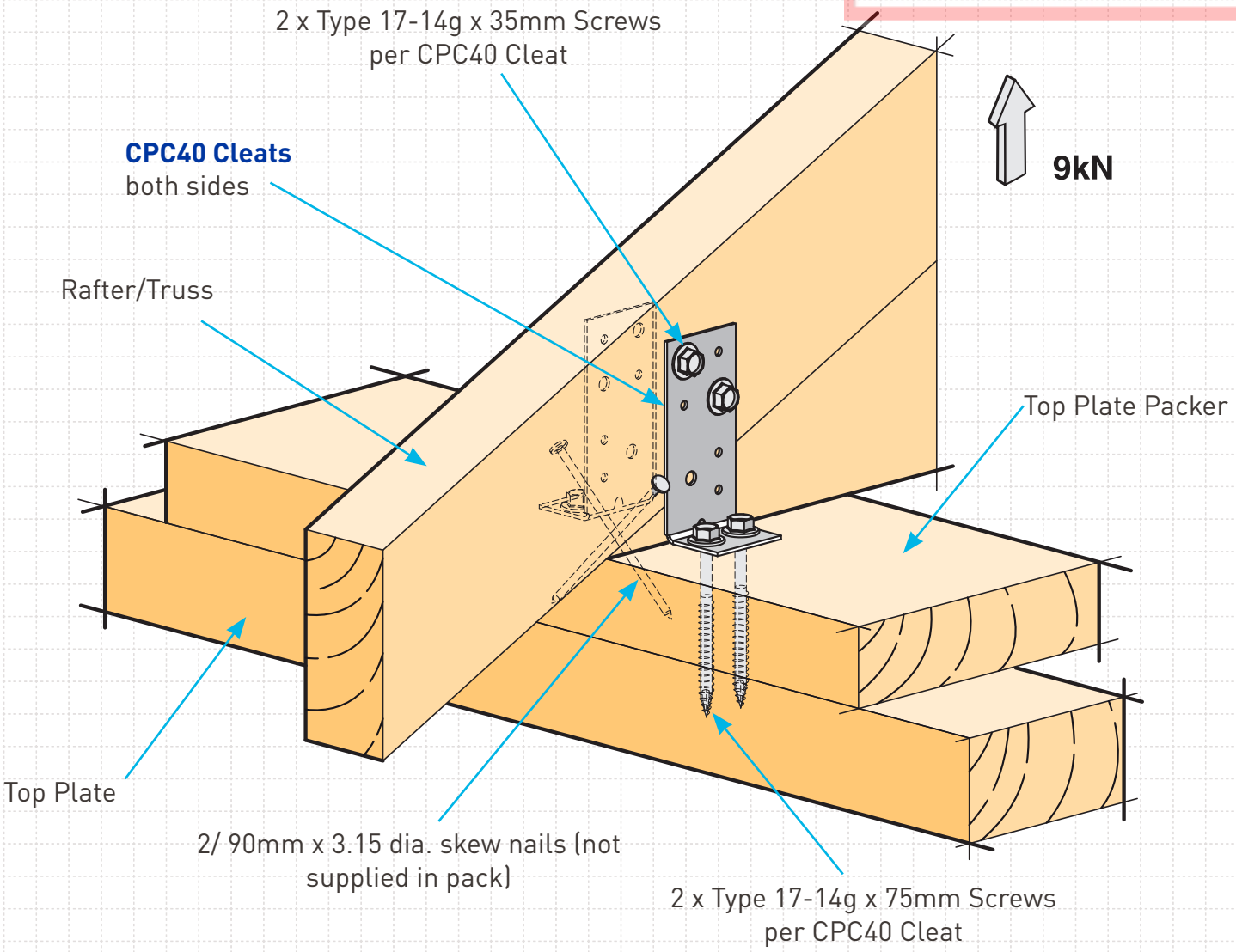
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9kN TRUSS TO TOP PLATE FIXING

COMPLIES WITH TABLE 10.15 NZS 3604:2011

Top mounted fixing allows additional face fixing if required.



Code: 9KNTTP

Material: CPC40 1.55mm G300 Z275 Galvanised Steel

Packed: 2 x CPC40 Cleats
4 x Type 17-14g x 35mm Hex Head Galvanised Screws
4 x Type 17-14g x 75mm Hex Head Galvanised Screws

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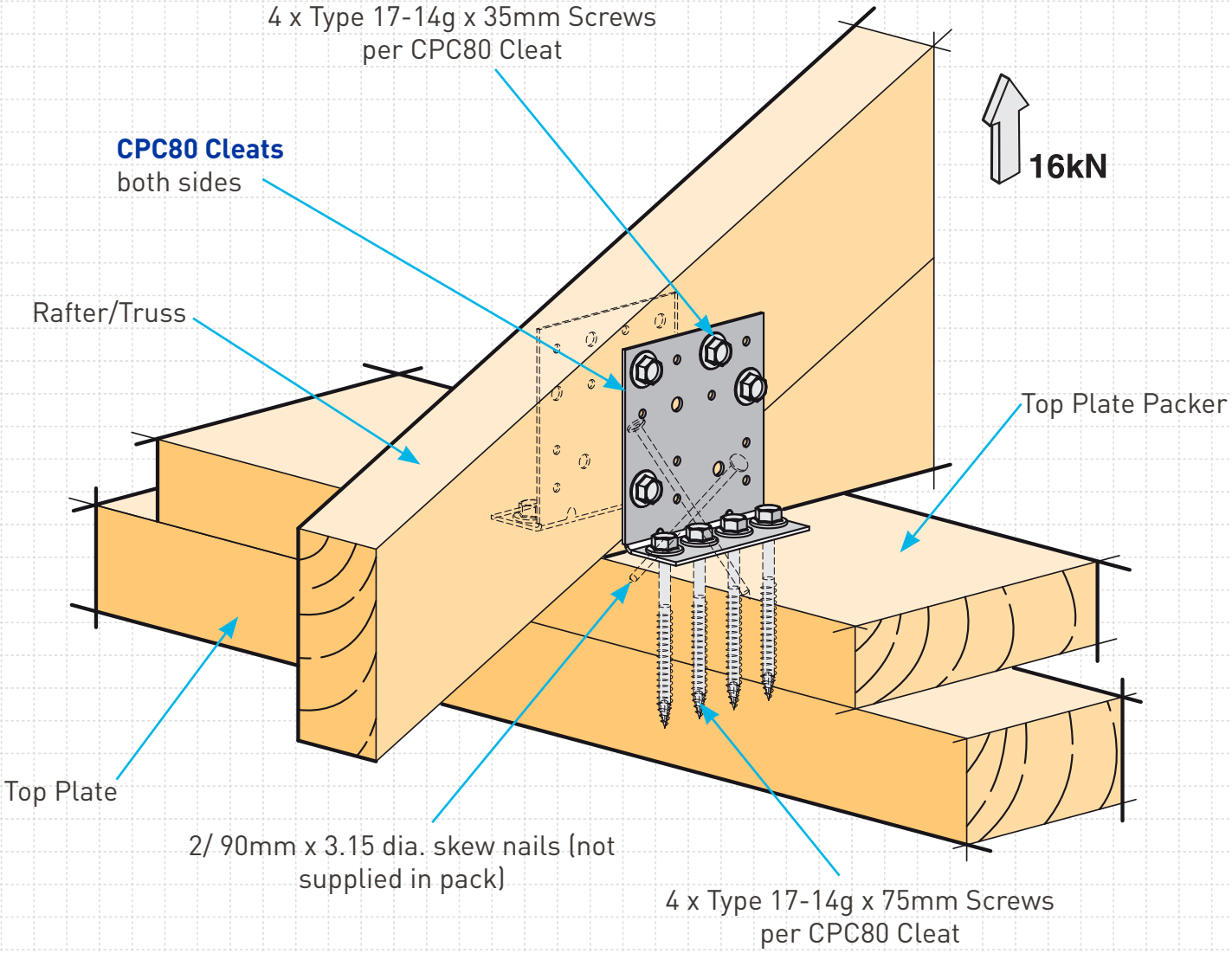
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16kN TRUSS TO TOP PLATE FIXING

COMPLIES WITH TABLE 10.15 NZS 3604:2011

Top mounted fixing allows additional face fixing if required.



Code: 16KNTTP

Material: CPC80 1.55mm G300 Z275 Galvanised Steel

Packed: 2 x CPC80 Cleats
8 x Type 17-14g x 35mm Hex Head Galvanised Screws
8 x Type 17-14g x 75mm Hex Head Galvanised Screws

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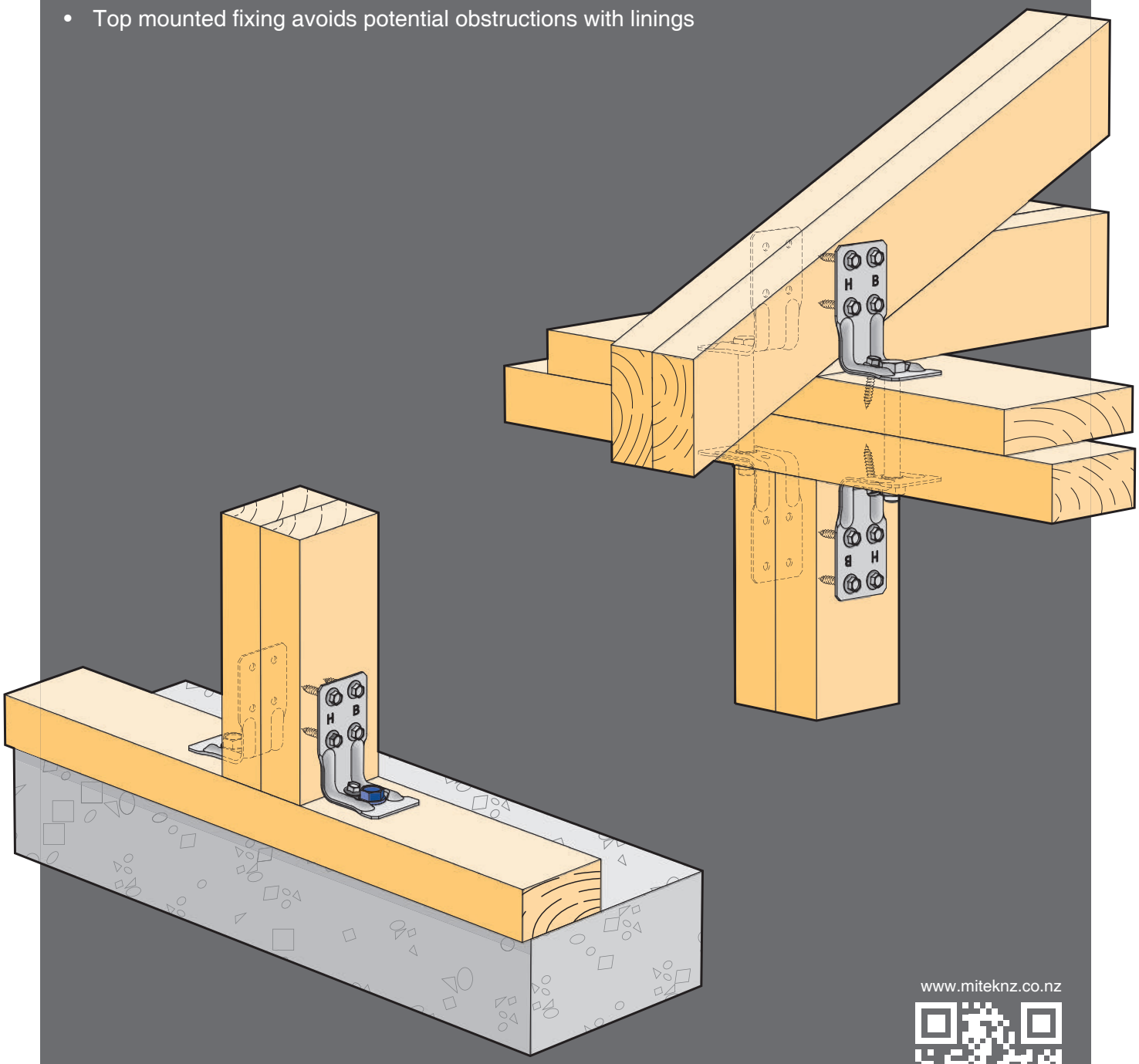
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BOWMAC®
STRUCTURAL BRACKETS

24kN Uplift Fixing

INCLUDES BOTH TRUSS FIXING AND BOTTOM PLATE FIXING

- Complies with Table 10.15 NZS 3604:2011
- Top mounted fixing avoids potential obstructions with linings

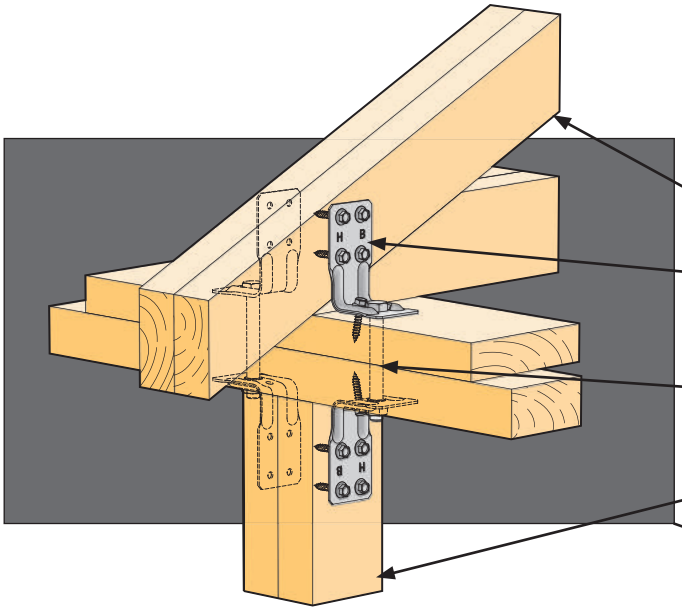


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BOWMAC® STRUCTURAL BRACKETS
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Truss To Top Plate Fixing

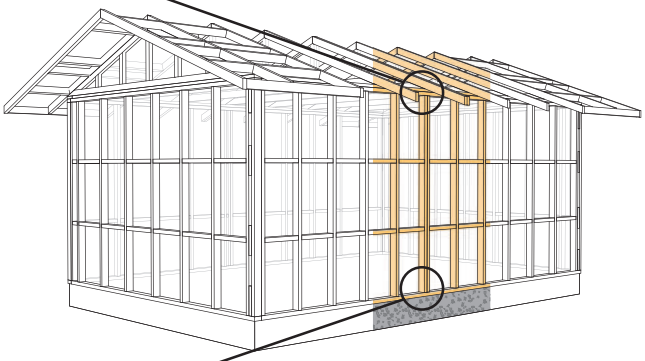


Double rafter/truss

GIB HandiBrac® fixed both sides with supplied LUMBERLOK® Type 17-14g x 35mm Electro Galvanised Screws

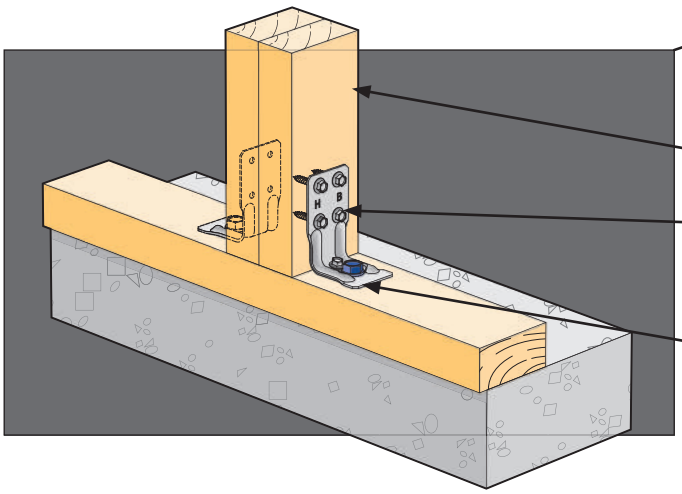
M12 bolts through top plate and packer both sides

Double stud



24kN

Stud To Bottom Plate Fixing



Double stud

GIB HandiBrac® fixed both sides with supplied LUMBERLOK® Type 17-14g x 35mm Electro Galvanised Screws

One BOWMAC® Screw Bolt M10 x 140mm per GIB HandiBrac® into concrete slab

CODE	B24KNUF
MATERIAL	GIB HandiBrac® - 2.0mm G250 Z275 Galvanised Steel
PACKED	6 x GIB HandiBrac®
	2 x M12 120mm bolt and nut set
	2 x BOWMAC® Screw Bolt M10 x 140mm
	30 x LUMBERLOK® Type 17-14g x 35mm Electro Galvansied Screws

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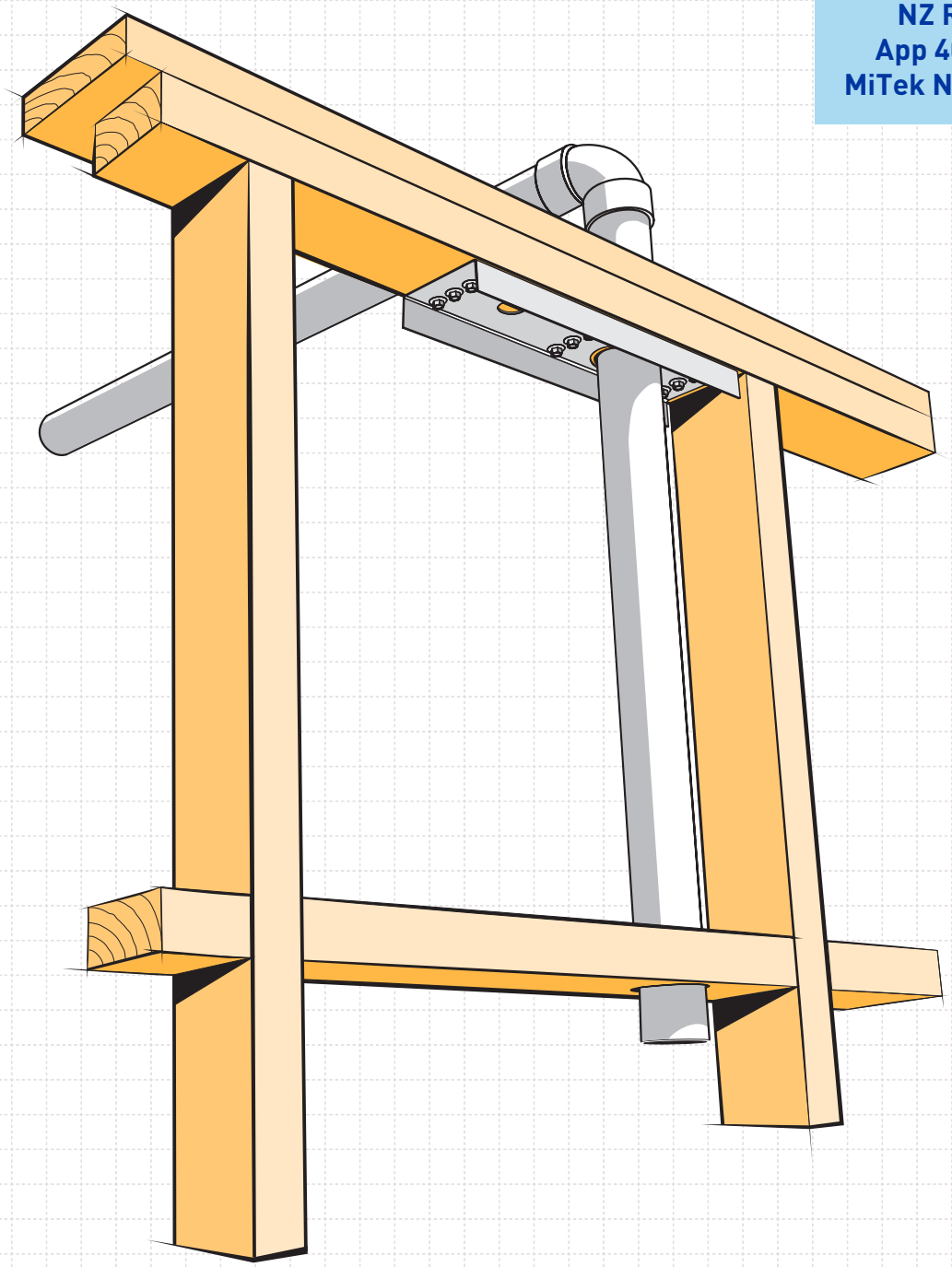
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TOP PLATE STIFFENER

FOR PLUMBING OR VACUUM SYSTEM DUCTING THROUGH TOP PLATES

- Reinforces the top plate back to FULL STRENGTH
- Alternative solution to figure 8.20 NZS 3604:2011

NZ REG DESIGN
App 408133 © 2006
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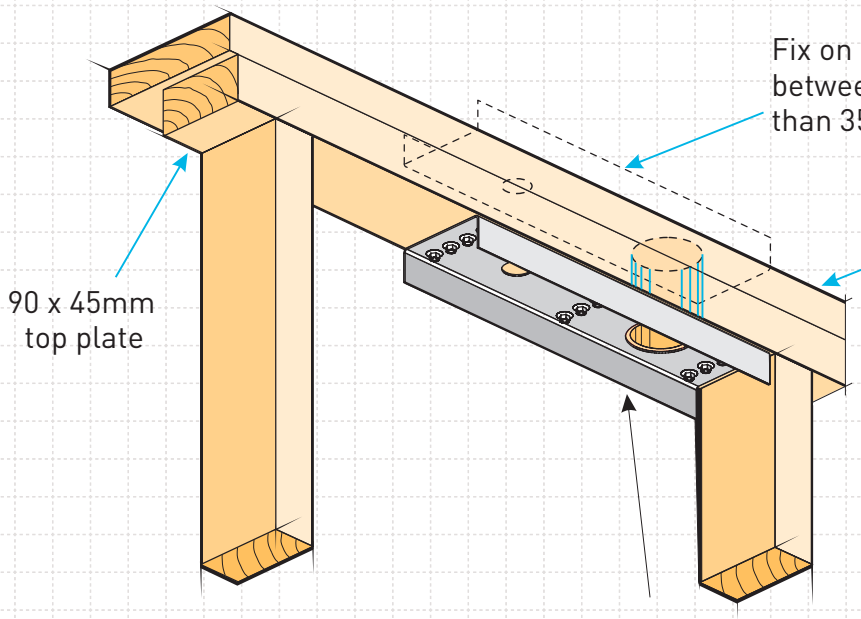
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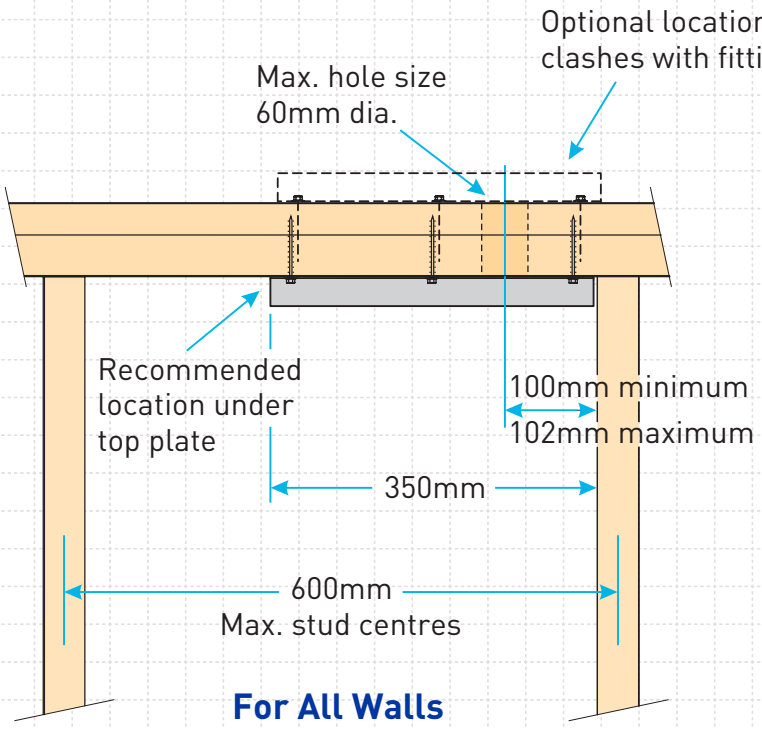
TOP PLATE STIFFENER



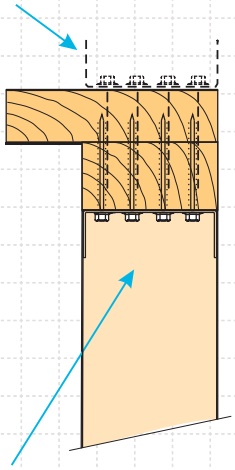
NOTE:
Use Top Plate Stiffener as template for drilling 60mm hole

NOTE:
For single top plate fix with Type 17-14g x 35mm Hex Head Screws (not supplied)

Fix up into top plate and into packer with 3 rows of 4 x Type 17-14g x 75mm Hex Head Screws (supplied). It may be advisable to drill pilot hole for each screw to assist installation



For All Walls



Recommended location: Top Plate Stiffener under top plate as shown within the wall frame

Code: TPS
Material: 1.55mm G300 Z275 Galvanised Steel
Packed: 8 x Framing Stud Stiffeners per carton
100 x Type 17-14g x 75mm Hex Head Galvanised Screws

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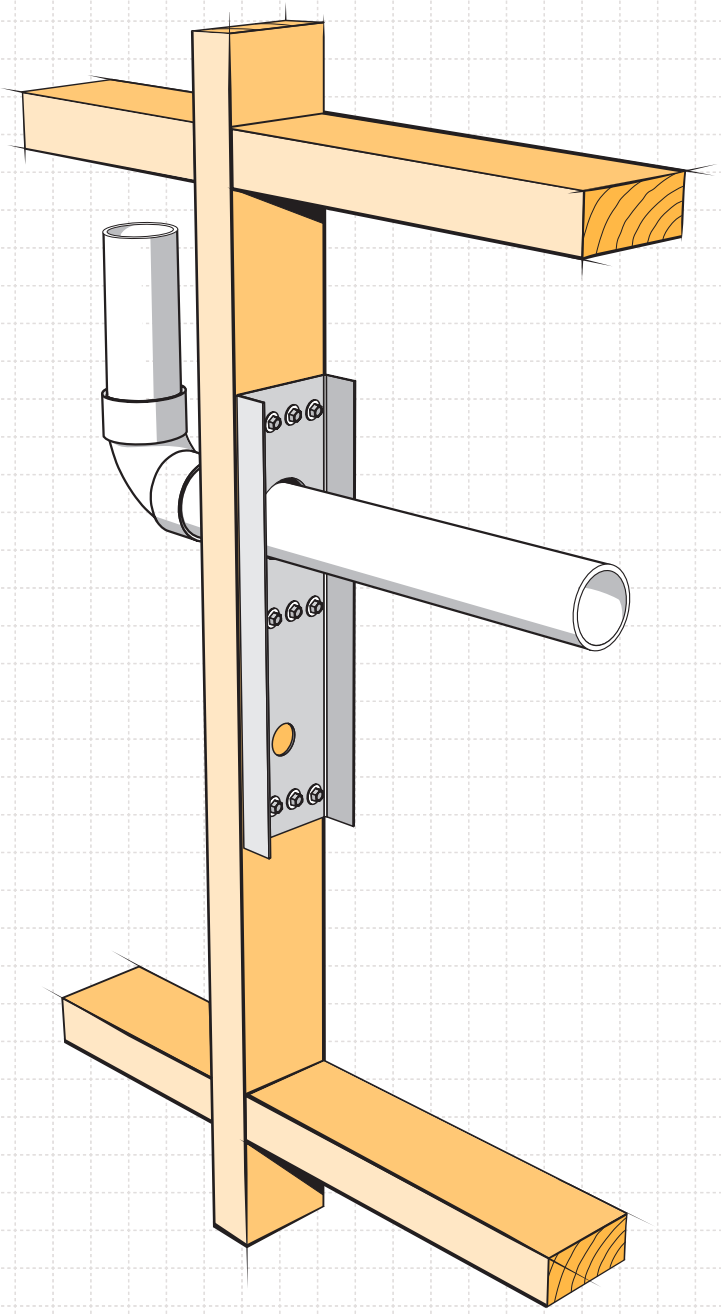
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FRAMING STUD STIFFENER

FOR DUCTING THROUGH TIMBER STUDS

- Reinforces 90 x 45mm timber studs back to FULL STRENGTH
- Solution to include holes up to 60mm diameter
- Refer Clause 8.5.1.6 NZS 3604:2011



NZ reg. Design
App. 408133 © 2006
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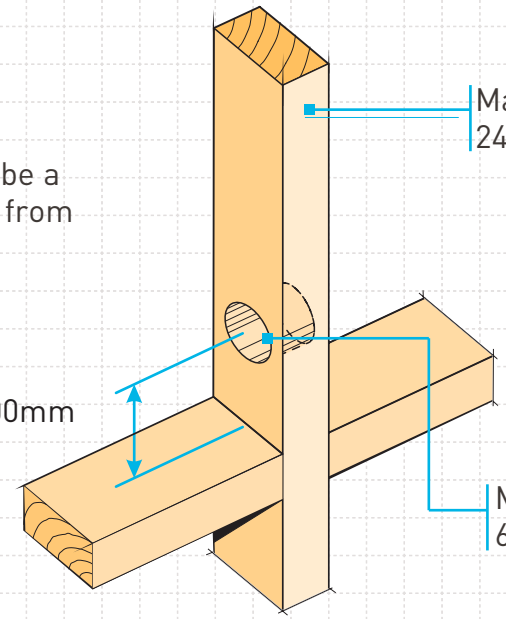
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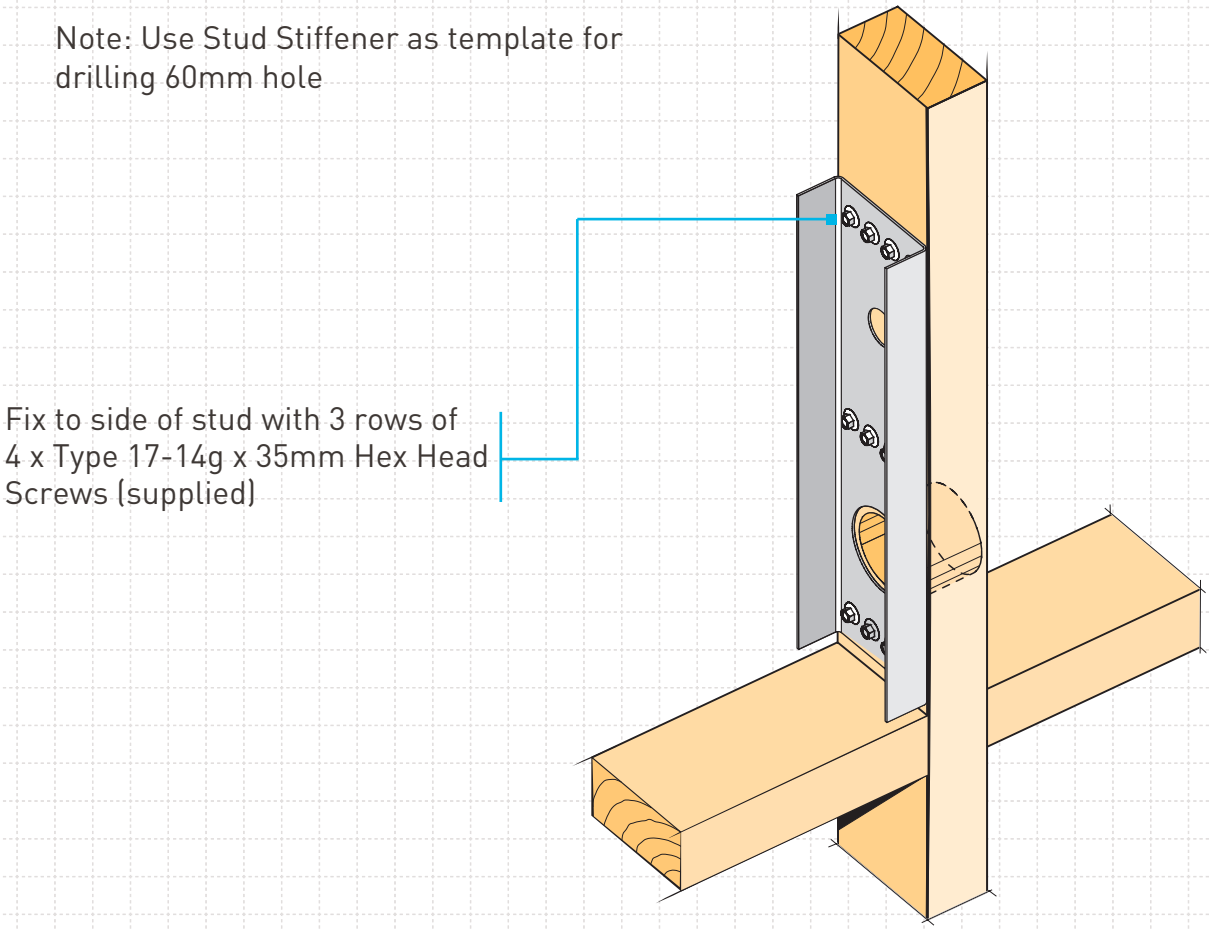
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FRAMING STUD STIFFENER



Note: Use Stud Stiffener as template for drilling 60mm hole



Code: FSS
Material: 1.55mm G300 Z275 Galvanised Steel
Packed: 8 x Framing Stud Stiffeners per carton
100 x Type 17-14g x 35mm hex head Galvanised Screws

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GIB® EzyBrace® Systems

Specification and installation manual



CBI 5113

AUGUST 2016

Document Set ID: 683756
Version: 1, Version Date: 04/11/2023



NATIONAL SUPPORT

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GIB® HELPLINE

0800 100 442

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Based on learnings derived from the 2011 Canterbury earthquakes GIB EzyBrace® Systems have been updated to offer improved design flexibility and further simplification of the bracing design and build process.

NEW GIB EZYBRACE® 2016 DESIGN SOFTWARE

- Improved user interface with simplified bracing design process.
- Increased functionality including exterior line check function, easy insert/deletion of bracing elements and built in software help function.
- Includes the new GIB® Bracing element GS2- NOM
- Allows the GIBFix® Framing System to be used in GIB EzyBrace® designs.

NEW GIB® BRACING ELEMENT GS2-NOM

- Allows internal walls lined with GIB® plasterboard on both sides and fastened off as per the standard fixing requirements of the current GIB® Site Guide to contribute to bracing resistance.
- Potentially reduces the amount of fasteners[1]
- Encourages more even bracing distribution throughout the building.

[1] Actual savings dependent on building and bracing design

UPDATE TO OPENINGS IN BRACING ELEMENTS AND CEILING DIAPHRAGMS

- Large hole specification updated to use a more conservative methodology.
- Guidance included for fireplace flues and range hoods.

NEW — GIBFIX® FRAMING SYSTEM

- Reduced potential for fastener pop and joint cracking as a result of timber frame movement.
- Reduced potential for on-site call backs.
- Improved thermal performance.
- Reinforced plasterboard junctions.

BRANZ Appraised
Appraisal No.928 [2016]

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GIB EzyBrace® Systems — August 2016

Winstone Wallboards Ltd accepts no liability if GIB EzyBrace® Systems are not designed and installed in strict accordance with instructions contained in this publication.

USE ONLY THE CURRENT SPECIFICATION

This publication may be superseded by a new publication at any time. Winstone Wallboards accepts no liability for reliance upon publications that have been superseded. Check for the current publication at gib.co.nz/library before using this publication. If you are unsure whether this is the current publication, call the GIB® Helpline on 0800 100 442.

GIB EzyBrace® 2011 software and specification literature remains valid until futher notice.

PATENTS

GIBFix® Framing System and GIB EzyBrace® Systems, including componentry and design method, have patents pending (NZ Patent Number 596691, NZ Patent 709159 pending) and design and other IP rights reserved.

Beware of substitution

The performance of GIB® Systems are very sensitive to design detailing and construction practices. All GIB® Systems have been developed specifically for New Zealand conditions and independently tested or assessed to ensure the required level of performance. It is important to use only GIB® branded components where specified and to closely follow the specified design details and construction practices, to be confident that the required level of performance and quality is achieved on site.

For further information call our GIB® Helpline on 0800 100 442.

GIB EzyBrace® Systems have been designed and tested using only the products specified. When additional GIB® plasterboard properties are required the table below provides acceptable alternative options.

	Acceptable alternative GIB® plasterboards								
Specified GIB® plasterboard	GIB® Standard	GIB Ultraline®	GIB Braceline/ Noiseline®	GIB Aqualine®	GIB Toughline®	GIB Fyreline®			
						10mm	13mm	16mm	19mm
GIB® Standard		OK	OK	OK	OK	Note 1 and 3			
GIB Braceline®	X	X		Note 2	OK	X	Notes 1, 2 and 3		

Note 1 *The fastener type and length must be as required for the relevant FRR system using the perimeter fixing pattern illustrated for the relevant bracing specification.*

Note 2 *The element must be 900mm or longer. Decrease perimeter fastener centres to 100mm. The bracing corner fastening pattern, as illustrated for the relevant specification applies to all four corners of the element. Panel hold-down fixings are required.*

Note 3 *Specify traditional wall framing layout (see figure 1) where a Fire Resistance Rating (FRR) is required.*

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Scope of use

This document is a guide to wall bracing of light timber frame (LTF) buildings constructed in accordance with NZS3604:2011 Timber Framed Buildings and presents a simple and efficient method for calculating and incorporating bracing resistance. This information draws on recent experiences from seismic activity in New Zealand and seeks to minimise earthquake damage to plasterboard linings in LTF buildings.

This document outlines the main principles of bracing design and construction using GIB® plasterboard products and systems. Further detailed information can be found in the GIB® Bracing Supplement by visiting gib.co.nz/library. This 'live' on-line document is updated continuously in response to market feedback and Winstone Wallboards' development initiatives.

Finish quality — framing and substrates

Home owners are increasingly demanding a high quality of interior finish. Finish quality is heavily influenced by the substrate to which linings are fixed. Detailed information on 'Levels of Finish' is given in AS/NZS 2589 and the latest version of the GIB® Site Guide.

New GIBFix® Framing System

With increased NZ Building Code requirements and growing customer demand for thermal efficiency and high quality interior finishes, traditional framing practices present problems such as multiple framing members at wall intersections creating thermal 'bridges' and cavities where insulation cannot be installed effectively.

Figure 1 shows a traditional wall framing layout. Figure 2 shows the alternative GIBFix® Framing System layout.

Multiple timber framing members also take longer to dry resulting in an increased risk of fastener pops and blemishes resulting from timber frame movement.

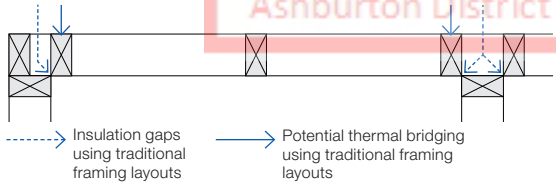
The GIBFix® Framing System offers better thermal efficiencies and minimises potential joint imperfections resulting from interior linings being fixed to multiple timber framing members.

The GIBFix® Framing System can be used in conjunction with GIB EzyBrace® Systems.

Bracing resistance is not affected by the GIBFix® Framing System if the use of this alternative timber framing layout is preferred. Refer to the GIBFix® Framing System literature for more information.

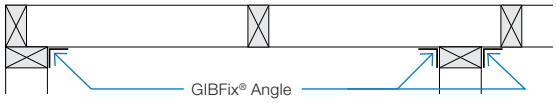
Bracing ratings apply whether fixing is directly into timber or into the metal components, provided correct construction details, fastener types and centres are applied.

FIGURE 1: TRADITIONAL WALL FRAMING LAYOUT



GFS004

FIGURE 2: GIBFIX® FRAMING SYSTEM (ALTERNATIVE LAYOUT)



GFS005

NEW GS2-NOM Bracing Element

The new GS2-NOM bracing element allows most homes to be braced with a single lining type and less fixings so that a high quality finish is maintained throughout.

GS2-NOM permits the contribution of 'nominally fixed' internal walls. Higher performance elements are commonly specified on external walls and where limited wall area is available or adjacent to significant openings.

Winstone Wallboards recommends the use of the GIBFix® Framing System in conjunction with GS2-NOM elements. Key benefits of this approach include:

- Reduced potential for fastener pop and joint cracking of plasterboard linings.
- Enhanced thermal performance.
- Allows internal walls lined with GIB® plasterboard on both sides and fastened off as per the standard fixing requirements of the current GIB® Site Guide to contribute bracing resistance.
- Potentially reduces the amount of fasteners[1].
- Encourages more even bracing distribution throughout the building.

1. Actual savings dependent on building and bracing design.

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Compliance with the NZ Building Code

NZBC CLAUSE B1 — STRUCTURE

The design and material specification for steel and timber framing used in conjunction with this literature must be in accordance with the performance requirements of NZBC Clause B1. GIB EzyBrace® Systems comply with the requirements of NZS 3604:2011, when designed and installed in accordance with this publication and relevant technical literature. NZS 3604:2011 is an acceptable solution to NZBC Clause B1.

NZBC CLAUSE B2 — DURABILITY

Under normal conditions of dry internal use GIB EzyBrace® Systems have a service life in excess of 50 years and satisfy the requirements of NZBC Clause B2. When in conditions of dry internal use, the components specified in this literature satisfy the requirements of NZBC Clause B2.

GIB® EzyBrace® Systems must not be specified in areas where 15 year durability applies and where linings are subject to direct water pressure, e.g. shower cubicle or shower over bath situations.

NZBC CLAUSE F2 — HAZARDOUS BUILDING MATERIALS

Under normal conditions of use, during handling, installation or serviceable life, the products detailed in GIB EzyBrace® Systems do not constitute a health hazard and meet the provisions of the NZBC Clause F2.

NZBC CLAUSE H1 — ENERGY EFFICIENCY

Buildings must be constructed to achieve an adequate degree of energy efficiency and the building envelope must provide adequate thermal resistance. The required thermal resistance (R-value) of timber framed external walls depends on climate zone but is commonly in the range from R 1.9 to R 2.0.

CAD design details

Where applicable drawings related to GIB EzyBrace® Systems have been produced for CAD design. These are identified by a unique number in the bottom corner of each detail box. CAD design details can be found at gib.co.nz/library.

Appraisal

GIB EzyBrace® Systems 2016 have been appraised by the Building Research Association of New Zealand (BRANZ), Appraisal No. 928 (2016) GIB EzyBrace® Systems, 2016.

It is of prime importance to comply with the details of design, construction and workmanship in this document.

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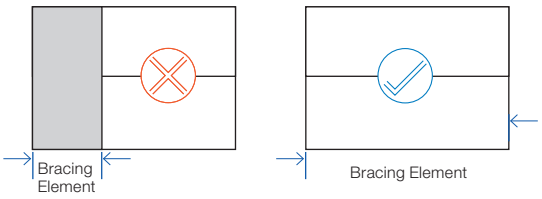
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Bracing resistance

WALL BRACING LAYOUT

When designing the bracing layout, carefully consider the final finished appearance and utilise full wall lengths where possible, avoiding unnecessary fastenings in the centre of a clear wall. Using the available wall length provides additional bracing and achieves improved aesthetics.

FIGURE 3: WALL BRACING LAYOUT



BRACING DISTRIBUTION

Distribute bracing by drawing a grid pattern of bracing lines along and across the building. Bracing lines must coincide as much as possible with the wall bracing elements. Pairs of elements may be counted on a single line provided they are no more than 2 metres apart and parallel. See figure 4.

Locate bracing evenly throughout the building and as close as practical to corners of external walls.

Space bracing lines no more than:

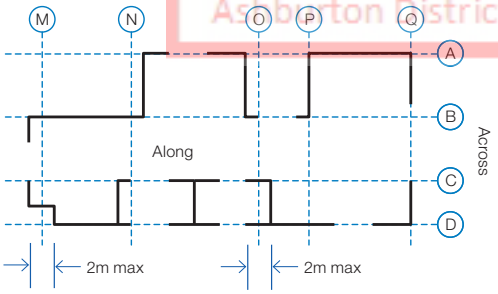
- 6 metres for standard construction with any GIB® plasterboard ceiling, or
- 7.5 metres where dragon ties in accordance with NZS3604:2011 have been installed, or
- 12 metres with a GIB® plasterboard ceiling diaphragm.

The construction of ceiling diaphragms is described in detail on p.18–20.

NZS3604:2011 requires that no bracing line shall have a capacity less than the greater of:

- 100 Bracing Units (BUs), or
- 15 x the external wall length (BUs) for bracing lines coinciding with external walls, or
- 50% of the total demand (D) divided by the number of lines (n) in the direction being considered (BUs).

FIGURE 4: BRACING GRID LAYOUT



The NZS3604 ‘rules’ are merely minimum guidelines and compliance with them does not in itself ensure even distribution. The designer is responsible for checking distribution. Poor distribution can cause torsional effects and localised or more significant damage in an earthquake event.

GIB EZYBRACE® SYSTEMS

The GIB EzyBrace® Specification Numbering System (and sub-components thereof) is protected by copyright and makes specification and identification of GIB EzyBrace® Systems transparent.

- 'GS' stands for GIB® Standard.
- 'BL' for GIB Braceline®.
- 'P' for plywood.
- '1' and '2' for linings one or both sides.
- ‘N’ stands for 'no specific panel hold-down fixings'.
- 'H' stands for 'specific panel hold-down fixing' required.
- 'NOM' stands for 'nominal plasterboard fixing'. This refers to the standard fixing method used to install plasterboard as shown in the current GIB® Site Guide.

Where specific hold-down fixings are specified, refer to p.15-16. GIB HandiBrac® is fully contained within the framing cavity and does not interfere with lining installation and quality of finish.

Where no specific hold-down fixings are required, the minimum NZS3604:2011 bottom plate fixings apply.

Full bracing element construction details are provided in this technical literature.

Further general design and construction information can also be found in our GIB® Bracing Supplement by visiting gib.co.nz/library.

Specifying GIB EzyBrace® elements (minimum wall length 400mm)

Inside lining external walls.	Nominate available lengths of wall as GS1-N elements. Use BL1-H if higher ratings are required. If the other side of the frame is lined with plywood consider GSP-H or BLP-H elements or use alternative proprietary bracing systems.
Internal walls (only one side available for bracing).	Nominate available lengths of wall as GS1-N elements. Use BL1-H if higher ratings are required.
Internal walls (both sides available for bracing).	Nominate available length of wall as GS2-NOM elements. Change to GS1-N if higher ratings are required. Change to GS2-N if higher ratings are required. Change to BLG-H for even higher ratings. Consider GSP-H or BLP-H if the opposite side is lined with plywood.

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Bracing demand

GIB EZYBRACE® CALCULATOR

The GIB EzyBrace® calculator is a software tool to determine the wind and earthquake bracing demand and to design the bracing resistance for light timber-framed buildings constructed in accordance with NZS 3604:2011.

The updated GIB EzyBrace® calculator combines an up-to-date user-friendly interface with the latest knowledge relating to the performance of GIB® plasterboard in light timber-framed structures when subjected to high winds or earthquakes. The calculator can be down-loaded free of charge by visiting gib.co.nz/ezybrace and can be installed on either Microsoft® or Apple® Mac environments.

DEMAND

Wind and Earthquake 'Demand' calculates the forces a structure must be able to resist during its 'design life'. The GIB EzyBrace® calculator's Demand sheet determines the number of Bracing Units required depending on building location, building dimensions and materials used. The Demand sheet closely follows the familiar format of our Excel based GIB EzyBrace® calculator, and includes additional features such as a pop-up help facility explaining required input.

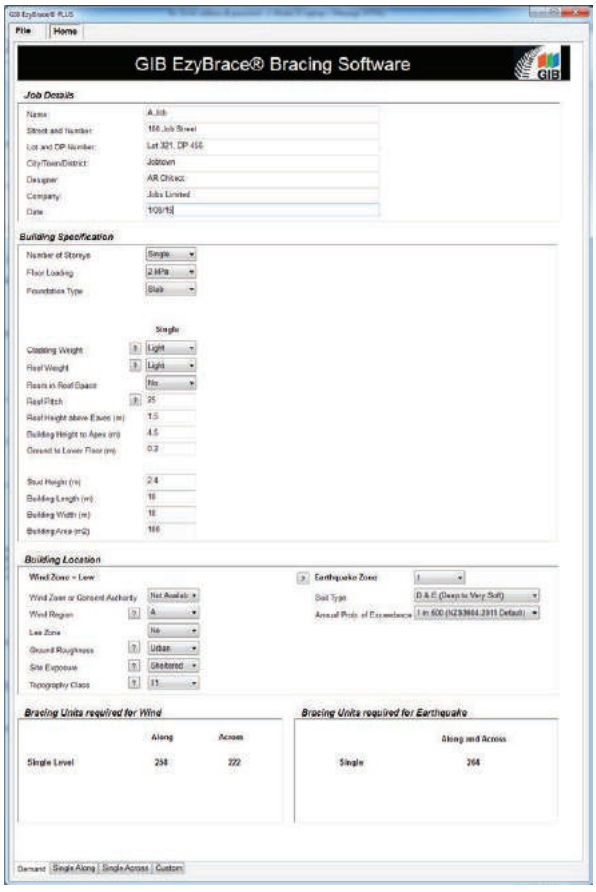
Bracing resistance sheets ('tabs') are added depending on the building specification entered. For example, subfloor bracing resistance tabs only show when a 'subfloor' foundation type has been selected.

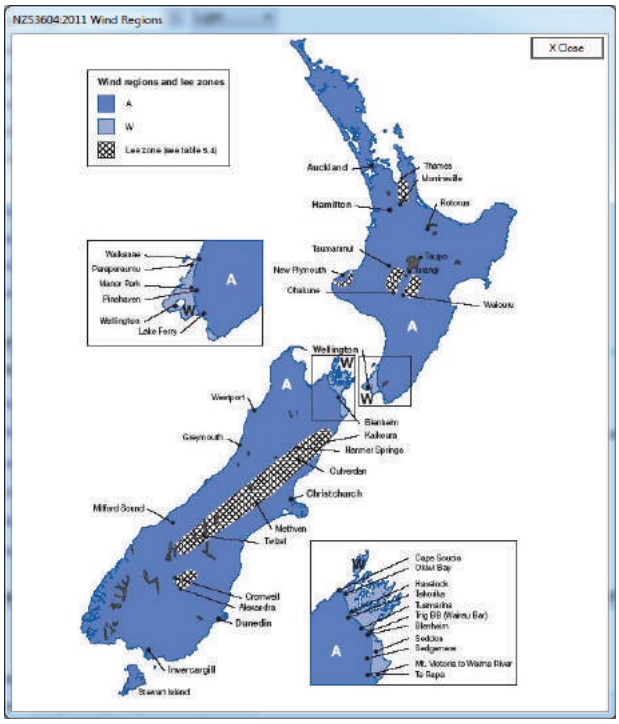
The Demand sheet gives the designer the option to select a longer earthquake return period which represents a higher earthquake design force. The default for buildings constructed in accordance with NZS3604:2011 is an earthquake that has a 10% chance of being exceeded within the assumed 50 year 'design life' of a light timber framed residential structure, a 'return period' of 500 years.

Many commercial and public buildings are designed for the more stringent requirement of a 10% probability of exceedance in a 100 or 250 year life expectancy.

A screen shot of the GIB EzyBrace® 2016 Demand Sheet and Help Facility is shown in figure 5.

FIGURE 5: GIB EZYBRACE® 2016 — DEMAND CALCULATION SHEET AND 'POP UP' HELP FACILITY





Download GIB EzyBrace® 2016 design software from gib.co.nz/ezybrace

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Software functionality

Innovations adopted in the GIB EzyBrace® 2016 bracing 'resistance' calculation sheets include the ability to easily add and delete lines and elements during calculations.

The software compares bracing resistance achieved with demand and for wall bracing lines incorporating external walls, the external wall length can now be entered to check minimum bracing units required on that line. The NZS 3604:2011 rules and associated software output are not the only check. Designers must additionally check the building layout to ensure adequate bracing distribution.

Figures 6 and 7 show screen shots of the Wall and Subfloor Resistance Sheets respectively.

FIGURE 6: GIB EZYBRACE® 2016 — WALL BRACING RESISTANCE CALCULATION SHEET

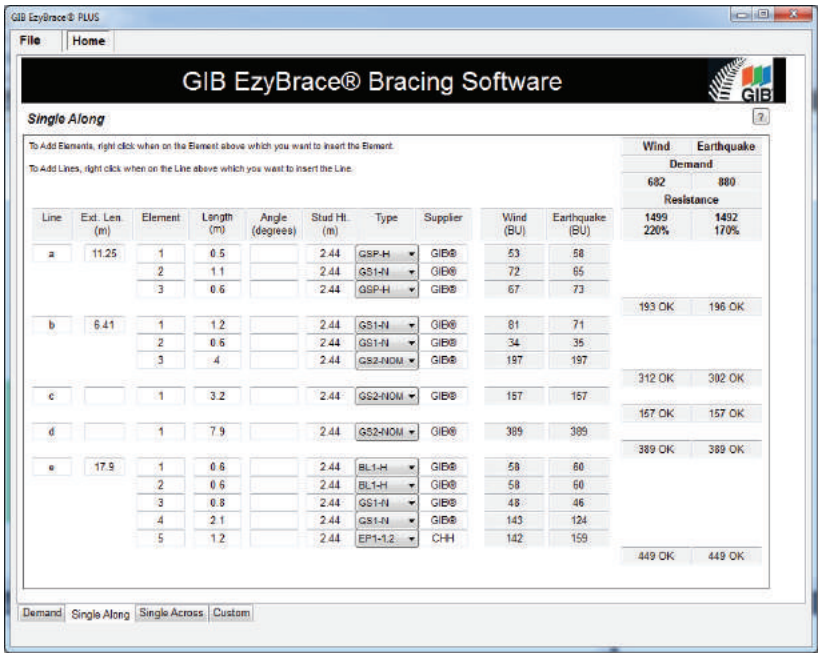
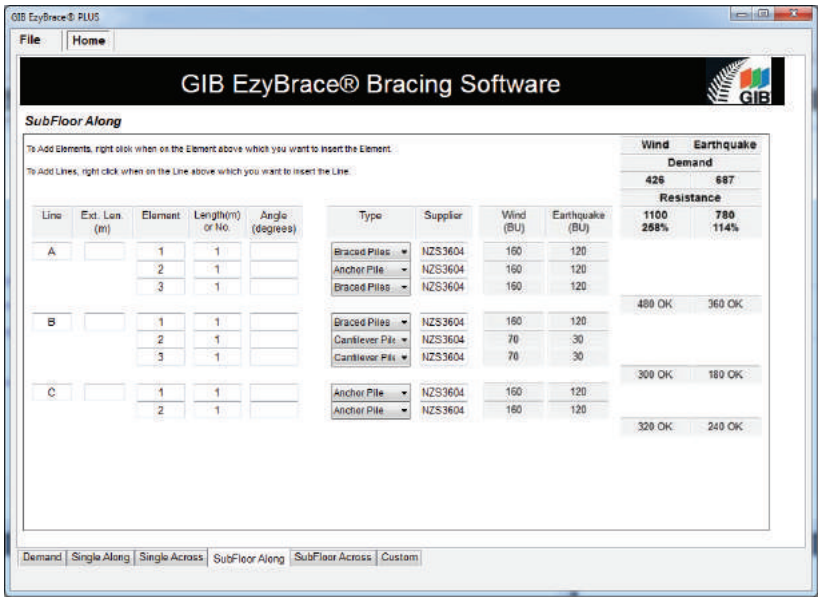


FIGURE 7: GIB EZYBRACE® 2016 — SUBFLOOR BRACING RESISTANCE CALCULATION SHEET



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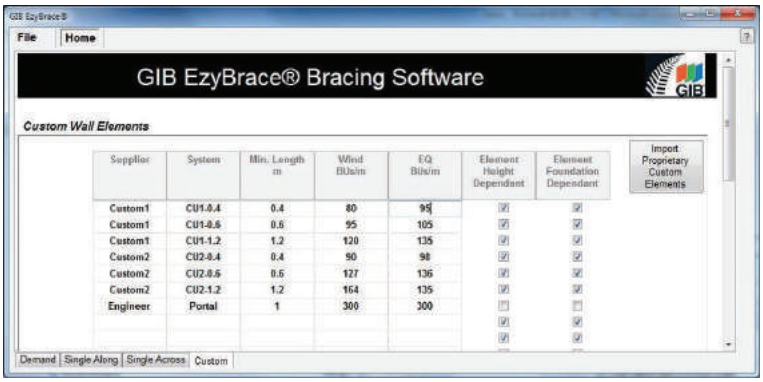
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Software functionality

Custom elements can be entered by accessing the 'custom' tab as shown in figure 8.

FIGURE 8: GIB EZYBRACE® 2016 — CUSTOM ELEMENTS SHEET



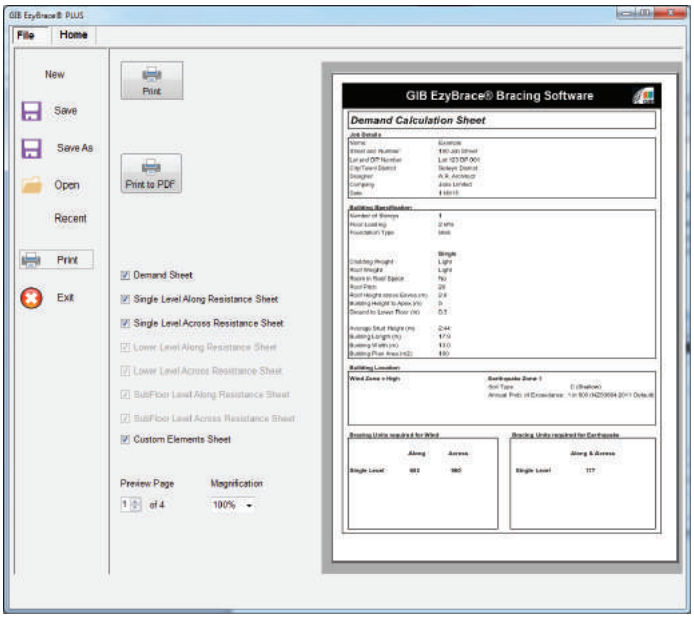
Note: Values and systems shown in Custom Elements Sheets are for illustrative purposes only.

Help can be accessed by pressing the ? symbol which displays a window with further information.

The GIB EzyBrace® 2016 software has a number of options that can be accessed via the File tab at the top left hand corner of the window. The options include: New, Save, Save As, Open, Recent and Print.

- The New option closes any opened job ready for the input of a new job.
- The Save option saves the currently opened job to the same filename and the Save As option saves the job to a new filename.
- The Open option prompts for the name of an existing job.
- The Recent option displays a list of the ten latest jobs and allows for the selection of one of these jobs to be opened.
- The Print option displays the print screen. In this screen, a print preview is displayed. The print preview can be copied to the clipboard by clicking the right-hand mouse button. Also on the print screen is the option to choose which pages are to be printed and the option to print the output to a portable data format, PDF, file.
- The Print Screen View is shown in figure 9.

FIGURE 9: GIB EZYBRACE® 2016 — PRINT SCREEN VIEW



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GIB® plasterboard linings

When fixing part sheets of GIB® plasterboard, a minimum sheet width of 300mm applies for bracing elements. Horizontal fixing is recommended. If fixing vertically, full height sheets shall be used where possible. Where sheet end butt joints are unavoidable they must be formed over nogs or over the studs and fastened at 200mm centres. Alternatively, and preferably, sheet end butt joints may be back-blocked.

When a GIB® Bracing element has been designated for a section of wall, BU ratings cannot be increased by incorporating additional proprietary bracing elements within that same section of wall.

LIMITATIONS

- GIB® plasterboard must be stacked flat and protected from the weather.
- GIB® plasterboard must be handled as a finishing material.
- GIB® plasterboard in use must not be exposed to liquid water or be installed in situations where extended exposure to humidities above 90% RH can reasonably be expected.
- GIB EzyBrace® Systems must not be used in showers or behind baths.
- It is highly recommended not to install GIB® plasterboard in any situation where external claddings are not in place or the property is not adequately protected from the elements.
- If GIB® plasterboard is installed under these conditions, the risk of surface defects such as joint peaking or cracking is greatly increased.

GIB EzyBrace® Systems in water-splash areas

When GIB® plasterboard is installed in locations likely to be frequently exposed to liquid water it must have an impervious finish. Examples are adhesive fixed acrylic shower linings or ceramic tiles over an approved waterproof membrane over GIB Aqualine® The NZBC requires 15 years durability in these situations. Bracing elements are required to have a durability of 50 years. Bracing elements are not to be located in shower cubicles or behind baths because of durability requirements, the likelihood of renovation, and practical issues associated with fixing bracing elements to perimeter framing members. Otherwise GIB EzyBrace® Systems can be used in water-splash areas as defined by NZBC Clause E3, provided these are maintained impervious for the life of the building.

For futher design details refer to the current GIB Aqualine® Wet Area Systems literature.

Renovation

When relining walls during the process of renovation, ensure that bracing elements are reinstated (check the building plans).

Openings in bracing elements

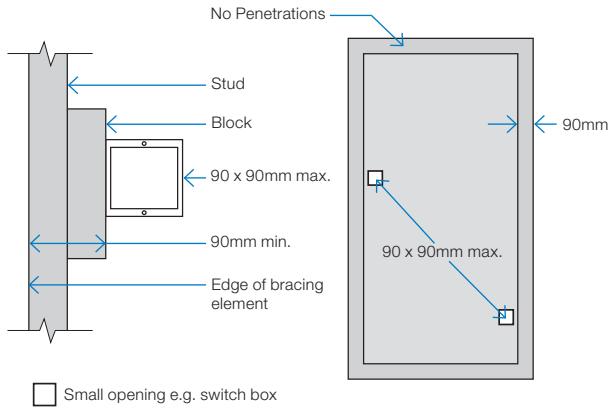
SMALL OPENINGS

Small openings (e.g. power outlets) of 90 x 90mm or less may be placed no closer than 90mm to the edge of the braced element. A block may need to be provided alongside the perimeter stud as shown below.

LARGE OPENINGS

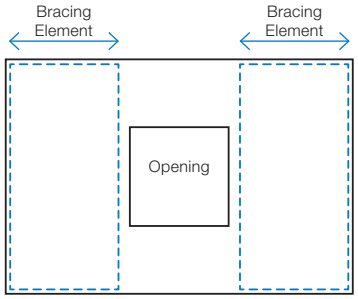
Openings above 90 x 90mm such as switch boards, recessed cabinets and TV's etc. should be placed outside of the bracing element or locate bracing on the other side of the wall framing.

FIGURE 10: SMALL OPENINGS IN BRACING ELEMENTS



GEB001

FIGURE 11: LARGE OPENINGS AND BRACING ELEMENTS



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Timber framing

General framing requirements such as grade, spacings and installation shall comply with the provisions of NZS 3604:2011. To achieve the published bracing performance the minimum actual framing dimensions are 90 x 45mm for external walls and 70 x 45mm for internal walls.

As a minimum the use of Kiln Dried Stress Graded timber for all wall, roof and mid-floor framing members is recommended.

GIBFix® Framing System (alternative layout)

Practices recommended as part of the GIBFix® Framing System aim to increase timber framing efficiencies, reduce reliance on unnecessary framing at wall junctions and minimise surface imperfections that commonly arise from constructing plasterboard junctions over multiple timber members. GIBFix® Angles fixed to a single timber framing member are introduced to tie together plasterboard junctions, improving seismic resilience and decrease the risk of future defects due to timber movement. The GIBFix® Framing System can be used in conjunction with the GIB EzyBrace® System.

Note: GIBFix® Angles and 32mm x 7g GIB® Grabber® Dual Thread Screws may also be used in traditional wall framing layouts and in GIB EzyBrace® Systems.

When the GIBFix® Framing System is used a minimum of 2 equally spaced nogs for walls between 2.4m and 3m in height are required at corners and wall junctions.

When used in GIB EzyBrace® systems GIBFix® Angles must run from top to bottom on all applicable studs. If 2 GIBFix® Angles are required on a stud they must be overlapped by a minimum of 300mm with 2/32mm 7g GIB® Grabber® Dual Thread Screws penetrating through both GIBFix® Angles.

For full specification details refer to GIBFix® Framing System literature available at gib.co.nz/gibfix.

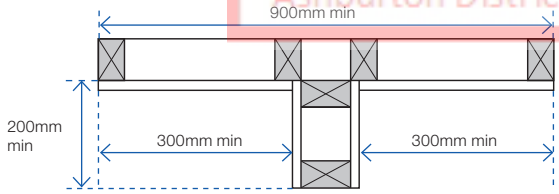
Guidelines for intersection walls

GIB® Bracing Elements may have intersecting walls with a minimum length of 200mm. Fasteners are required around the perimeter of the bracing element. Vertical joints at T-junctions shall be fixed and jointed as specified for intermediate sheet joints. The bracing element length must be no less than 900mm.

Where a Wall Bracing Element is interrupted by a T-junction the element is deemed to be continuous for the whole length (900mm minimum in the example illustrated).

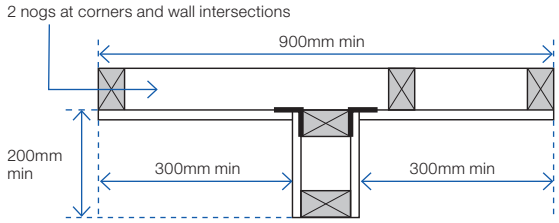
When fixing part sheets of GIB® plasterboard to the side of a T-junction, a minimum width of 300mm applies for bracing elements. See figures 12 and 13.

FIGURE 12: WALL INTERSECTION (TRADITIONAL WALL FRAMING)



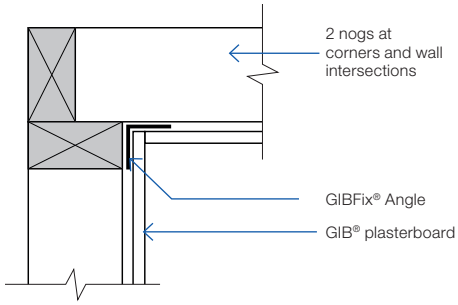
GEB002

FIGURE 13: WALL INTERSECTION (GIBFIX® FRAMING SYSTEM)



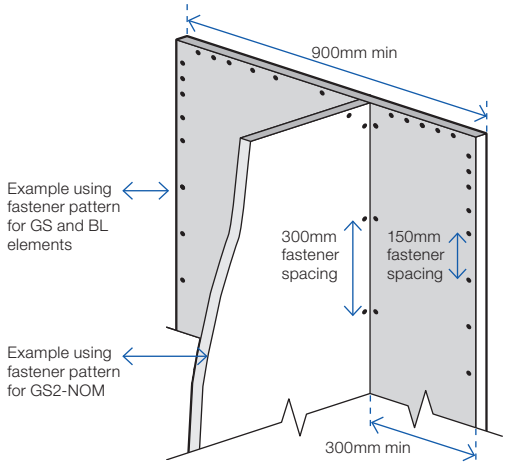
GEB003

FIGURE 14: CORNER INTERSECTION (GIBFIX® FRAMING SYSTEM)



GFS001

FIGURE 15: WALL INTERSECTION FASTENER PLACEMENT



Junction

Min 32mm x 6g GIB® Grabber® High Thread or 32mm x 7g GIB® Grabber® Dual Thread Screws @ 300mm ctrs each side.

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Top plate connections

For top plate connections refer to NZS3604:2011 section 8.7.3.

Parapets and gable end walls

Bracing elements must be fixed from top plate to bottom plate. Fixing to a row of nogs is not acceptable unless either:

A continuous member such as an ex 90 x 45mm ribbon plate is fixed across the studs just above a row of nogs at the ceiling line, as shown in figure 16.

or

GIBFix® Angle as shown in figure 17. The angle is fixed to a row of nogs with 30 x 2.5mm galv flat head nails or 32mm x 7g GIB® Grabber® Dual Thread Screws at 300mm centres.

Bottom plate fixing

TIMBER FLOOR

For elements with an 'N' specification use 2/100 x 3.75mm hand or 3/90 x 3.15mm power-driven nails at 600mm centres.

In addition, for elements with an 'H' specification, use GIB HandiBrac® panel hold-down fixings at each end of the bracing element, see p.16.

CONCRETE FLOOR — EXTERNAL WALL BRACING ELEMENTS

For bracing elements with an 'N' specification fix external wall plates in accordance with NZS 3604:2011.

Use GIB HandiBrac® panel hold-down fixings at each end of bracing elements with an 'H' specification and minimum intermediate fixings as required by NZS 3604:2011.

CONCRETE FLOOR — INTERNAL WALL BRACING ELEMENTS

For bracing elements with an 'N' specification fix plates in accordance with NZS 3604:2011 or use 75 x 3.8mm shot-fired fasteners with 16mm discs spaced at 150 and 300mm from end-studs and 600mm centres thereafter.

For bracing elements with an 'H' specification use GIB HandiBrac® panel hold-down fixings at each end of the element and minimum intermediate fixings as required by NZS 3604:2011.

FIGURE 16: PARAPETS AND GABLE ENDS WITH RIBBON PLATE

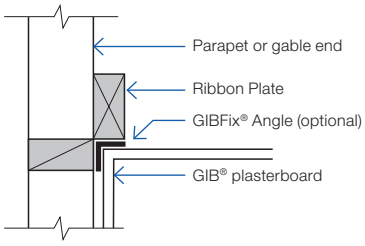
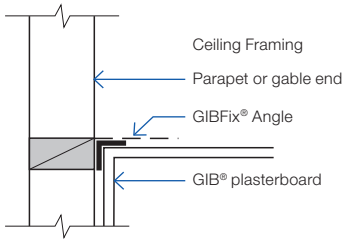


FIGURE 17: PARAPETS AND GABLE ENDS WITH GIBFIX® ANGLE



GFS003

BOTTOM PLATE FIXINGS FOR GIB® BRACING ELEMENTS

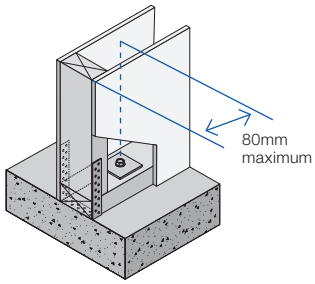
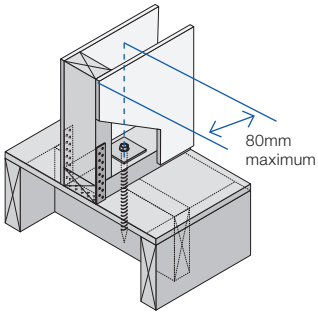
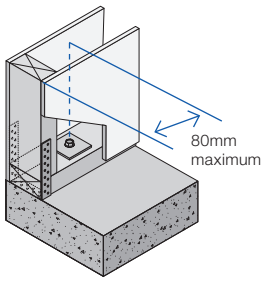
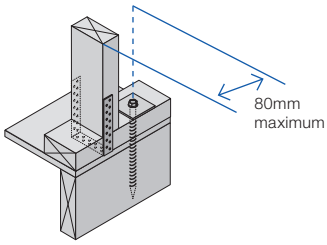
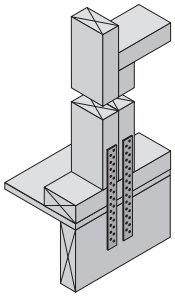
Brace type	Concrete slabs		Timber floors
	External wall	Internal wall	External and Internal walls
GS1-N	As per NZS 3604:2011. No specific additional fastening required.	As per NZS 3604:2011. Alternatively use 75 x 3.8mm shot-fired fasteners with 16mm discs, 150mm and 300mm from each end of the bracing element and at 600mm thereafter.	Pairs of 100 x 3.75mm flat head hand driven nails or 3/90 x 3.15mm power driven nails at 600mm centres in accordance with NZS 3604:2011.
GS2-N	Not applicable.		
GS2-NOM			
GSP-H BL1-H BLP-H	Intermediate fastenings to comply with NZS 3604:2011 In addition: GIB HandiBrac® fixings or metal wrap-around strap fixings and bolt as illustrated on p.15 and 16.		Pairs of 100 x 3.75mm flat head hand driven nails or 3/90 x 3.15mm power driven nails at 600mm centres in accordance with NZS 3604:2011. In addition: GIB HandiBrac® fixings or metal wrap-around strap fixings and bolt as illustrated on p.15 and 16.
BLG-H	Not applicable	As for GSP-H, BL1-H, BLP-H on concrete slab as illustrated on p.15 and 16.	

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Bracing strap installation

Care needs to be taken with the installation of the bracing strap. It should be checked in to be flush with the face of the stud providing a flat substrate for the plasterboard and positioned in such a way that the corner fastenings of the bracing element are not affected by it. Keeping the strap to the edge of the end stud as shown will allow the corner fastenings to be installed without having to penetrate the bracing strap.

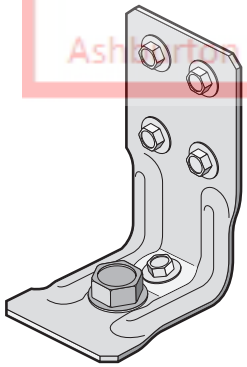
Concrete floor	Timber floor
400 x 25 x 0.9mm galvanised strap to pass under the plate and up the other side of the stud. Six 30 x 2.5mm flat head galvanised nails to each side of the stud. Three 30 x 2.5mm flat head galvanised nails to each side of the plate. Hold down bolt with 50 x 50 x 3mm washer to be fitted within 80mm of the end of the element.	
Internal wall	
 GEB004	 GEB005
External wall	
 GEB006	 GEB007
Note: Where applicable drawings have been produced for CAD design. These are identified by a unique number in the bottom corner of each detail box that can be found at gib.co.nz/library.	2/300 x 25 x 0.9mm galvanised straps with six 30 x 2.5mm flat head galvanised nails to each stud and into the floor joist and three nails to the plate. Block to nog fixed with 3/100 x 3.75mm nails to stud.
	 GEB008

Hold-down fastener requirements	
Concrete floor	Timber floor
A mechanical fastening with a minimum characteristic uplift capacity of 15kN fitted with a 50 x 50 x 3mm square washer within 80mm of the ends of the bracing element.	12 x 150mm galvanised coach screw fitted with a 50 x 50 x 3mm square washer within 80mm of the ends of the bracing element

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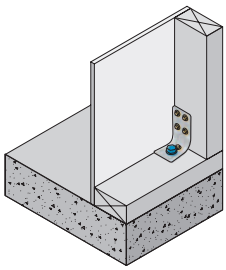
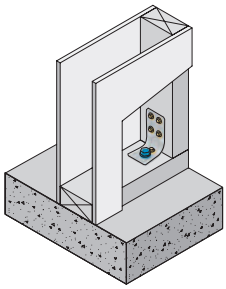
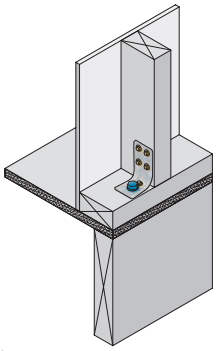
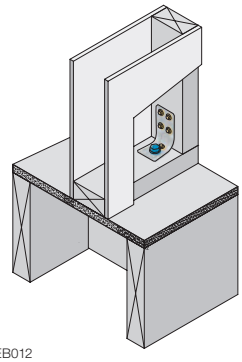
GIB HandiBrac® installation



Developed in conjunction with MiTek™, the GIB HandiBrac® has been designed and tested by Winstone Wallboards for use in GIB EzyBrace® elements that require hold-downs. The GIB HandiBrac® is a substitute for bottom plate hold-down straps.

- Quick and easy to fit.
- May be fitted at any stage before lining.
- Framing face is clear to allow flush lining.
- Easily inspected.

The GIB HandiBrac® with BOWMAC® blue head screw bolt is suitable for timber and concrete floors constructed in accordance with NZS 3604:2011.

Concrete floor		**Timber floor**	
External walls	Internal walls	External walls	Internal walls
 GEB009	 GEB010	 GEB011	 GEB012
Position GIB HandiBrac® as close as practicable to the internal edge of the bottom plate.	Position GIB HandiBrac® at the stud/plate junction and at mid-width of plate.	Position GIB HandiBrac® flush with the outside stud face, as close as practicable to the centre of the boundary joist.	Position GIB HandiBrac® in the centre of floor joist or full depth solid block.
Hold-down fastener requirements			
A mechanical fastening with a minimum characteristic uplift capacity of 15kN or use supplied BT10/140 screwbolt in GIB HandiBrac® pack.		12 x 150mm galvanised coach screw or use supplied BT10/140 screwbolt in GIB HandiBrac® pack.	

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GIB HandiBrac® placement with GIBFix® Framing System for concrete floors

Figure 18 shows the preferred positioning of the GIB HandiBrac® panel hold-down brackets within the GIBFix® Framing System layout and where they are required by bracing systems with an 'H' in the specification code.

Note that, in corners and at wall junctions, a single GIB HandiBrac® can serve 'H' type bracing elements in both directions, but additional intermediate concrete anchors may need to be installed to meet the minimum requirements of NZS 3604:2011 for bottom plate fixing.

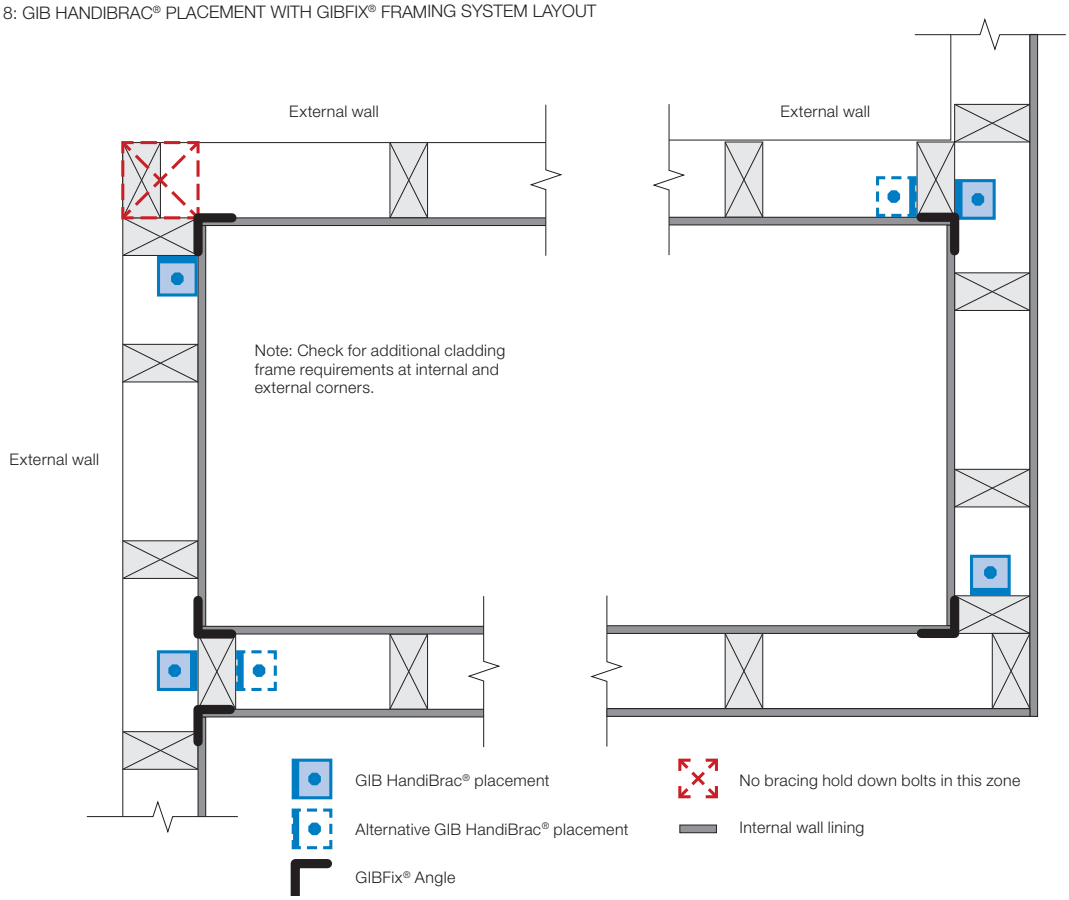
The GIB HandiBrac® is fixed to the stud which has the GIBFix® Angle.

For bracing elements with sheet material both sides of the wall connect corner studs using 8/90mm gun nails as shown in figure 19.

TIMBER FLOORS

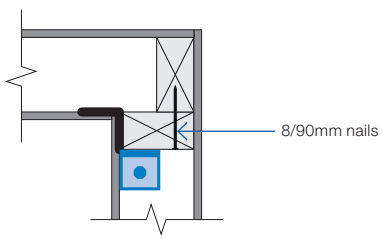
For timber floors bolt fixing in to solid joist or block is required, as shown on p 15.

FIGURE 18: GIB HANDIBRAC® PLACEMENT WITH GIBFIX® FRAMING SYSTEM LAYOUT



GEB013

FIGURE 19: STUD CONNECTION FOR 'H' TYPE BRACING ELEMENTS WITH SHEET MATERIAL BOTH SIDES



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Ceiling diaphragms

GIB® plasterboard ceiling diaphragms are stiff and strong horizontal elements which effectively transfer loads to bracing walls. They themselves do not have a bracing unit rating but are used when bracing lines exceed 6m separation. The basic shape of a ceiling diaphragm is square or rectangular. Protrusions are permitted but cut-outs are not. The length of a ceiling diaphragm shall not exceed twice its width. Dimensions are measured between supporting bracing lines. Supporting bracing lines shall have a bracing capacity no less than the greater of 100 bracing units or 15 bracing units per metre of diaphragm dimension, measured at right angles to the line being considered, see figure 21.

Limitations for GIB® plasterboard ceiling diaphragms

Ceiling diaphragms may be constructed using any GIB® plasterboard provided perimeter fixing is at;

150mm centres for: Diaphragms up to 7.5m in length, no steeper than 15°.

100mm centres for: Diaphragms up to 7.5m in length, no steeper than 45°. Diaphragms up to 12m in length, no steeper than 25°.

Diaphragms outside these parameters must be specifically designed.

General fixing requirements for GIB® Ceiling Diaphragms:

- Linings must be installed over the entire area of the diaphragm.
- Fastening must be no less than 12mm from sheet edges and not less than 18mm from sheet ends.
- Sheets must be supported by framing members (e.g., ceiling battens) spaced at no more than 500mm centres for 10mm GIB® plasterboard and at no more than 600mm centres for 13mm GIB® plasterboard.
- Sheets within the diaphragm area may be fastened and finished conventionally in accordance with the publication entitled, “GIB® Site Guide”. All joints shall be GIB® Joint Tape reinforced and stopped. It is recommended that sheet butt joints are formed off framing and back-blocked (see “GIB® Site Guide”).
- Use full width sheets where possible. At least 900mm wide sheets with a length not less than 1800mm shall be used. Sheets less than 900mm wide but no less than 600mm may be used provided all joints with adjacent sheets are back-blocked (see “GIB® Site Guide” and figure 22).
- Fasteners are placed at the specified centres around the ceiling diaphragm with the corners fastened using the GIB EzyBrace® fastener pattern.

FIGURE 20: PROTRUSIONS AND CUTOUTS

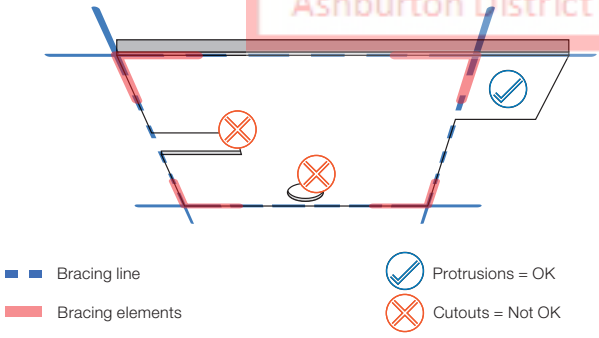


FIGURE 21: DIAPHRAGM BRACING LINING SPACINGS

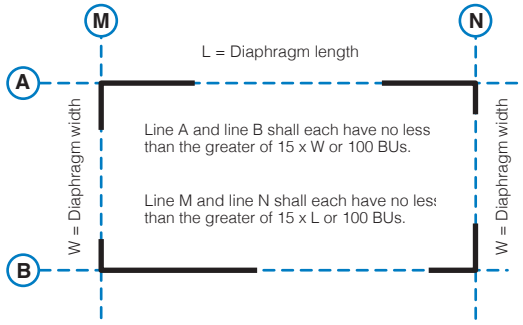
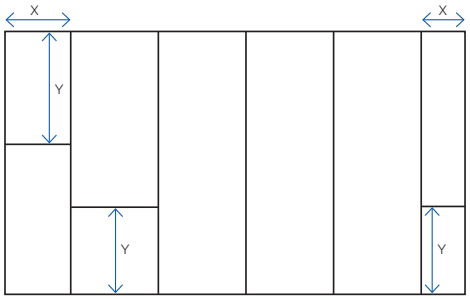
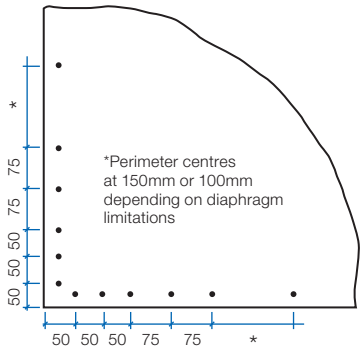


FIGURE 22: GIB® CEILING DIAPHRAGM SHEET WIDTHS AND LENGTHS



X = 900mm min or 600–900mm min provided all adjacent joints are back-blocked.
Y = 1800mm min sheet lengths at ends of ceiling diaphragms.

FIGURE 23: GIB EZYBRACE® FASTENER PATTERN



Unless stated all fastener spacings are maximums.

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Ceiling battens in ceiling diaphragms

Ceiling diaphragms may be constructed using steel or timber ceiling battens.

Battens shall be spaced at a maximum of:
- 500mm for 10mm GIB® plasterboard.
- 600mm for 13mm GIB® plasterboard.

Timber battens shall be fixed in accordance with the requirements of NZS 3604:2011.

Metal battens shall be GIB® Rondo® battens with two external flanges of 8mm to allow direct screw fixing to roof framing.

GIB® Rondo® metal battens shall be fixed with 2/32mm x 8g GIB® Grabber® Wafer Head Self Tapping screws to supporting framing.

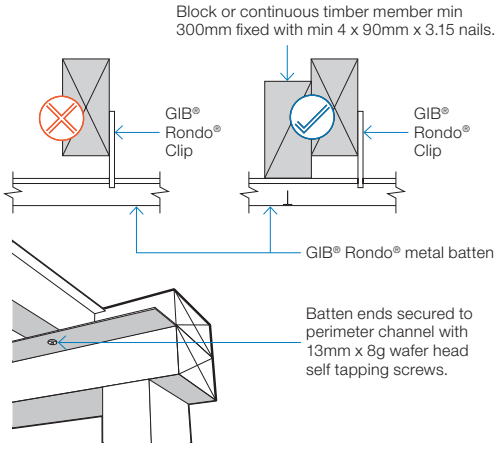
GIB® Rondo® metal battens must be fixed directly to the roof framing. If a clip system has been used, a timber block (min 300mm) or a continuous timber member can be fixed alongside the bottom chord to permit a direct connection to the batten, see figure 26.

For GIB® Rondo® metal battens, a GIB® Rondo® metal channel or metal angle is required at the perimeter of the diaphragm. The perimeter channel shall be fastened to the top plate with 32mm x 8g GIB® Grabber® Wafer Head Self Tapping screws or 32mm x 7g GIB® Grabber® Dual Thread screw at 300mm centres maximum.

Linings are fastened to metal using 25mm x 6g GIB® Grabber® Self Tapping screws and to timber framing using 32mm x 6g GIB® Grabber® High Thread screws. Alternatively 32mm x 7g GIB® Grabber® Dual Thread screws can be used in both cases. Fastener centres are specified on p.18.

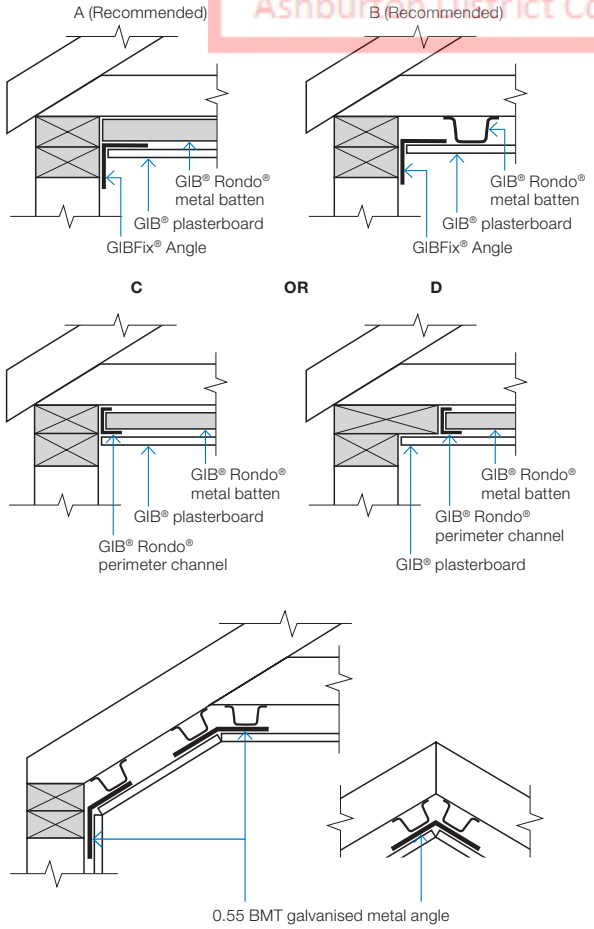
Coved ceiling diaphragms can be achieved by using nominally 32 x 32 x 0.55mm proprietary galvanised metal angles ("back-flashing") at the changes in direction. These angles shall be:
- Fastened at 300mm on each edge to metal battens using 32mm x 8g GIB® Grabber® Wafer Head Self Tapping screws or 32mm x 7g GIB® Grabber® Dual Thread screws.
- Fastened to timber framing using 32mm x 7g GIB® Grabber® Dual Thread screws when linings are installed.

FIGURE 26: GIB® RONDO® METAL CEILING BATTEN INSTALLATION



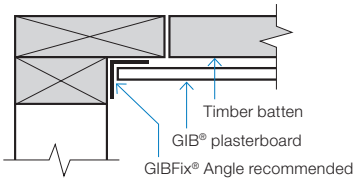
GEB016

FIGURE 27: GIB® RONDO® METAL CEILING BATTENS WITH CORNER ANGLES



GEB017

FIGURE 28: TIMBER CEILING BATTENS*



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Openings in ceiling diaphragms

SMALL OPENINGS

Small opening (e.g. down lights) of 90 x 90mm or less may be placed no closer than 90mm to the edge of the ceiling diaphragm.

LARGE OPENINGS

Openings are allowed withing the middle third of the diaphragms length and width. Fixing of sheet material to opening trimmers shall be at 150mm centres. Neither opening dimension shall exceed a third of the diaphragm width. Larger openings or openings in other locations require specific engineering design.

Where fireplace flue or range hood openings are required in a ceiling diaphragm use a galvansed metal backing plate as shown in figure 25, with a maximum hole diameter of 350mm.

Figure 25 can also be used for range hood openings in walls.

For information on openings in ceiling diaphragms contact the GIB® Helpline on 0800 100 442.

FIGURE 24: LARGE OPENINGS IN CEILING DIAPHRAGMS

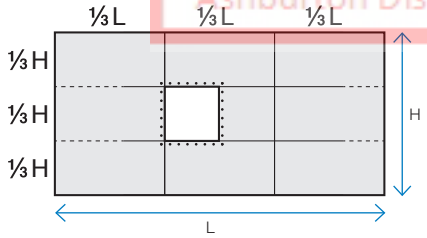
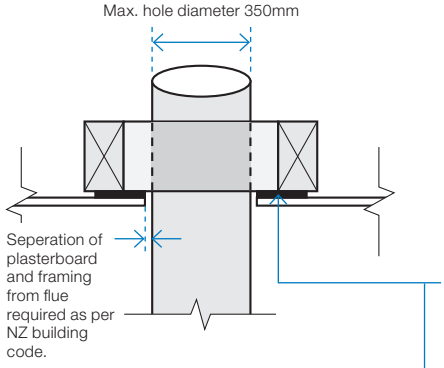
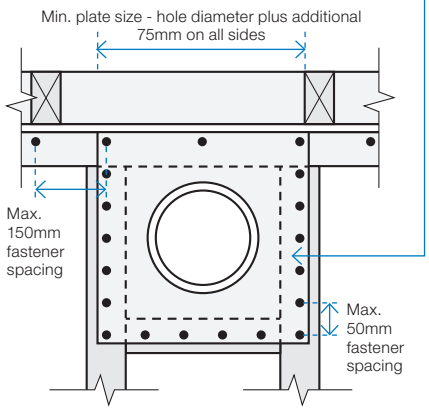


FIGURE 25: FIREPLACE FLUES AND RANGE HOOD OPENINGS

Section view



Plan view



Steel plate
0.55 BMT Galvanised sheet Max. opening 350mm diameter. Installed prior to GIB® plasterboard.

Framing
90 x 45mm framing trimmed to provide extra fixing.

GIB® plasterboard ceiling
Installed over the steel plate and into framing using a minimum of 32mm x 6g GIB® Grabber High Thread or 32mm x 7g GIB® Grabber Dual Thread screws at 50mm max centre spacing.

Plasterboard ceiling not shown in plan view

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Length of GIB EzyBrace® elements ('N' Type)

The length of GIB EzyBrace® elements with an 'N' extension (requiring standard NZS3604:2011 plate connections) can be taken as the full frame length measured from the outside of the end-stud to the opening face as illustrated in figures 29-32.

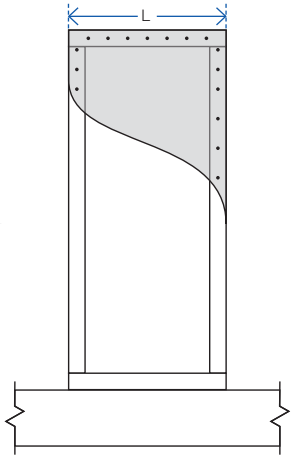
'N' type GIB EzyBrace® elements are identified by GIB® specification numbers GS1-N, GS2-N and GS2-NOM

The dimension 'L' shall not be less than 400mm.

Perimeter bracing fixing for linings of both 'H' and 'N' type elements is along the top and bottom plates, end stud, and doubling stud immediately adjacent to the opening.

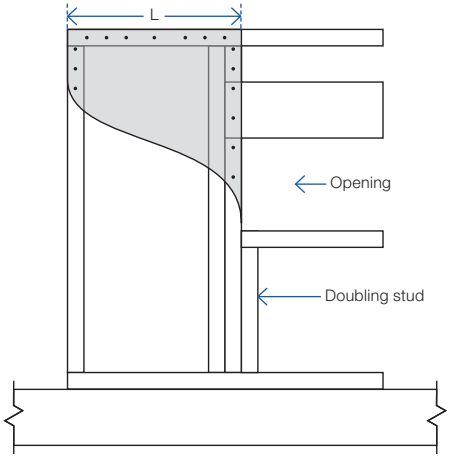
Fastener spacings and diagram scales shown in Figures 29–32 are indicative only. Refer to p.23–30 for construction details.

FIGURE 29: GS BRACING ELEMENTS (OPTION A)



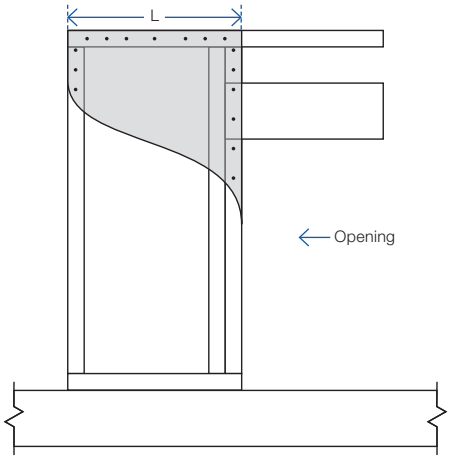
GS1-N, GS2-N elements
'L' indicates the length of the bracing element

FIGURE 30: GS BRACING ELEMENTS (OPTION B)



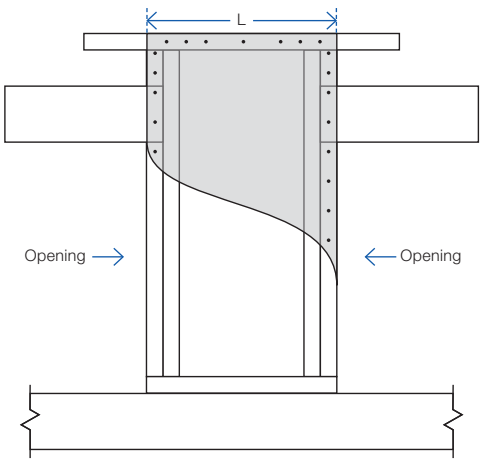
GS1-N, GS2-N elements
'L' indicates the length of the bracing element

FIGURE 31: GS BRACING ELEMENTS (OPTION C)



GS1-N, GS2-N elements
'L' indicates the length of the bracing element

FIGURE 32: GS BRACING ELEMENTS (OPTION D)



GS1-N, GS2-N elements
'L' indicates the length of the bracing element

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Length of GIB EzyBrace® elements ('H' Type)

GIB EzyBrace® elements with an 'H' extension (requiring special panel hold-down fixings) can be used when the dimension 'L' as illustrated in figures 33–36 is 400mm or more.

'H' type GIB EzyBrace® elements are identified by GIB® specification numbers GSP-H, BL1-H, BLG-H and BLP-H.

The length of an 'H' type element is not only determined by the sheet material, but also by the placement of the hold-down fixings.

Hold-down fixings cannot be placed closer together than what is shown for the standard panel in figure 33.

Hold-down fixings can be placed under windows provided sill trimming studs beneath the opening are connected to the bracing element using 8/90mm gun nails, as illustrated in figure 34.

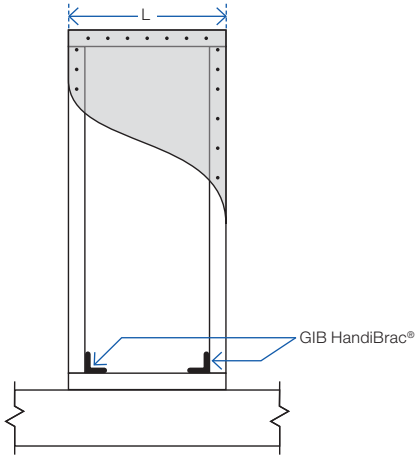
Spike doubling stud to trimming stud using a minimum of 2/90mm gun nails at 600mm centres. Lintel straps (where required for wind uplift) should be checked in and be located away from the bracing element fasteners.

Perimeter bracing fixing for linings of both 'H' and 'N' type elements is along the top and bottom plates, end stud, and doubling stud immediately adjacent to the opening as indicated in figures 34-36.

When using bracing straps, installed in accordance with p.17, fix the strap to the same framing member as shown for the GIB Handibrac® below, and install the adjacent anchor bolt in the same position as the GIB HandiBrac® bolt.

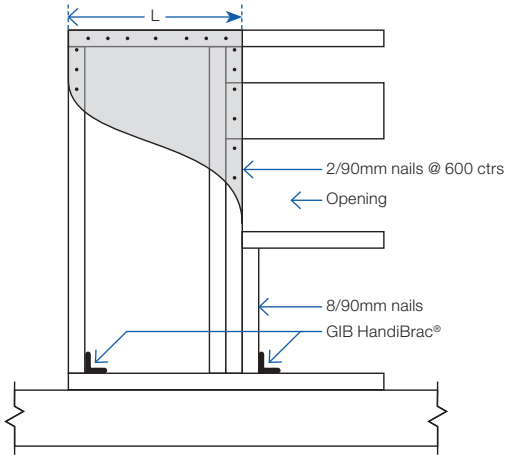
Fastener spacings and diagram scales shown in figures 33–36 are indicative only. Refer to p.23–30 for construction details.

FIGURE 33: BL BRACING ELEMENTS (OPTION A)



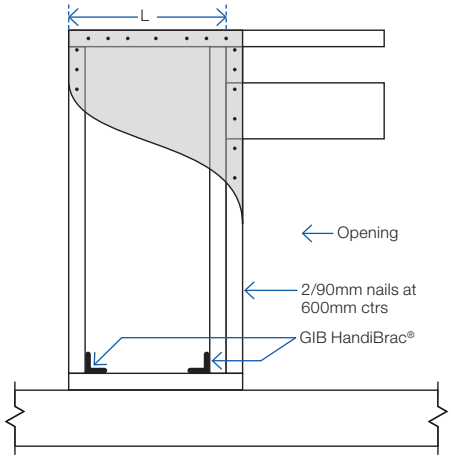
'H' type elements with specific hold downs
'L' indicates the length of the bracing element

FIGURE 34: BL BRACING ELEMENTS (OPTION B)



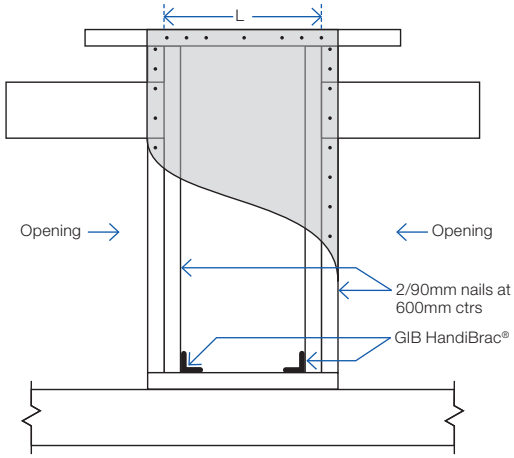
'H' type elements with specific hold downs
'L' indicates the length of the bracing element

FIGURE 35: BL BRACING ELEMENTS (OPTION C)



'H' type elements with specific hold downs
'L' indicates the length of the bracing element

FIGURE 36: BL BRACING ELEMENTS (OPTION D)



'H' type elements with specific hold downs
'L' indicates the length of the bracing element

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GIB EzyBrace® Systems specification GS1-N

Specification code	Minimum length (m)	Lining requirement
GS1-N	0.4	Any 10mm or 13mm GIB® Standard plasterboard to one side only

WALL FRAMING

Wall framing to comply with;

- NZBC B1 — Structure B1/AS1 Clause 3 Timber (NZS 3604:2011).
- NZBC B2 — Durability B2/AS1 Clause 3.2 Timber (NZS 3602).

Framing dimensions and height as determined by NZS 3604:2011 stud and top plate tables for load bearing and non-bearing walls. The use of kiln dried stress graded timber is recommended.

BOTTOM PLATE FIXING

Timber floor

Pairs of hand driven 100 x 3.75mm nails at 600mm centres; or three power driven 90 x 3.15mm nails at 600mm centres.

Concrete floor

Internal Wall Bracing Lines: In accordance with the requirements of NZS 3604:2011 for internal wall plate fixing or 75 x 3.8mm shot fired fasteners with 16mm discs spaced at 150mm and 300mm from end studs and 600mm centres thereafter.

External Wall Bracing Lines: In accordance with the requirements of NZS 3604:2011 for external wall bottom plate fixing.

WALL LINING

- Any 10mm or 13mm GIB® plasterboard lining.
- Sheets can be fixed vertically or horizontally.
- Sheet joints shall be touch fitted.
- Use full length sheets where possible.

PERMITTED ALTERNATIVES

For permitted GIB® plasterboard alternatives refer to p. 5 in GIB EzyBrace® Systems literature.

FASTENING THE LINING

Fasteners

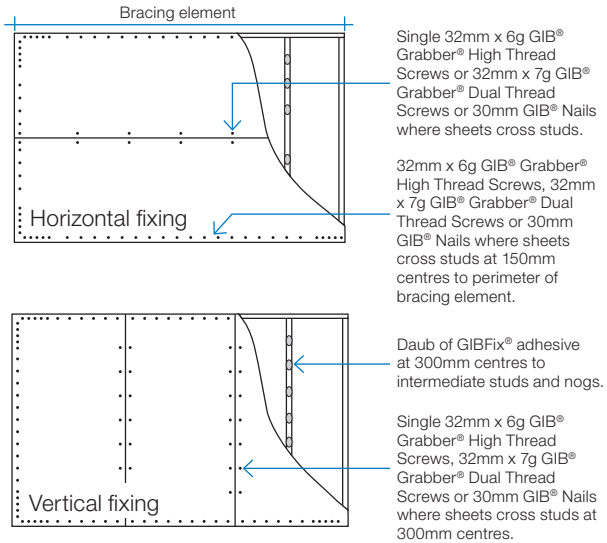
32mm x 6g GIB® Grabber® High Thread Screws, 32mm x 7g GIB® Grabber® Dual Thread Screws or 30mm GIB® Nails. If using the GIBFix® Angle use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

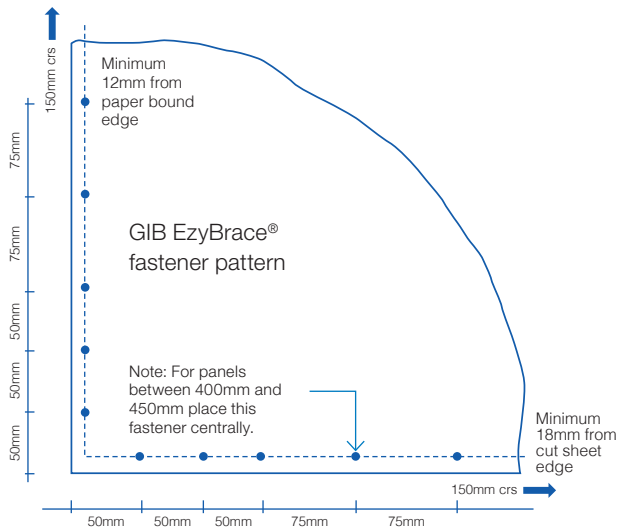
Fastener centres

50,100,150, 225, 300mm maximum from each corner and 150mm thereafter around the perimeter of the bracing element. For vertically fixed sheets place fasteners at 300mm maximum centres to intermediate sheet joints. For horizontally fixed sheets place single fasteners to the sheet edge where it crosses the stud. Use daubs of GIBFix® adhesive at 300mm maximum centres to intermediate studs. Place fasteners no closer than 12mm from paper bound sheet edges and 18mm from any sheet end or cut edge.

JOINTING

Joint strength is important in delivering bracing system performance. All fastener heads stopped and all sheet joints GIB® Joint Tape reinforced and stopped in accordance with the GIB® Site Guide.





Unless stated all fastener spacings are maximums.

In order for GIB® systems to perform as tested, all components must be installed exactly as prescribed. Substituting components produces an entirely different system and may seriously compromise performance. Follow the specifications. This specification sheet is issued in conjunction with the publication GIB EzyBrace® Systems

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GIB EzyBrace® Systems specification GS2-NOM

Specification code	Minimum length (m)	Lining requirement
GS2-NOM	0.4	Any 10mm or 13mm GIB® Standard plasterboard fixed to each side of the wall framing

WALL FRAMING

Wall framing to comply with;

- NZBC B1 — Structure B1/AS1 Clause 3 Timber (NZS 3604:2011).
- NZBC B2 — Durability B2/AS1 Clause 3.2 Timber (NZS 3602).

Framing dimensions and height as determined by NZS 3604:2011 stud and top plate tables for load bearing and non-bearing walls. The use of kiln dried stress graded timber is recommended.

BOTTOM PLATE FIXING

Timber floor

Pairs of hand driven 100mm x 3.75mm nails at 600mm centres; or three power driven 90mm x 3.15mm nails at 600mm centres.

Concrete floor

Internal Wall Bracing Lines: In accordance with the requirements of NZS 3604:2011 for internal wall plate fixing or 75mm x 3.8mm shot fired fasteners with 16mm discs spaced at 150mm and 300mm from end studs and then 600mm centres thereafter.

WALL LINING

- A layer of 10mm or 13mm GIB® plasterboard to each side of the wall.
- Sheets can be fixed vertically or horizontally.
- Sheet joints shall be touch fitted.
- Use full length sheets where possible.

PERMITTED ALTERNATIVES

For permitted GIB® plasterboard alternatives refer to p. 5 in GIB EzyBrace® Systems literature.

FASTENING THE LINING

Fasteners

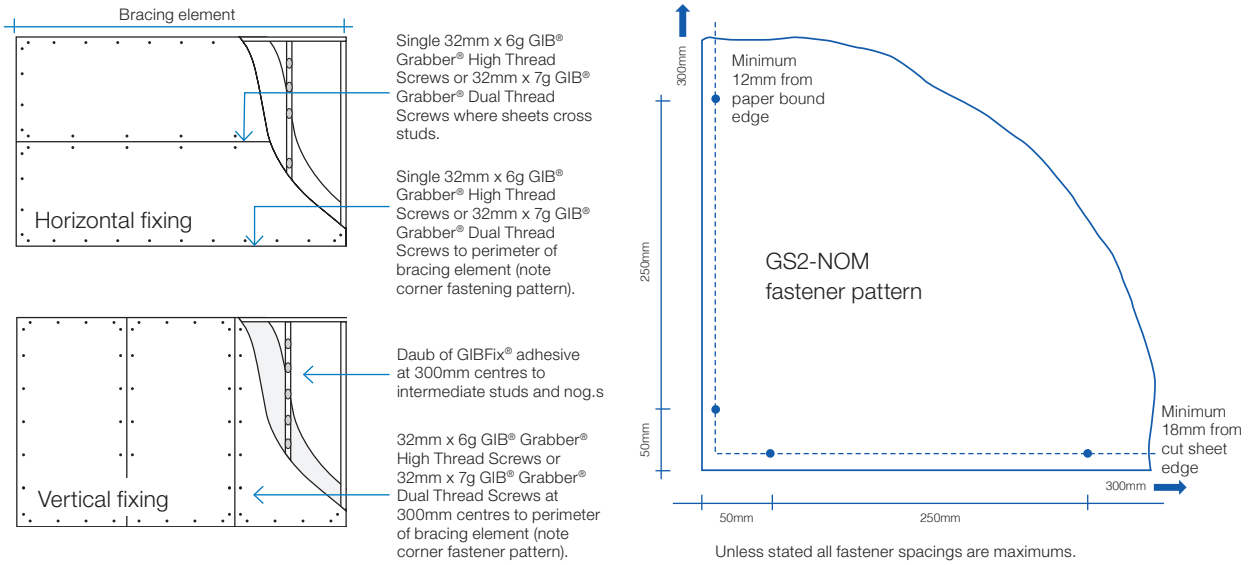
32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws. If using the GIBFix® Angle use 32mm x 7g GIB® Grabber® Dual Thread Screws.

Fastener centres

50, 300mm from each corner and 300mm maximum thereafter around the perimeter of the bracing element. For horizontally fixed sheets place single fasteners to the sheet edge where it crosses the stud. Use daubs of GIBFix® adhesive at 300mm maximum centres to intermediate studs. Place fasteners no closer than 12mm from paper bound sheet edges and 18mm from any sheet end or cut edge.

JOINTING

Joint strength is important in delivering bracing system performance. All fastener heads stopped and all sheet joints GIB® Joint Tape reinforced and stopped in accordance with the GIB® Site Guide.



Unless stated all fastener spacings are maximums.

In order for GIB® systems to perform as tested, all components must be installed exactly as prescribed. Substituting components produces an entirely different system and may seriously compromise performance. Follow the specifications. This specification sheet is issued in conjunction with the publication GIB EzyBrace® Systems

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GS2-NOM ADHESIVE FIXING OPTION AT DOOR JAMBS

As an alternative to using screw fixings, a continuous 6-10mm bead of solvent based GIBFix® All-Bond can be applied along the full height studs immediately adjacent to an internal door opening and at the door lintel or head trimmer. The lining is then bedded into the adhesive and installed into the rebated jamb, as shown in figure 38.

This solvent based adhesive option may only be used with GS2-NOM specification and is designed to reduce popping of fasteners around door openings on internal walls.

FIGURE 37: SCREW FIX FOR OPENINGS

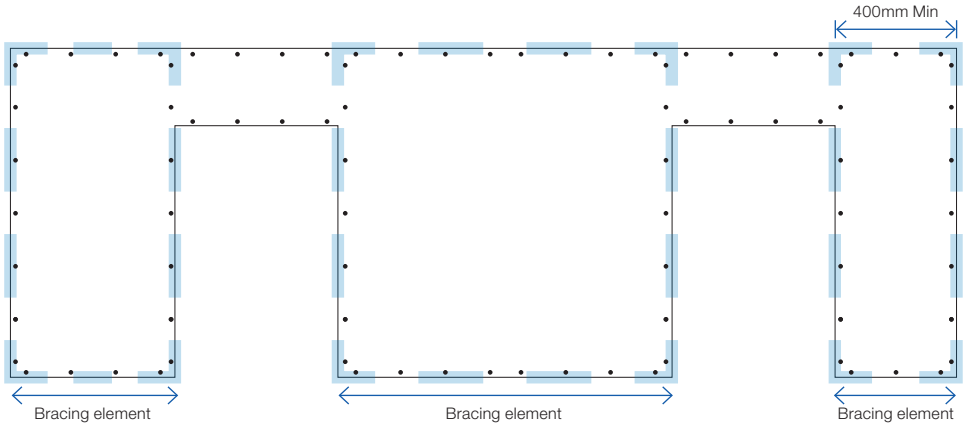
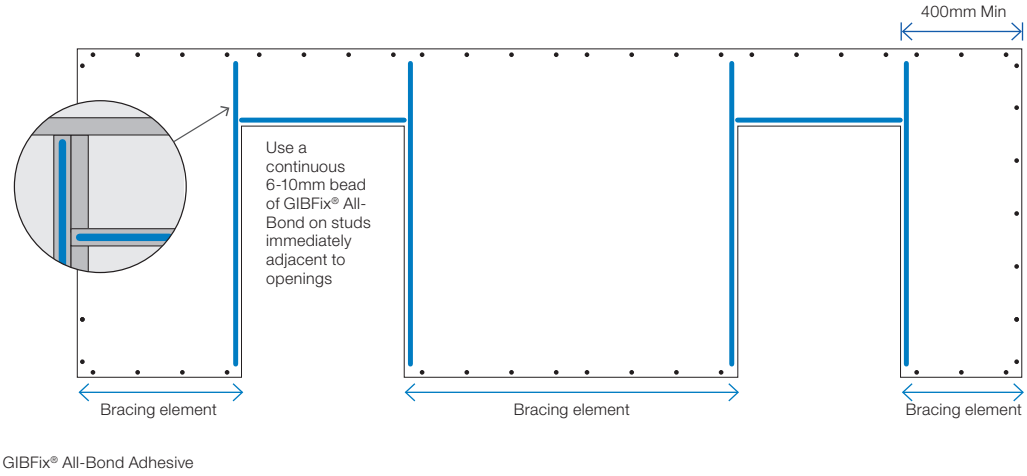
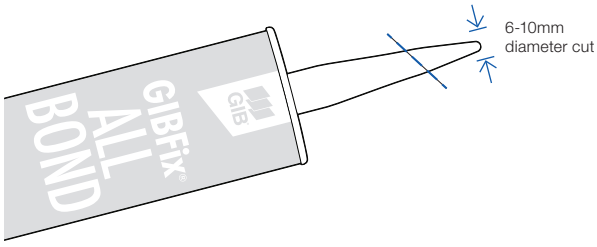


FIGURE 38: SCREW AND ADHESIVE FIX FOR OPENINGS



ADHESIVE NOZZLE APERTURE



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GIB EzyBrace® Systems specification GS2-N

Specification code	Minimum length (m)	Lining requirement
GS2-N	0.4	Any 10mm or 13mm GIB® Standard plasterboard fixed to each side of the wall framing

WALL FRAMING

Wall framing to comply with;

- NZBC B1 — Structure B1/AS1 Clause 3 Timber (NZS 3604:2011).
- NZBC B2 — Durability B2/AS1 Clause 3.2 Timber (NZS 3602).

Framing dimensions and height as determined by NZS 3604:2011 stud and top plate tables for load bearing and non-bearing walls. The use of kiln dried stress graded timber is recommended.

BOTTOM PLATE FIXING

Timber Floor

Pairs of hand driven 100 x 3.75mm nails at 600mm centres; or three power driven 90 x 3.15mm nails at 600mm centres.

Concrete floor

Internal Wall Bracing Lines: In accordance with the requirements of NZS 3604:2011 for internal wall plate fixing or 75 x 3.8mm shot fired fasteners with 16mm discs spaced at 150mm and 300mm from end studs and then 600mm centres thereafter.

WALL LINING

- A layer of 10mm or 13mm GIB® plasterboard to each side of the wall.
- Sheets can be fixed vertically or horizontally.
- Sheet joints shall be touch fitted.
- Use full length sheets where possible.

PERMITTED ALTERNATIVES

For permitted GIB® plasterboard alternatives refer to p. 5 in GIB EzyBrace® Systems literature.

FASTENING THE LINING

Fasteners

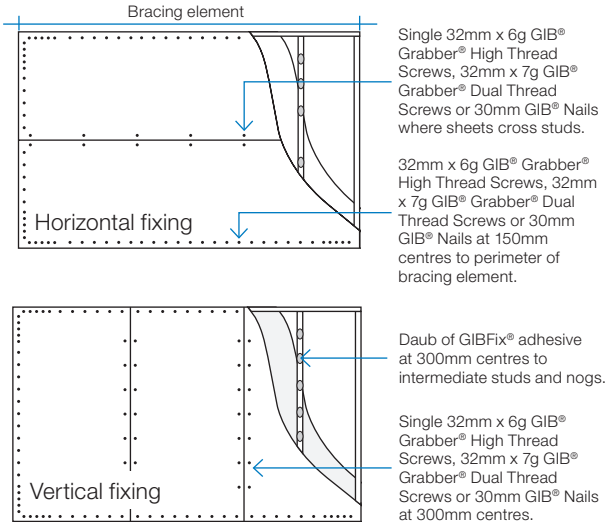
32mm x 6g GIB® Grabber® High Thread Screws,32mm x 7g GIB® Grabber® Dual Thread Screws or 30mm GIB® Nails. If using the GIBFix® Angle use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

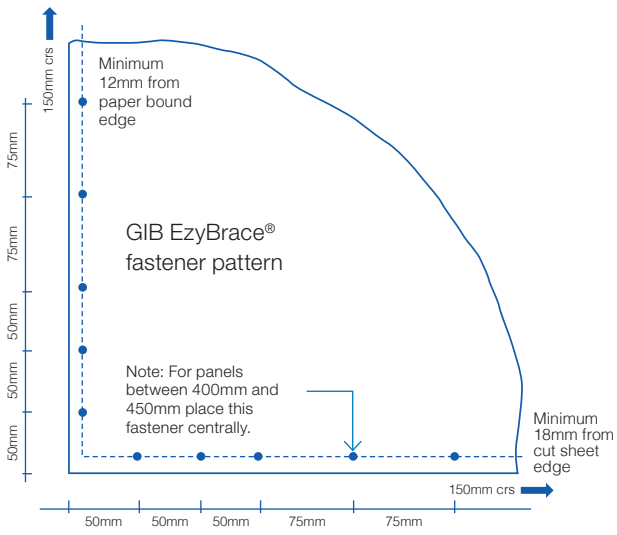
Fastener centres

50,100,150, 225, 300mm maximum from each corner and 150mm thereafter around the perimeter of the bracing element. For vertically fixed sheets place fasteners at 300mm maximum centres to intermediate sheet joints. For horizontally fixed sheets place single fasteners to the sheet edge where it crosses the stud. Use daubs of GIBFix® adhesive at 300mm maximum centres to intermediate studs. Place fasteners no closer than 12mm from paper bound sheet edges and 18mm from any sheet end or cut edge.

JOINTING

Joint strength is important in delivering bracing system performance. All fastener heads stopped and all sheet joints GIB® Joint Tape reinforced and stopped in accordance with the GIB® Site Guide.





Unless stated all fastener spacings are maximums.

In order for GIB® systems to perform as tested, all components must be installed exactly as prescribed. Substituting components produces an entirely different system and may seriously compromise performance. Follow the specifications. This specification sheet is issued in conjunction with the publication GIB EzyBrace® Systems

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GIB EzyBrace® Systems specification GSP-H

Specification Code	Minimum length (m)	Lining requirement	Other requirements
GSP-H	0.4	Any 10mm or 13mm GIB® plasterboard lining to one side of framing and minimum 7mm structural plywood manufactured to AS/NZ 2269.0 :2012 to the other side	Hold downs

WALL FRAMING

Wall framing to comply with;

- NZBC B1 — Structure B1/AS1 Clause 3 Timber (NZS 3604:2011).
- NZBC B2 — Durability B2/AS1 Clause 3.2 Timber (NZS 3602).

Framing dimensions and height as determined by NZS 3604:2011 stud and top plate tables for load bearing and non-bearing walls. The use of kiln dried stress graded timber is recommended.

BOTTOM PLATE FIXING

Timber floor

Use panel hold downs at each end of the bracing element. The GIB HandiBrac® is recommended. See details in GIB EzyBrace® Systems or GIB® Site Guide.

Pairs of hand driven 100 x 3.75mm nails at 600mm centres; or Three power driven 90 x 3.15mm nails at 600mm centres.

Concrete floor

Use panel hold downs at each end of the bracing element. The GIB HandiBrac® is recommended. See details in GIB EzyBrace® Systems or GIB® Site Guide. Within the length of the bracing element bottom plates are to be fixed in accordance with the requirements of NZS 3604:2011.

WALL LINING

- A layer of 10mm or 13mm GIB® plasterboard to one side of the wall plus minimum 7mm structural plywood manufactured to AS/NZ 2269.0 :2012 to the other side.
- Sheets can be fixed vertically or horizontally, with edges supported.
- Sheet joints shall be touch fitted.
- Use full length sheets where possible.

PERMITTED ALTERNATIVES

For permitted GIB® plasterboard alternatives refer to p. 5 in GIB EzyBrace® Systems literature.

FASTENING THE LINING

Fasteners

32mm x 6g GIB® Grabber® High Thread Screws, 32mm x 7g GIB® Grabber® Dual Thread Screws or 30mm GIB® Nails.

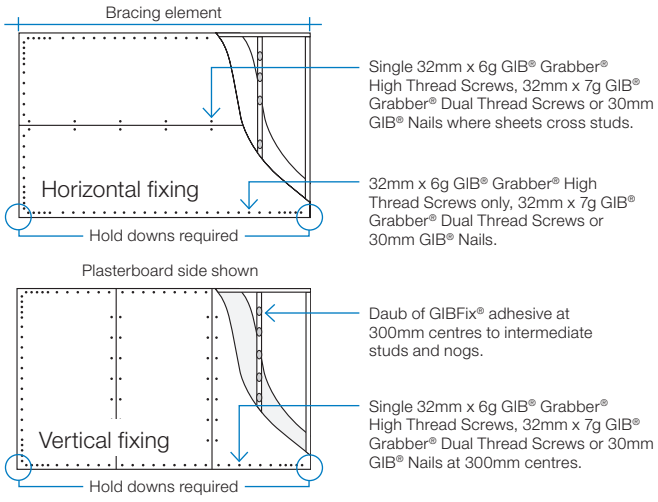
If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread Screws. Plywood: 50 x 2.8mm Galv or Stainless steel annular grooved FH nails.

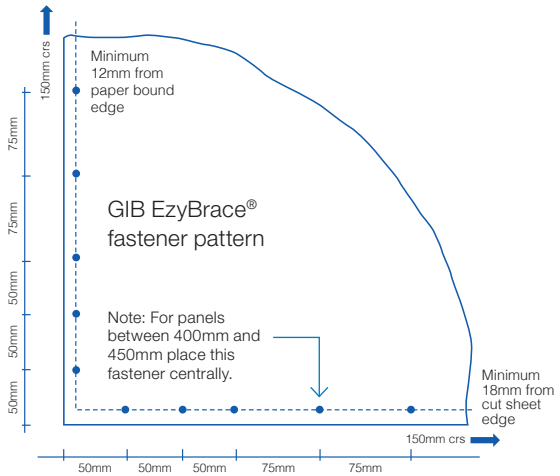
Fastener centres

GIB® plasterboard side: 50,100,150, 225, 300mm maximum from each corner and 150mm thereafter around the perimeter of the bracing element. For vertically fixed sheets place fasteners at 300mm maximum centres to the intermediate sheet joints. For horizontally fixed sheets place single fasteners to the sheet edge where it crosses the stud. Use daubs of GIBFix® adhesive at 300mm maximum centres to intermediate studs. Place fasteners no closer than 12mm from paper bound sheet edges and 18mm from any sheet end or cut edge. Plywood side: 150mm centres to the perimeter of each sheet. GIB® corner fastener pattern does not apply to the plywood side. 300mm centres to intermediate studs.

JOINTING

Joint strength is important in delivering bracing system performance. All fastener heads stopped and all sheet joints GIB® Joint Tape reinforced and stopped in accordance with the GIB® Site Guide.





Unless stated all fastener spacings are maximums.

In order for GIB® systems to perform as tested, all components must be installed exactly as prescribed. Substituting components produces an entirely different system and may seriously compromise performance. Follow the specifications. This specification sheet is issued in conjunction with the publication GIB EzyBrace® Systems

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GIB EzyBrace® Systems specification BL1-H

Specification code	Minimum length (m)	Lining requirement	Other requirements
BL1-H	0.4	10mm or 13mm GIB Braceline® to one side only	Hold downs

WALL FRAMING

Wall framing to comply with;

- NZBC B1 — Structure B1/AS1 Clause 3 Timber (NZS 3604:2011).
- NZBC B2 — Durability B2/AS1 Clause 3.2 Timber (NZS 3602).

Framing dimensions and height as determined by NZS 3604:2011 stud and top plate tables for load bearing and non-bearing walls. The use of kiln dried stress graded timber is recommended.

BOTTOM PLATE FIXING

Timber floor

Use panel hold downs at each end of the bracing element. The GIB HandiBrac® is recommended. See details in GIB EzyBrace® Systems or GIB® Site Guide.

Pairs of hand driven 100 x 3.75mm nails at 600mm centres; or Three power driven 90 x 3.15mm nails at 600mm centres.

Concrete floor

Use panel hold downs at each end of the bracing element. The GIB HandiBrac® is recommended. See details in GIB EzyBrace® Systems or GIB® Site Guide. Within the length of the bracing element bottom plates are to be fixed in accordance with the requirements of NZS 3604:2011.

WALL LINING

- A layer of 10mm or 13mm GIB Braceline®
- Sheets can be fixed vertically or horizontally.
- Sheet joints shall be touch fitted.
- Use full length sheets where possible.

PERMITTED ALTERNATIVES

For permitted GIB® plasterboard alternatives refer to p. 5 in GIB EzyBrace® Systems literature.

FASTENING THE LINING

Fasteners

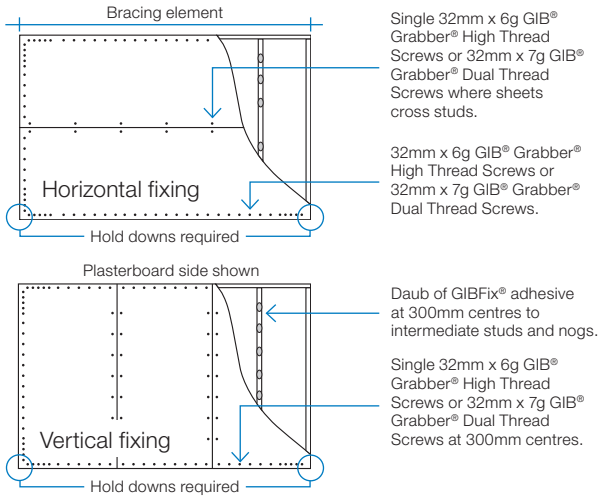
32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws. If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

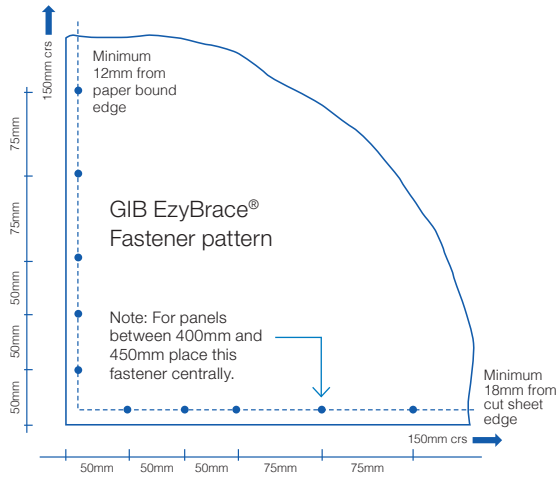
Fastener centres

50,100,150, 225, 300mm from maximum each corner and 150mm thereafter around the perimeter of the bracing element. For vertically fixed sheets place fasteners at 300mm maximum centres to the sheet joint. For horizontally fixed sheets place single fasteners to the sheet edge where it crosses the stud. Use daubs of GIBFix® adhesive at 300mm maximum centres to intermediate studs. Place fasteners no closer than 12mm from paper bound sheet edges and 18mm from any sheet end or cut edge.

JOINTING

Joint strength is important in delivering bracing system performance. All fastener heads stopped and all sheet joints GIB® Joint Tape reinforced and stopped in accordance with the GIB® Site Guide.





Unless stated all fastener spacings are maximums.

In order for GIB® systems to perform as tested, all components must be installed exactly as prescribed. Substituting components produces an entirely different system and may seriously compromise performance. Follow the specifications. This specification sheet is issued in conjunction with the publication GIB EzyBrace® Systems

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GIB EzyBrace® Systems specification BLG-H

Specification code	Minimum length (m)	Lining requirement	Other requirements
BLG-H	0.4	10mm or 13mm GIB Braceline® to one side of the frame plus any 10mm or 13mm GIB® plasterboard to the other side	Hold downs

WALL FRAMING

Wall framing to comply with;

- NZBC B1 — Structure B1/AS1 Clause 3 Timber (NZS 3604:2011).
- NZBC B2 — Durability B2/AS1 Clause 3.2 Timber (NZS 3602).

Framing dimensions and height as determined by NZS 3604:2011 stud and top plate tables for load bearing and non-bearing walls. The use of kiln dried stress graded timber is recommended.

BOTTOM PLATE FIXING

Timber floor

Use panel hold downs at each end of the bracing element. The GIB HandiBrac® is recommended. See details in GIB EzyBrace® Systems or GIB® Site Guide. Pairs of hand driven 100 x 3.75mm nails at 600mm centres; or Three power driven 90 x 3.15mm nails at 600mm centres.

Concrete floor

Use panel hold downs at each end of the bracing element. The GIB HandiBrac® is recommended. See details in GIB EzyBrace® Systems 2011 or GIB® Site Guide. Within the length of the bracing element bottom plates are to be fixed in accordance with the requirements of NZS 3604:2011.

WALL LINING

- A layer of 10mm or 13mm GIB Braceline® to one side of the wall plus any 10mm or 13mm GIB® plasterboard lining to the other side.
- Sheets can be fixed vertically or horizontally.
- Sheet joints shall be touch fitted.
- Use full length sheets where possible.

PERMITTED ALTERNATIVES

For permitted GIB® plasterboard alternatives refer to p. 5 in GIB EzyBrace® Systems literature.

FASTENING THE LINING

Fasteners

GIB Braceline® side: 32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws.Other side: 32mm x 6g GIB® Grabber® High Thread Screws, 30mm GIB Nails or 32mm x 7g GIB® Grabber® Dual Thread Screws.

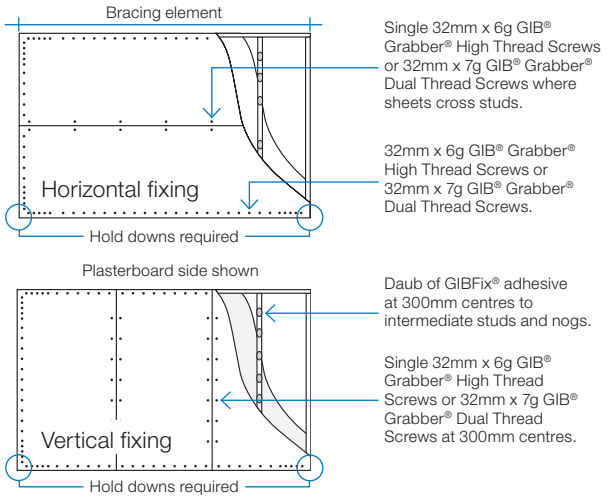
If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

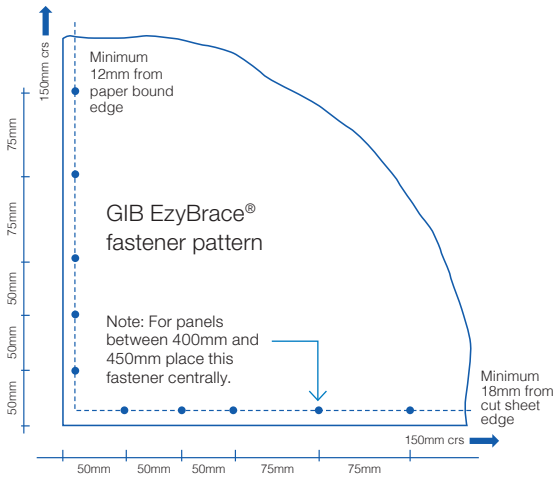
Fastener centres

50,100,150, 225, 300mm maximum from each corner and then 150mm thereafter around the perimeter of the bracing element. For vertically fixed sheets place fasteners at 300mm maximum centres to the intermediate sheet joints. For horizontally fixed sheets place single fasteners to the sheet edge where it crosses the stud. Use daubs of GIBFix® adhesive at 300mm maximum centres to intermediate studs. Place fasteners no closer than 12mm from paper bound sheet edges and 18mm from any sheet end or cut edge.

JOINTING

Joint strength is important in delivering bracing system performance. All fastener heads stopped and all sheet joints GIB® Joint Tape reinforced and stopped in accordance with the GIB® Site Guide.





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GIB EzyBrace® Systems specification BLP-H

Specification code	Minimum length (m)	Lining requirement	Other requirements
BLP-H	0.4	10mm or 13mm GIB Braceline® to one side of the frame plus minimum 7mm structural plywood manufactured to AS/NZ 2269.0 :2012 to the other side	Hold downs

WALL FRAMING

Wall framing to comply with;

- NZBC B1 — Structure; B1/AS1 Clause 3 Timber (NZS 3604:2011).
- NZBC B2 — Durability B2/AS1 Clause 3.2 Timber (NZS 3602).

Framing dimensions and height as determined by NZS 3604:2011 stud and top plate tables for load bearing and non-bearing walls. The use of kiln dried stress graded timber is recommended.

BOTTOM PLATE FIXING

Timber floor

Use panel hold downs at each end of the bracing element. The GIB® HandiBrac is recommended. See details in GIB EzyBrace® Systems or GIB® Site Guide.

Pairs of hand driven 100 x 3.75mm nails at 600mm centres; or Three power driven 90 x 3.15mm nails at 600mm centres.

Concrete floor

Use panel hold downs at each end of the bracing element. The GIB HandiBrac® is recommended. See details in GIB EzyBrace® Systems or GIB® Site Guide. Within the length of the bracing element bottom plates are to be fixed in accordance with the requirements of AS/NZ 2269/0 :2012.

WALL LINING

- A layer of 10mm or 13mm GIB Braceline® to one side of the wall plus minimum 7mm structural plywood manufactured to AS/NZS 2269.0 :2012 to the other side.
- Sheets can be fixed vertically or horizontally.
- Plywood is to be fixed vertically with edges supported.
- Sheet joints shall be touch fitted.
- Use full length sheets where possible.

PERMITTED ALTERNATIVES

For permitted GIB® plasterboard alternatives refer to p. 5 in GIB EzyBrace® Systems literature.

FASTENING THE LINING

Fasteners

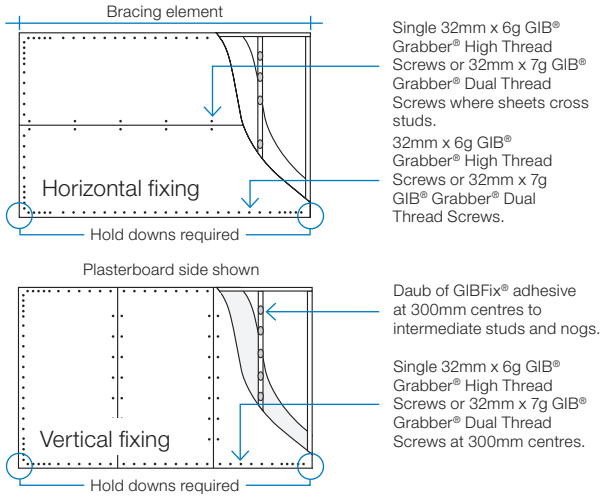
GIB Braceline® side: 32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws. Plywood: 50 x 2.8mm Galv or Stainless steel annular grooved FH nails. If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

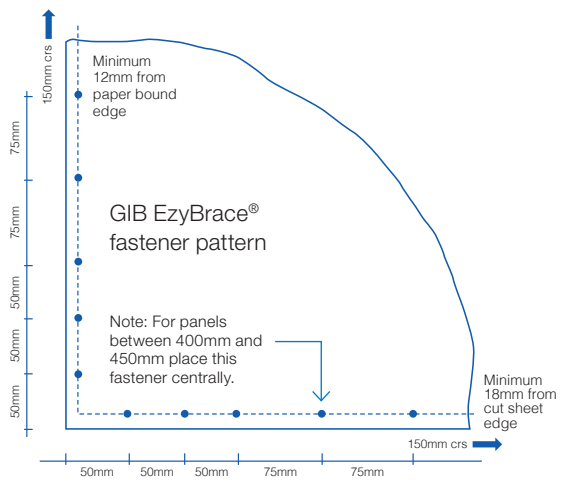
Fastener centres

GIB® Plasterboard side: 50,100,150, 225, 300mm from each corner and then 150mm thereafter around the perimeter of the bracing element. For vertically fixed sheets place fasteners at 300mm centres to the intermediate sheet joints. For horizontally fixed sheets place single fasteners to the sheet edge where it crosses the stud. Use daubs of GIBFix® adhesive at 300mm centres to intermediate studs. Place fasteners no closer than 12mm from paper bound sheet edges and 18mm from any sheet end or cut edge. Plywood side: 150mm centres to the perimeter of each sheet. GIB® corner fastener pattern does not apply to the plywood side. 300mm centres to intermediate studs.

JOINTING

Joint strength is important in delivering bracing system performance. All fastener heads stopped and all sheet joints GIB® Joint Tape reinforced and stopped in accordance with the GIB® Site Guide.





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Winstone Wallboards is committed to protecting the environment. Environmental matters are integrated into all business activities:

- Our operations strive to exceed all environmental regulatory requirements at all times.
- Protection of the environment is a day to day responsibility that we all must accept.
- We allocate appropriate management time and resources to address relevant environmental issues and continuously improve our activities in that area.
- We will achieve our standards of performance through positive action, employee involvement and constant communication with our neighbours, local authorities and customers.

Minimise on-site waste when designing and/or installing GIB® Systems. For larger projects give consideration to our cut-to-length service to reduce waste. GIB® plasterboard off-cuts, if separated from other waste building materials, can be readily recycled.

For larger projects waste can be diverted to compost manufacturers who grind up the GIB® plasterboard and use it in compost. For smaller projects, the GIB® plasterboard can be ground up and spread around the building site.

GLOBAL GREENTAG^{CERTTM}

The Global GreenTag^{CertTM} certified eco-label acknowledges product as meeting the GreenRate Standard set by Global GreenTag.^{CertTM}

GIB® plasterboard has a Level B green rating.

DECLARE CERTIFICATION

Declare is a database of non-toxic, sustainably sourced building products.

Many GIB® plasterboard products including GIB® Standard, GIB Braceline®, GIB Noiseline® and GIB Aqualine® have achieved Red List Free status in Declare certification.

For more information on Winstone Wallboards sustainability commitments visit gib.co.nz.

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Winstone Wallboards asserts its moral rights and reserves all other intellectual property rights in the materials contained in this brochure and related to GIBFix® Framing System and GIB EzyBrace® Systems.

TRADEMARKS

The names GIB®, GIB Fyreline®, GIB Ultraline®, GIB Braceline®, GIB Toughline®, GIB Noiseline®, GIB Aqualine®, GIB Nail®, GIB Tradeset®, GIB Plus 4®, GIB-Cove®, GIB Lite Blue®, GIBFix®, the colour mauve for GIB Toughline®, GIB HandiBrac®, GIB EzyBrace®, the colour blue for GIB Braceline®, the colour pink for GIB Fyreline®, the colour green for GIB Aqualine®, and the shield device are registered trademarks of Fletcher Building Holdings Limited.

PATENTS

GIBFix® Framing System and GIB EzyBrace® Systems, including componentry and design method, have patents pending (NZ Patent Number 596691, NZ Patent 709159 pending) and design and other IP rights.

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FOR MORE INFORMATION VISIT

gib.co.nz

OR CALL THE GIB® HELPLINE

0800 100 442

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GIB® Bracing Supplement Document

Issue Date December 2016

GIB® Bracing design notes

SUPPLEMENT	ISSUE DATE
GIB Ezybrace® Systems 2016 BU/m Ratings	Sept-16
Designing and Building with GS2-NOM	Sept-16
Multi Layer Bracing Systems	Aug-16
GIB® News article: Wings, Blocks & Diaphragms	Apr-13
GIB® News article: Low Damage Solutions for Non- Structural Elements	Jul-12
GIB® News article: Canterbury Earthquake Online Guides	Mar-12
Bracing Light Timber Frame Buildings Using Sheet Materials	Nov-11
Distribution of Wall Bracing Elements	Nov-11
Designing Bracing Upgrades	Jun-11

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GIB Ezybrace® Systems 2016 BU/m Ratings

Issue Date September 2016

The BU/m ratings for GIB EzyBrace® Systems shown below are responsibly conservative and are provided to allow manual calculation, and for use in alternative proprietary software.

The GIB EzyBrace® 2016 software delivers more accurate demand calculations based on specific building parameters entered, and bracing resistance (BU/m) is often higher than the values presented below. Do not use this table to assess bracing substitutions.

Table 1: GIB® Standard Bracing Unit Ratings

Type	Minimum Length (m)	Lining	Other Requirements	BU/m	
				W	EQ
GS1-N	0.4	GIB® Standard plasterboard one side	N/A	50	55
	1.2			70	60
GS2-N	0.4	GIB® Standard plasterboard both sides	N/A	70	65
	1.2			95	85
GS2-NOM	0.4	GIB® Standard plasterboard both sides (standard GIB® site guide fastener pattern)	N/A	50	50
GSP-H	0.4	GIB® Standard plasterboard one side, structural plywood the other	Panel hold-down fixings	100	115
	1.2			150*	150*

Table 2: GIB Braceline® Bracing Unit Ratings

Type	Minimum Length (m)	Lining	Other Requirements	BU/m	
				W	EQ
BL1-H	0.4	GIB Braceline® one side	Panel hold-down fixings	90	100
	1.2			125*	105
BLG-H	0.4	GIB Braceline® one side, GIB® Standard plasterboard the other	Panel hold-down fixings	110	115
	1.2			150*	145*
BLP-H	0.4	GIB Braceline® one side, structural plywood the other	Panel hold-down fixings	120*	135*
	1.2			150*	150*

** Timber Floors – A limit of 120 BU/m for NZS 3604:2011 timber floors applies unless specific engineering ensures that uplift forces generated by elements rated higher than 120 BU/m can be resisted by floor framing.*

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Wall Heights other than 2.4m

The published Bracing Unit ratings are based on a 2.4 metre height. For greater heights, the ratings must be multiplied by a factor f = 2.4 divided by the actual wall height. The Bracing Unit ratings for walls higher than 2.4 metres will reduce.

For example:

The Bracing Unit rating of a 2.7 metre high wall is obtained by multiplying the values in Tables 1 and 2 by f = 2.4/2.7 = 0.89

The Bracing Unit rating of a 3.6 metre high wall is obtained by multiplying the values in Tables 1 and 2 by f = 2.4/3.6 = 0.67

The height of walls with a sloping top plate can be taken as the average height.

Walls lower than 2.4 metres shall be rated as if they were 2.4 metres high.

For more information visit gib.co.nz/ezybrace or call the GIB® Helpline on 0800 100 442.

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BC0777/21
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Designing and Building with GS2-NOM

Issue Date September 2016

GIB EzyBrace® Systems 2016 literature and software includes the option of allowing nominally fixed internal walls lined on both sides with GIB® plasterboard to contribute to the building's bracing resistance. The fixing pattern as illustrated below represents the standard fixing pattern as published on page 38-39 of the GIB® Site Guide (December 2014).

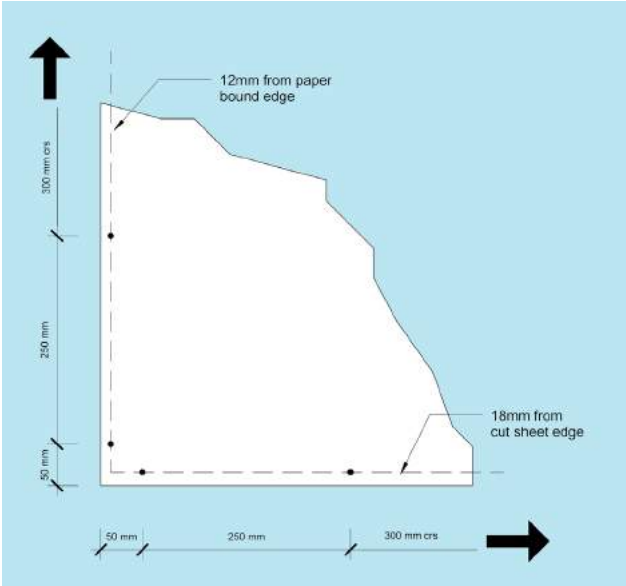
Building investigations following the Canterbury earthquakes have confirmed that not only designated bracing elements (such as GS1-N & GS2-N) resist lateral forces. Nominally fastened internal walls also contribute (often substantially) to the building's total resistance. An earthquake does not distinguish between designated GIB® plasterboard bracing elements and nominally fastened GIB® plasterboard linings. All the walls contribute to providing resistance against wind and earthquake forces.

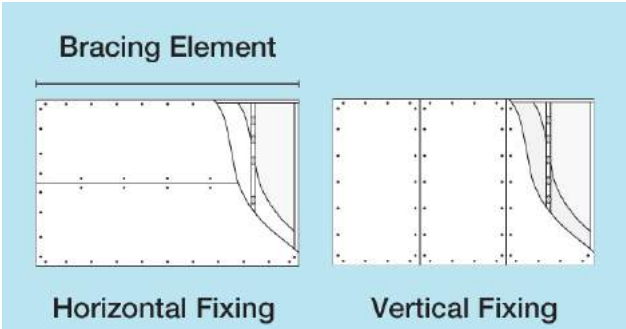
Permitting nominally fixed internal GIB® plasterboard linings to contribute to bracing resistance means that the total number of nails or screws can be reduced significantly. This results in a simpler and more uniform fastener pattern and a reduction in the risks of fastener 'popping' as a result of timber movement. This improves the chance of achieving a high quality of finish.

When compared with GS1-N and GS2-N, the same Bracing Unit (BU) rating can be achieved with GS2-NOM using 30% to 40% fewer screws.

The design examples on the following pages illustrate how fastener numbers can be reduced.

FIGURE 1: GS2-NOM SCREW FIXING PATTERN





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GS2-NOM - DESIGN APPROACH 1

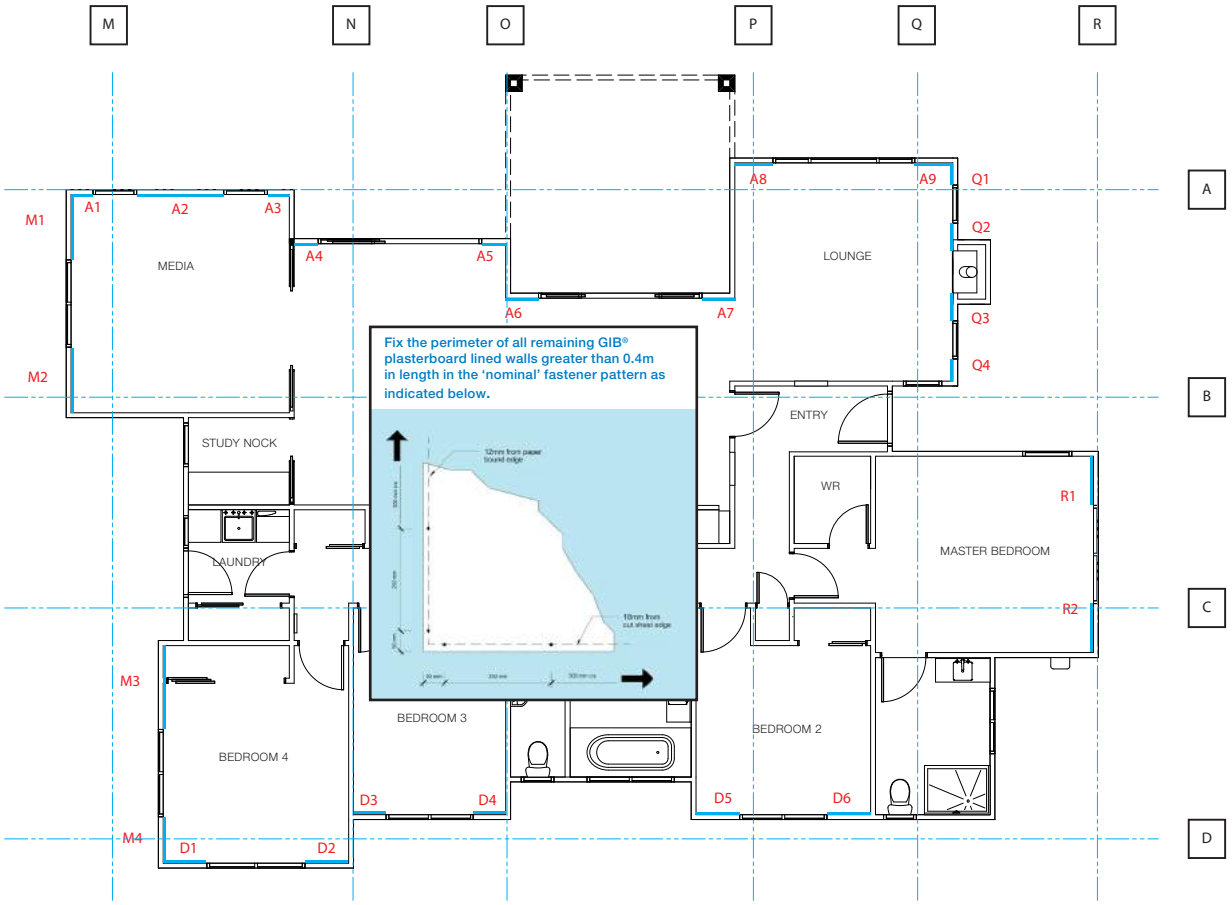
The design example in Figure 2 below shows designated bracing elements GS1-N and BL1-H used around the perimeter of the house. A note is added that all remaining GIB® plasterboard linings are fixed at the nominal GIB® Site Guide pattern.

In this particular case the design calculations in Figure 3 show that bracing resistance exceeds demand by 60% when accounting for nominally fixed GS2-NOM throughout. Had GS1-N or GS2-N designated internal bracing elements been used, in addition to nominally fixed (not counted) remaining walls, the fastener count could have increased by more than 500 screws.

The calculations also show how lengths of GS2-NOM can be accumulated on a bracing line. Lengths of internal wall equal or greater than 0.4 m can be added, provided walls are lined both sides with a minimum of 10 mm GIB® Standard plasterboard fixed in the nominal GIB® Site Guide pattern. The accumulated length is then entered in the bracing resistance calculations. Bathroom walls and walls with significant openings are not added to the accumulated length.

In this case the Building Official should be able to take the design redundancy into account, ensure internal walls lined both sides are generally fixed in accordance with the standard GIB® Site Guide GS2-NOM pattern, and focus more specifically on critical elements around the building perimeter.

FIGURE 2: DESIGN APPROACH 1– BRACING LAYOUT PLAN



This design considers the inherent bracing provided by the structure and tops up with designated bracing elements where required. To avoid any potential for miscommunication and delays onsite during construction and inspection, designers should clearly note the intent to use standard GIB® Site Guide GS2-NOM fixing on bracing plans.

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FIGURE 3: DESIGN APPROACH 1 - BRACING RESISTANCE CALCULATIONS INCLUDING GS2-NOM

Single Level Along Resistance Sheet

Job Name:

									Wind	EQ
									Demand	
									624	712
									Achieved	
Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	992 159%	976 137%
A	1	0.40		2.4	GS1-N	GIB®	21	23		
	2	1.60		2.4	GS1-N	GIB®	110	96		
	3	0.40		2.4	GS1-N	GIB®	21	23		
	4	0.50		2.4	GS1-N	GIB®	28	29		
	5	0.50		2.4	GS1-N	GIB®	28	29		
	6	0.70		2.4	GS1-N	GIB®	41	41		
	7	0.70		2.4	GS1-N	GIB®	41	41		
	8	0.80		2.4	GS1-N	GIB®	49	47		
	9	0.80		2.4	GS1-N	GIB®	49	47		
	External Length = 15								388 OK	377 OK
B	1	1.60		2.4	GS2-NOM	GIB®	80	80		
	2	1.60		2.4	GS2-NOM	GIB®	80	80		
									160 OK	160 OK
C	1	1.80		2.4	GS2-NOM	GIB®	90	90		
	2	1.80		2.4	GS2-NOM	GIB®	90	90		
									180 OK	180 OK
D	1	0.80		2.4	GS1-N	GIB®	49	47		
	2	0.80		2.4	GS1-N	GIB®	49	47		
	3	0.60		2.4	GS1-N	GIB®	34	35		
	4	0.60		2.4	GS1-N	GIB®	34	35		
	5	0.80		2.4	GS1-N	GIB®	49	47		
	6	0.80		2.4	GS1-N	GIB®	49	47		
	External Length = 15								264 OK	259 OK

Single Level Across Resistance Sheet

Job Name:

									Wind	EQ
									Demand	
									785	712
									Achieved	
Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	1155 147%	1103 155%
M	1	1.30		2.4	GS1-N	GIB®	90	78		
	2	1.30		2.4	GS1-N	GIB®	90	78		
	3	1.60		2.4	GS1-N	GIB®	110	96		
	4	0.90		2.4	GS1-N	GIB®	57	53		
	External Length = 12								347 OK	305 OK
N	1	3.20		2.4	GS2-NOM	GIB®	160	160		
									160 OK	160 OK
O	1	3.20		2.4	GS2-NOM	GIB®	160	160		
									160 OK	160 OK
P	1	2.00		2.4	GS2-NOM	GIB®	100	100		
									100 OK	100 OK
Q	1	0.40		2.4	GS1-N	GIB®	21	23		
	2	0.40		2.4	GS1-N	GIB®	21	23		
	3	0.40		2.4	GS1-N	GIB®	21	23		
	4	0.40		2.4	GS1-N	GIB®	21	23		
	5	2.00		2.4	GS2-NOM	GIB®	100	100		
									185 OK	193 OK
R	1	0.90		2.4	BL1-H	GIB®	102	92		
	2	0.90		2.4	BL1-H	GIB®	102	92		
	External Length = 12								204 OK	185 OK

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GS2-NOM - DESIGN APPROACH 2

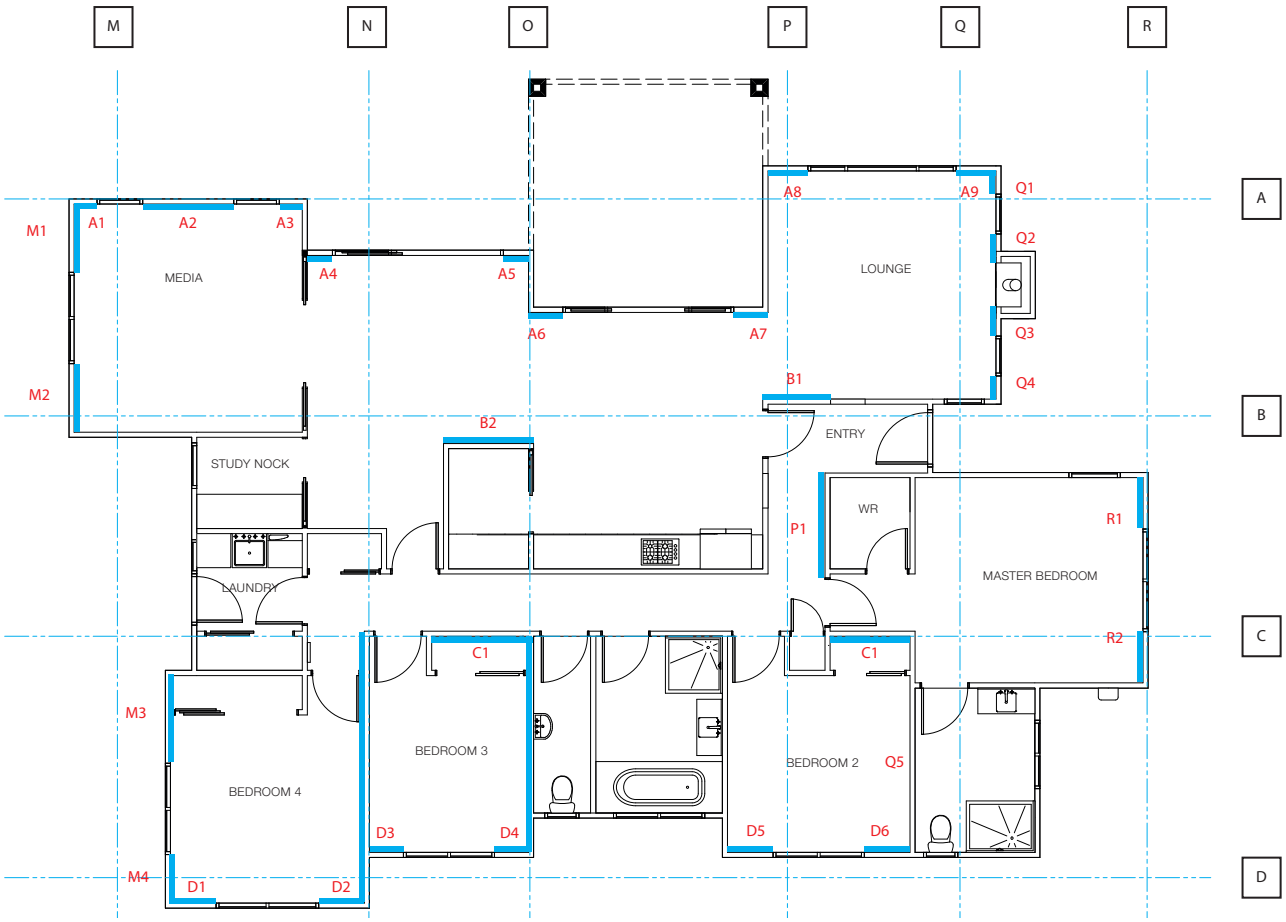
The design approach in Figure 4 below shows designated bracing elements GS1-N and BL1-H used around the perimeter of the house. Standard GIB® Site Guide fixing is used on internal walls lined both sides. Specific sections of these internal walls are nominated as GS2-NOM bracing elements, sufficient to meet or exceed the minimum bracing demand on the particular bracing grid line.

In this case GS2-NOM is used as a conventional bracing element. This method might be preferred by some designers, builders and building officials as it represents a more traditional approach to bracing resistance calculations and construction and permits focus on designated elements.

The outcome in terms of number of fastener is the same as that achieved with DESIGN APPROACH 1 where the fastener count could have increased by 500 screws if GS1-N or GS2-N designated internal bracing elements had been used in place of GS2-NOM.

In this case the calculations show how GS2-NOM is used as an orthodox bracing element and the building consent and inspection processes are also conventional. Given the many internal walls not counted in this case, it is still suggested that inspection focus should be more specifically on critical elements around the building perimeter.

FIGURE 4: DESIGN APPROACH 2 – BRACING LAYOUT PLAN



This design uses GS2-NOM as a conventional bracing element and designers should clearly identify designated elements on the bracing plan. Not counted internal walls fastened in the standard GIB® Site Guide pattern add further redundancy.

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FIGURE 4: DESIGN APPROACH 2 – BRACING LAYOUT PLAN

Single Level Along Resistance Sheet

Job Name:

									Wind	EQ
									Demand	
									624	712
									Achieved	
Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	1152 185%	1136 160%
A	1	0.40		2.4	GS1-N	GIB®	21	23		
	2	1.60		2.4	GS1-N	GIB®	110	96		
	3	0.40		2.4	GS1-N	GIB®	21	23		
	4	0.50		2.4	GS1-N	GIB®	28	29		
	5	0.50		2.4	GS1-N	GIB®	28	29		
	6	0.70		2.4	GS1-N	GIB®	41	41		
	7	0.70		2.4	GS1-N	GIB®	41	41		
	8	0.80		2.4	GS1-N	GIB®	49	47		
	9	0.80		2.4	GS1-N	GIB®	49	47		
	External Length = 15								388 OK	377 OK
B	1	5.00		2.4	GS2-NOM	GIB®	250	250		
									250 OK	250 OK
C	1	5.00		2.4	GS2-NOM	GIB®	250	250		
									250 OK	250 OK
D	1	0.80		2.4	GS1-N	GIB®	49	47		
	2	0.80		2.4	GS1-N	GIB®	49	47		
	3	0.60		2.4	GS1-N	GIB®	34	35		
	4	0.60		2.4	GS1-N	GIB®	34	35		
	5	0.80		2.4	GS1-N	GIB®	49	47		
	6	0.80		2.4	GS1-N	GIB®	49	47		
	External Length = 15								264 OK	259 OK

Single Level Across Resistance Sheet

Job Name:

									Wind	EQ
									Demand	
									785	712
									Achieved	
Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	1645 210%	1593 224%
M	1	1.30		2.4	GS1-N	GIB®	90	78		
	2	1.30		2.4	GS1-N	GIB®	90	78		
	3	1.60		2.4	GS1-N	GIB®	110	96		
	4	0.90		2.4	GS1-N	GIB®	57	53		
	External Length = 12								347 OK	305 OK
N	1	5.00		2.4	GS2-NOM	GIB®	250	250		
									250 OK	250 OK
O	1	5.00		2.4	GS2-NOM	GIB®	250	250		
									250 OK	250 OK
P	1	5.00		2.4	GS2-NOM	GIB®	250	250		
									250 OK	250 OK
Q	1	0.40		2.4	GS1-N	GIB®	21	23		
	2	0.40		2.4	GS1-N	GIB®	21	23		
	3	0.40		2.4	GS1-N	GIB®	21	23		
	4	0.40		2.4	GS1-N	GIB®	21	23		
	5	5.20		2.4	GS2-NOM	GIB®	260	260		
									345 OK	353 OK
R	1	0.90		2.4	BL1-H	GIB®	102	92		
	2	0.90		2.4	BL1-H	GIB®	102	92		
	External Length = 12								204 OK	185 OK

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GS2-NOM ADHESIVE FIXING OPTION AT REBATED JAMBS

When rebated jambs are used, GS2-NOM fastener numbers can be further reduced by using a continuous bead of GIBFix® All-Bond solvent-based adhesive on studs adjacent to the opening, as illustrated below. This method only applies to GS2-NOM fixing and not to other designated bracing elements.

If the adhesive fixing method is preferred, it is strongly recommended that it is discussed with the site building official at an early stage, prior to starting lining installation, so that an inspection and sign-off process can be agreed.

There should be ample opportunity to do this given that lining installation commences at an advanced stage of the project.

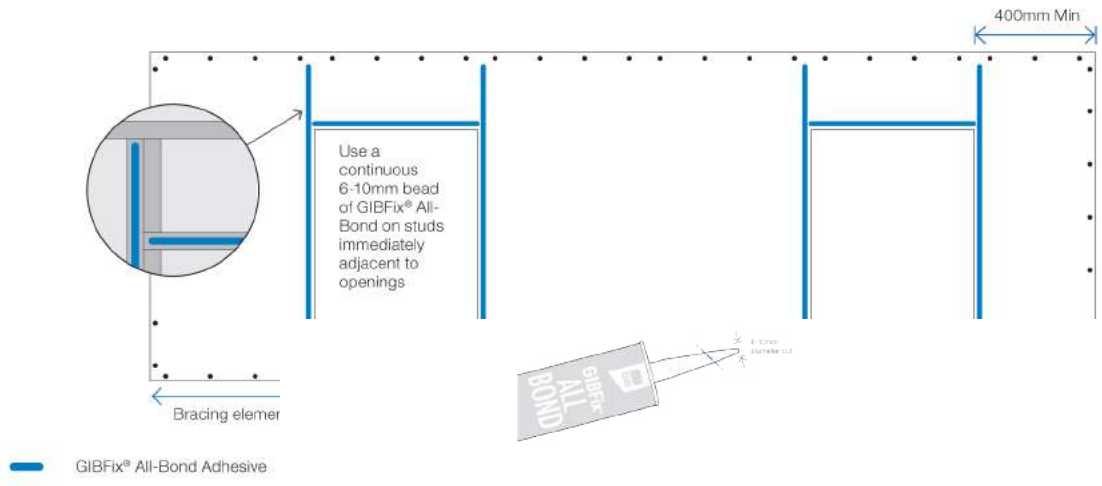
CLEAR COMMUNICATION BETWEEN THE DESIGNER, BUILDER AND BUILDING CONSENT AUTHORITY IS KEY!

A poor outcome would be when the designer and builder have elected to use the adhesive fixing method but have failed to advise the site building official prior to lining. If the building official has reservations about the application of adhesive, one of the following processes can be agreed;

A number of random core holes can be requested. They can be drilled with a small hole-saw in locations above openings as agreed between the building official and installer. If presence of GIB® All-Bond adhesive is evident it is at the building official's discretion to accept the installation 'on reasonable grounds'.

If the decision is made to reject the adhesive fixing method post-lining, screws can be installed in accordance with the Figure 1 GS2-NOM fixing pattern. If GIBFix® All-Bond adhesive has been used it is prudent to wait 7 days for the adhesive to fully cure before applying screws.

FIGURE 6: GS2-NOM SCREW AND GIBFIX® ALL-BOND FIXING FOR REBATED JAMBS



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SUMMARY GS2-NOM DESIGN, INSTALLATION AND INSPECTION

GS2-NOM

- GS2-NOM permits internal walls lined in accordance with standard GIB® Site Guide fixing to contribute to bracing resistance
- Using GS2-NOM can result in a significant reduction of screw fixings which in turn aids quality of finish
- Using GS2-NOM can result in a more uniform fastener pattern
- The decision to use GS2-NOM requires agreement between the various parties involved in the design and construction process
- Using GS2-NOM in calculations often results in designs with bracing resistance well exceeding bracing demand because most internal walls can be counted. In addition, conservative Bracing Unit ratings have been assigned to GS2-NOM in the GIB EzyBrace® Systems 2016 software.
- When inspecting GS2-NOM installations, the design margin should be taken into account
- When design margins are tight, focus should first be on bracing distribution and the design and construction of critical bracing elements, e.g. narrow panels adjacent to significant openings such as large windows, ranch sliders or garage doors.
- GS2-NOM specifies 300 mm maximum perimeter screw centres. Closer fixing is permitted.

GS2-NOM ADHESIVE FIXING OPTION

- If the GS2-NOM adhesive fixing method is preferred, prior communication between the contractor, installer, and building official is required. Installation of adhesive fixed GS2-NOM without prior consultation with the site building official is discouraged.
- The lining installer may wish to take a photographic record of the installation. However, acceptance depends on the practices adopted by the particular Building Control Authority and prior communication is once again recommended.
- If adhesive fixed GS2-NOM has been installed without prior consultation with the site building official, random core holes can be drilled to determine the presence of adhesive and establish‘reasonable grounds’ for sign off. If required, installation of additional screws can be requested.

COMMUNICATION IS KEY WHEN DESIGNING AND INSPECTING BRACING, INCLUDING GS2-NOM FIXING.

PRODUCT SUBSTITUTION

- In order for GIB® systems to perform as tested, all components must be installed exactly as prescribed. Substituting components producesan entirely different system and may compromise performance. Follow system specifications.

TECHNICIAL MATERIAL & ASSISTANCE

Technical specification materials are available from www.gib.co.nz/ezybrace. Or call the GIB® Helpline 0800 100 442 for more information.



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Multi Layer Bracing Systems

Issue Date August 2016

In a two layer wall system such as GIB® Fire or Noise control systems, the plasterboard bracing element sheets can be either:

Applied directly to the framing, with fasteners set out as per the bracing instructions and a fastener length as per the system being installed. The inner layer can be left unstopped. Or,

Applied to the outer sheets with the outer layer fasteners being installed as per the bracing instructions and fastener length as per the system being installed.

The outer layer is to be tapped and stopped as per GIB® Site Guide.

When a GIB® Bracing element has been designated for a section of wall, BU ratings can not be increased by incorporating additional proprietary bracing elements within that same section of wall.

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Wings, Blocks and Diaphragms

Issue Date April 2013

We are often asked if separate bracing calculation is required for 'wings' or 'blocks'.

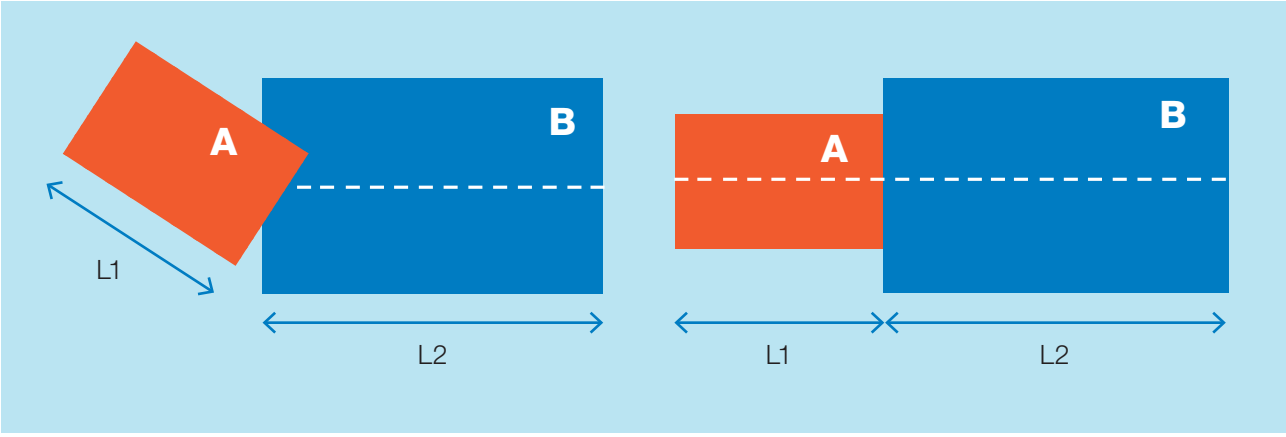
NZS 3604:2011 paragraph 5.1.5 requires wings or blocks to 'provide sufficient bracing individually' if they extend more than 6 metres from main building. Note that this requirement refers to the provision of bracing, and that separate calculation is not mentioned as a requirement.

The intent of the clause is that provision of bracing is relative to floor area. In other words, if a wing represents 20% of the total building floor area, then at least 20% of the bracing demand must be provided in that wing. This can be achieved by separate calculation, but is often more readily achieved by treating the building as a single unit and simply ensuring bracing distribution is balanced and proportional to floor area.

Even when wings or blocks are at an angle to the main building, a single calculation can be carried out. NZS3604:2011 paragraph 5.4.4 gives guidance for walls at angles to the bracing grid and is intended for single or few individual walls. Wings or blocks at an angle are better treated separately or by 'stretching' the building along the ridge line for calculation purposes and treating it as a single rectangular structure. The angle to bracing line function in the GIB EzyBrace® calculation sheet does not need to be applied in this situation.

Using a 'stretched' rectangular design will deliver the same outcome as doing two separate calculations. Again the important issue is to ensure that bracing provision and distribution is proportional to floor area.

Calculating A and B separately give the same bracing demand as treating them as a single 'stretched' building. Ensure that bracing provision is proportional to floor area.



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The other frequently encountered bracing question relates to ceiling diaphragms and when they are required.

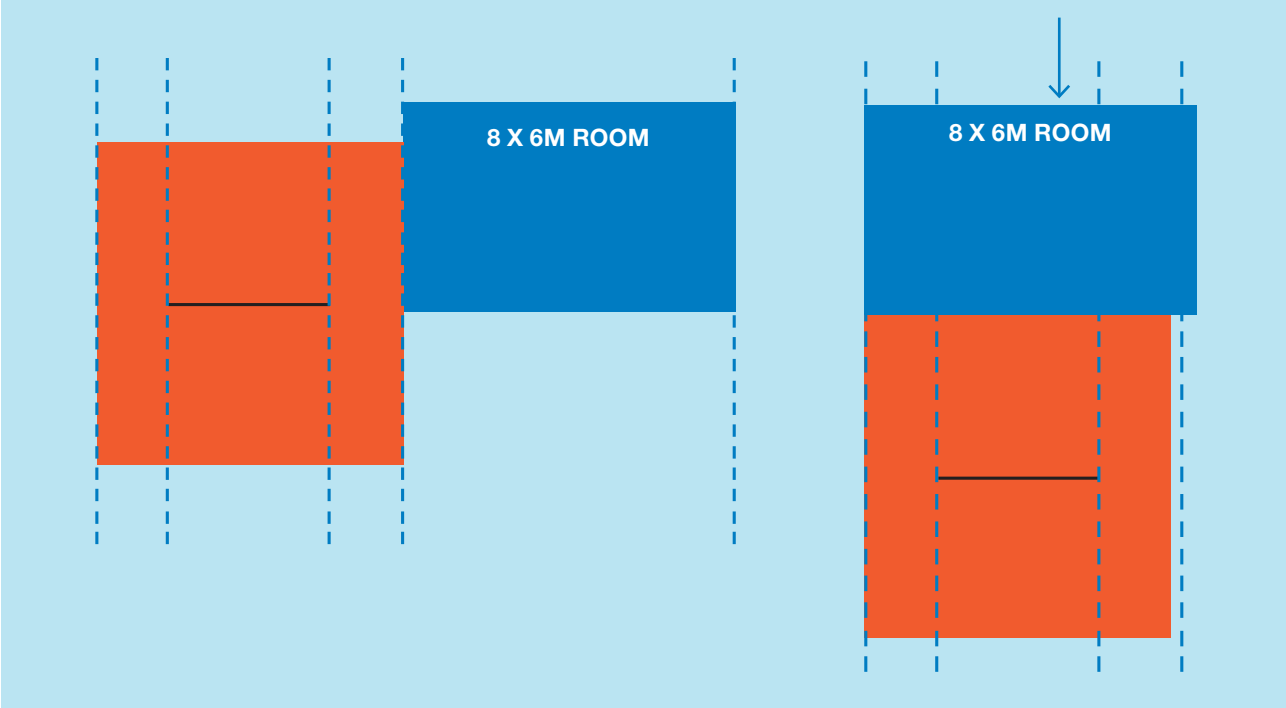
We often see diaphragms specified where they are not needed.

NZS3604:2011 paragraph 5.4.6 states that bracing lines 'shall not be at more than 6 m centres provided that there need be no bracing lines within the area covered by a diaphragm …' . The need for a diaphragm is thus determined by the spacing of bracing lines and not by the dimensions of a particular room.

The illustration below shows two designs incorporating a 8 x 6 m room. In one case NZS3604:2011 requires a ceiling diaphragm and in the other case it does not because bracing lines dissecting the room are spaced at less than 6 m.

A point to note is that the underlying NZS3604 assumption is that structural framing, such as trusses, rafters and their connections, provide support to the external wall (indicated by an arrow) back to the bracing grid. Use a ceiling diaphragm if there is any doubt whether such structural connections exist.

The 8 x 6m room on the left requires a ceiling diaphragm whilst the same size room on the right does not because bracing lines at less than 6m dissect the space.



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Low damage solutions for non-structural elements

Issue Date July 2012

Over the past 12 months Winstone Wallboards has been working closely with the engineering faculty at the University of Canterbury to develop improved systems for interior linings within commercial buildings.

Following the Canterbury earthquakes, many commercial buildings have suffered significant damage. As widely reported most high rise buildings in the Christchurch CBD have been, or are being, deconstructed. The many low-to-medium rise buildings that survived have often suffered significant damage to non-structural elements such as internal partitions and ceilings. Damage to these elements has generally been more costly than damage to the structure itself. Damage to non-structural elements also causes significant business disruption, either directly or during the repair process.

Non-structural ceilings and partitions are commonly lined with gypsum plasterboard and the owner's preference, often guided by the specifier, is more often than not for a flush monolithic finish. Expansive wall and ceiling areas are flush-finished and corners at wall and wall-to-ceiling intersections are typically square stopped. Non-structural elements tend to be tightly fitted into the main structure. Once taped and stopped, gypsum plasterboard lined walls and ceilings are very stiff. When locked into the main structure these elements do not have the ability to follow expected structural movement and 'inter-storey drifts' that occur during serviceability and design level earthquakes.

As a result non-structural elements can suffer significant damage. This has been evident in Christchurch and even after re-fixing, plasterstopping and painting, damage has repeated following further aftershocks.

Testing at Canterbury University has shown that 'low damage' solutions can be achieved by simply incorporating regular control joints. Negative details at wall junctions and intersections with the main structure, and breaking up expansive areas with regular control joints, will provide freedom for the non-structural elements to accommodate movements of the main structure.

Testing rig at University of Canterbury



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Comments from the researchers include;

"The details work astonishingly well. Partitions stay flawless till 2.0% drift"

"Even at triple the current serviceability requirements, damage was minimal or in serviceable condition"

"Gaps can be arranged by simple calculation with a very high precision"

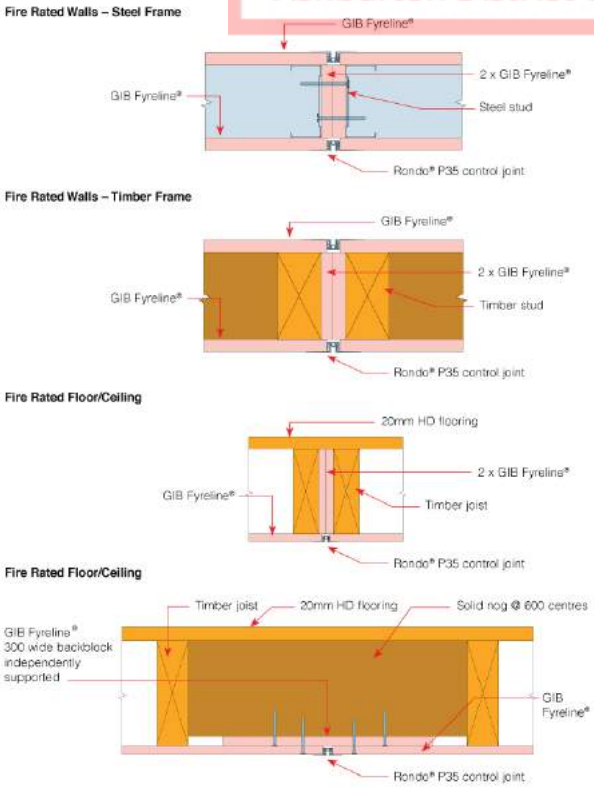
"Gaps can easily be made aesthetically pleasing or hidden with trim finishes"

"This cannot be achieved with existing monolithic finish practices"

Recommended details are as simple as they are effective, but a shift in owner and architectural expectation is required to make them work. The challenge to the architectural profession is to incorporate and 'celebrate' these expressed details if we are to have 'low' or 'no damage' solutions for non-structural elements in seismic zones.

For further information contact the GIB® Technical Helpline 0800 100 442. A detailed information bulletin is being prepared and will be available shortly.

Control joint illustrations from GIB® Fire Rated Systems 2006



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Canterbury Earthquake Online Guidelines

Issue Date March 2012

A series of possible details to provide freedom of movement & reduce earthquake damage to non-structural linings.

New updated Technical Bulletins can now be viewed at www.gib.co.nz/canterburyearthquake. These include guidelines for the damage assessment and repair of plasterboard linings in earthquake damaged properties. Guidance is also available for the repair of lath and plaster linings, and for the design of supplementary bracing using other sheet materials.

We must remember that the Canterbury earthquakes are structural events that test a building's bracing system in real life. Before committing to repairs it is essential to assess and reinstate where necessary, the structure's resistance to possible future events. Failure to do so can result in repeated damage and the need for ongoing repairs. Keep an eye out for updates on our website. Within the near future we will be launching a simple 'bracing assessment' tool aimed at assisting assessors, designers, and builders with evaluating structural adequacy of houses.

We have also posted a paper by our engineers Hans Gerlich and Richard Hunt summarising their observations relating to the performance of houses in and around Christchurch. In low-rise timber or steel framed buildings plasterboard linings will attract earthquake forces first and must be designed to resist them.

In commercial buildings, gypsum plasterboard linings obviously cannot be designed to resist forces resulting from imposed lateral movements of the main structure during a design level earthquake (see below).

Gypsum plasterboard linings in a commercial building being severely damaged and forced off the wall framing by structural movement

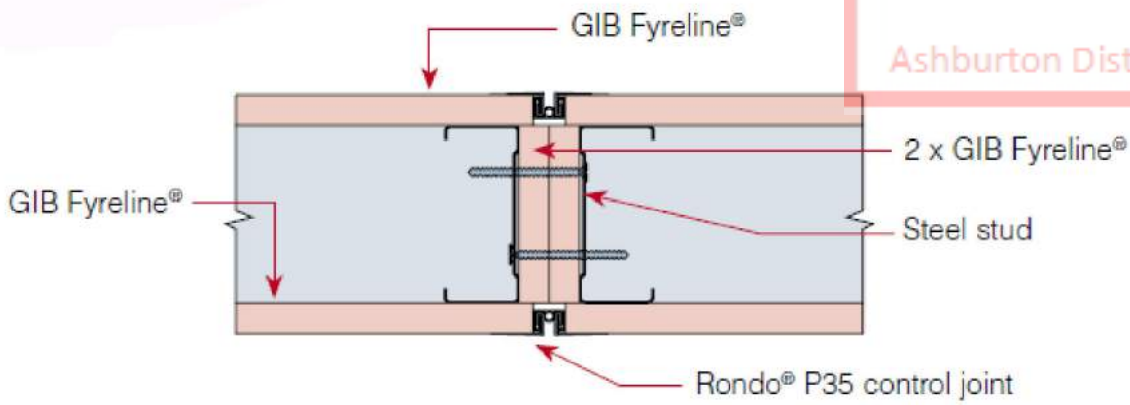


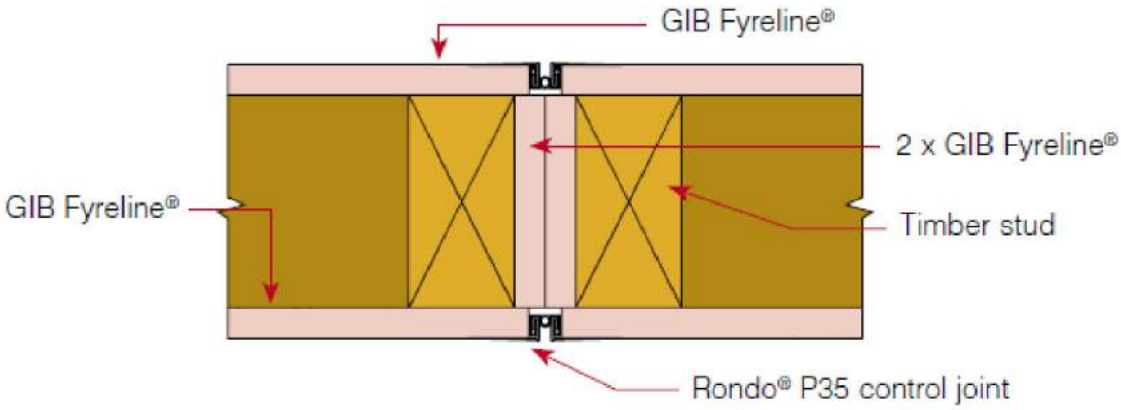
Where gypsum plasterboard cannot be expected to resist such forces, a degree of freedom must be provided. The illustrations below show the principles of control and movements joints which can be easily incorporated in partition designs (whilst maintaining other performance attributes such as fire resistance or noise control).

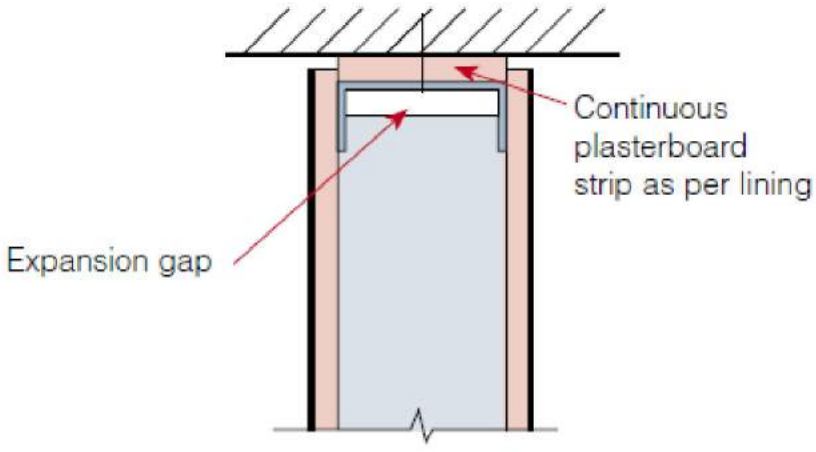
Unfortunately architectural trends and owner requirements often dictate that walls are finished flush with a minimum of visual interruptions. A change in aesthetic design and acceptability of such details is required if we are to minimise post-earthquake damage in commercial structures.

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Bracing light timber framed buildings using sheet materials

Issue Date November 2011

BRACING UNITS

Bracing Units (BUs) were introduced for use with NZS3604 in the late 1970s in recognition of the contribution sheet linings and claddings make to the bracing resistance of light timber framed structures. A 2.4 m high by 2.4 m long wall, with a cut-in metal angle brace and gypsum plasterboard on one face, was tested and achieved a bracing resistance of 5 kN (approximately 500 kg). This was defined as 100 BUs (or 42 BU/m).

Since then the bracing rating (BU/m) for many proprietary systems have been established using the BRANZ P21 Wall Bracing Test and Evaluation Procedure.

The approach adopted by NZS3604 aims to achieve bracing resistance by evenly distributing moderately rated bracing elements throughout the structure. The sum total of these BUs must exceed the design wind and earthquake forces (the demand).

DISTRIBUTION

The NZS3604 rules regarding bracing distribution have been tightened in 2011, but they are still minimum guidelines. It is the responsibility of the building designer to ensure even distribution of bracing and to seek professional engineering input in case of any doubt.

“Lop-sided” distribution can result in irregular response to wind and earthquake forces causing unpredictable damage.

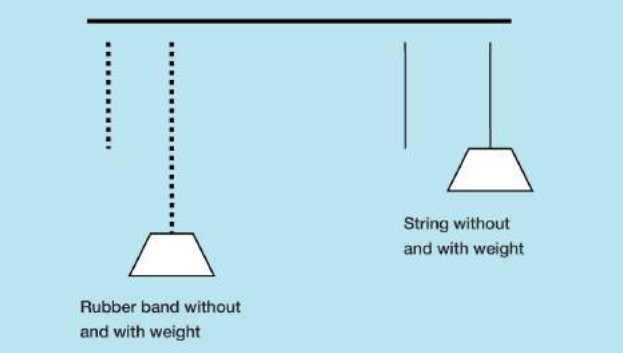
COMBINING DIFFERENT SHEET MATERIALS

Different sheet materials bring different attributes. The internal gypsum plasterboard lining system is inevitably very stiff once sheets are interconnected, taped and stopped. However, gypsum plasterboard bracing is less ductile than structural plywood sheet bracing.

Structural plywood sheet bracing, installed on the outside of external framing, provides excellent ductility but offers less stiffness than plasterboard.

Whether we like it or not, the internal plasterboard linings will attract wind and earthquake forces first before they can be transmitted to other more flexible bracing systems. If we do not design plasterboard linings to accept these forces, then we can expect more damage than might otherwise be the case. The Canterbury earthquakes have shown plasterboard failures to be far more extensive when internal linings were poorly or not designed and installed to withstand earthquake forces.

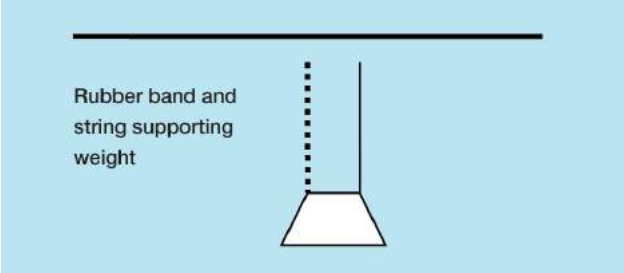
To help illustrate this principle imagine a length of rubber band (ductile plywood bracing) and a similar length of string (stiff gypsum plasterboard bracing) both capable of supporting a certain weight (the bracing demand). The rubber band stretches considerably when the weight is applied. However, there is minimal stretch when the same weight is supported by the string.



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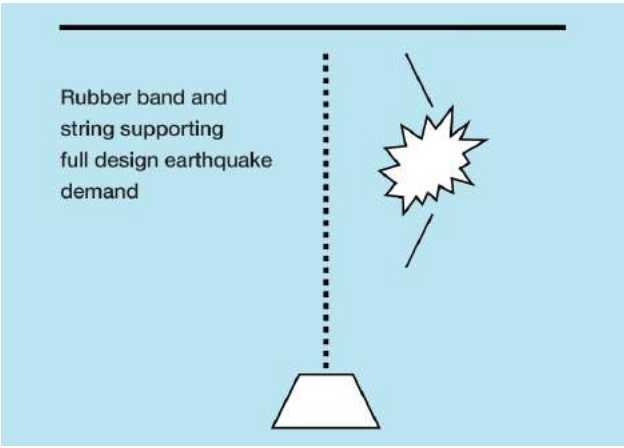
If we use the rubber band and string together to support the weight then the string does most of the work and needs to break before weight is transferred to the rubber band as illustrated below.



Now what happens when we apply these principles to buildings and do not design the stiffer element (gypsum plasterboard) to resist the full design wind and earthquake forces? In other words, what if the rubber band (plywood) has been designed to accept the bracing demand but the string (gypsum plasterboard) has only nominal fixings?

At frequent "serviceability" winds and small earthquake forces the string will perform as illustrated above.

However when forces approach "ultimate" design demand, the string will suffer damage or break before forces are transferred to the rubber band. So, although the plywood is likely to offer structural stability and protection from catastrophic failure well past design loads, the gypsum plasterboard lining system will suffer significant damage.



CONCLUSIONS

Sheet materials provide the most effective means of achieving bracing resistance in light timber framed structures such as houses.

The internal gypsum plasterboard lining system is the stiffest structural element in light timber framed structures and will attract design wind and earthquake forces first. Gypsum plasterboard linings must be designed and fixed to resist these forces regardless of whether supplementary bracing, such as structural plywood, is installed.

Discretionary use of high performance sheet materials such as structural plywood provides added ductility to enhance protection of structures against catastrophic failure.

The combination of gypsum plasterboard and structural plywood provides early strength and stiffness at design level events and added ductility when structures are subjected to even greater wind or earthquake actions.

Using a more flexible bracing system alone, based on multiple individual sheets or discrete length panels, and not fixing internal gypsum plasterboard linings to withstand wind and earthquake forces, is likely to result in significantly greater internal lining damage during a design and even more frequent serviceability events.

The best bracing system relies on a combination of internal gypsum plasterboard linings and plywood sheet bracing.Plasterboard provides strength and stiffness and plywood adds strength and ductility. To minimise damage during serviceability and ultimate design events, design plasterboard bracing to accept the full design demand and supplement with structural plywood for added strength and ductility as desired. Winstone Wallboards and Carter Holt Harvey publish combined GIB® / Ecoply® bracing systems where both the gypsum plasterboard and structural plywood are installed as a bracing element.

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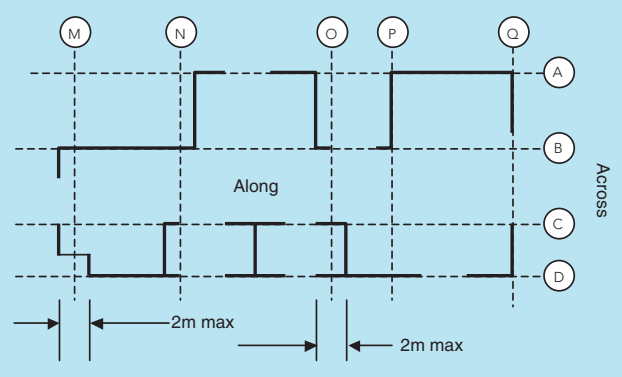
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Distribution of Wall Bracing Elements

Issue Date November 2011

Distribute bracing by drawing a grid pattern of bracing lines along and across the building. Bracing lines must coincide as much as possible with wall bracing elements.

Pairs of bracing elements may be counted on a single line provided they are no more than 2m apart as illustrated below. Locate wall bracing elements evenly throughout the building and as close as practical to corners of external walls.



Bracing lines must be spaced no more than;

- 6m for standard construction with any GIB® plasterboard ceiling, or
- 7.5m where dragon ties in accordance with NZS 3604:2011 have been installed to provide lateral strength to walls, or
- 12m with a GIB® plasterboard ceiling diaphragm, constructed in accordance with this publication. (Refer to the GIB® Ceiling Diaphragms technical note).

No bracing line shall have a capacity less than the greater of 100 bracing units or 50% of the total bracing demand

(D) divided by the number of bracing lines (n) in the direction being considered (0.5 x D/n).

For this purpose bracing lines less than 1m apart shall be considered one line.

For example, if the bracing demand for the building shown in the diagram above is 2,500 BUs (Wind) and 2,000 BUs

(Earthquake) in the across direction (M, N, O, P, Q) each line must each have at least the maximum of 0.5 x 2,500 /5 = 250 BUs (Wind) and 0.5 x 2,000 /5 = 200 BUs (Earthquake).

In addition external walls shall have a bracing capacity no less than 15 bracing units per metre of external wall length.

Wall bracing elements on timber floors shall not be rated higher than 120 BU/m.

Wall bracing elements on concrete floors shall not be rated higher than 150 BU/m.

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Designing Bracing Upgrades

Issue Date June 2011

Following the earthquake events in Christchurch homeowners may be looking for additional bracing performance.

As the New Zealand Building Code is based on a minimum requirement, customers may decide to specify above this level. This bulletin has been created to assist designers with upgrading bracing resistance using GIB EzyBrace® , for buildings that fall within the design scope of NZS 3604:2011.

PROBABILITY OF EXCEEDANCE AND BRACING RESISTANCE

The New Zealand Building Code requirements for Earthquake Bracing design are based on the probability that a certain design event is exceeded, as illustrated below.

Annual Probability of Exceedance	Return Period Factor for Specific Design[1]
Once in 500 years or 1/500	1.0
Once in 1000 years or 1/1000	1.3
Once in 2500 years or 1/2500	1.8

[1] *Equivalent Static Method of NZS1170.5:2004 compared with the GIB EzyBrace® software*

An earthquake with a probability of being exceeded once in 2500 years is much more severe than one with a 1/500 year probability of exceedance. Most residential buildings, such as those constructed in accordance with NZS 3604:2011, are required to meet a minimum 1/500 annual probability of exceedance, assuming a 50 year life expectancy. When a residential home is designed for a 100 year life expectancy, the required earthquake design period is 1/1000.

Multi-tenanted and public buildings such as hotels, apartments, offices, schools, medical centres, etc. can often be built to NZS 3604:2011 but commonly need to be designed for a different annual probability of exceedance ranging from 1/500 to 1/2500, depending on importance level and design working life.

To place some perspective, analysis of the information from the 22nd February Christchurch earthquake indicates that this event was close to the 1/2500 annual probability of exceedance.

UPGRADING BRACING RESISTANCE USING GIB EZYBRACE®

GIB EzyBrace® systems have been tested and appraised to meet the requirements of the New Zealand Building Code using New Zealand Standard NZS 3604:2011 and the default setting for earthquake design is an annual probability of exceedance of 1/500.

The GIB EzyBrace® software now incorporates an easy way to design for increased bracing resistance by selecting an increased annual probability of exceedance level.

Simply select the annual probability of exceedance using the drop down box in the demand sheet. For a 1/1000 probability, the bracing requirement (demand) increases by 30% and for a 1/2500 probability, bracing demand increases by 80% when compared with the default 1/500 minimum annual probability of exceedance.

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Wind Zone	High	Earthquake Zone	Soil Type
Select by Building Consent Authority Map		3 ▼	D&E (deep to very soft) ▼
or Preference	High ▼	Annual exceedance probability	
Wind region	Preference selected ▼	1/1000 (NZS3604:2011 x 1.3) ▼ *	
Lee Zone	Preference selected ▼	This design has been upgraded to resist	
Ground Roughness	Preference selected ▼	an annual earthquake exceedance	
Site Exposure	Preference selected ▼	probability of 1/1000	
Topographic Class	Preference selected ▼		

** Options include the default setting of 1/500, or increased annual probabilities of exceedance of 1/1000 or 1/2500*

When designing for increased bracing resistance a statement, similar to that below, should be highlighted on all bracing plans and associated information;

"The bracing design of this building has been upgraded at the clients request to exceed the requirements of a 1/[select] annual probability. This design must not be modified or substituted as this will affect the specified bracing performance of this building"

DESIGN ACROSS THE WHOLE BUILDING

As a general rule of thumb it is recommended to exceed the minimum bracing requirements by 10 to 20%. This means a target bracing resistance value of between 110 and 120%.

As is reflected in NZS 3604:2011 bracing should ideally be distributed evenly across the whole building and not just isolated to the external walls or building ends.

External walls generally only account for around 1/3 of the total bracing performance of a house. Therefore if bracing on the external walls is increased by say 30%, the actual improvement over the whole building is likely to be only 10% or less.

Also modifying plasterboard linings alone will often deliver limited improvement. To achieve a higher overall building performance, full bracing system specifications must be installed which often includes additional hardware such as panel hold-downs.

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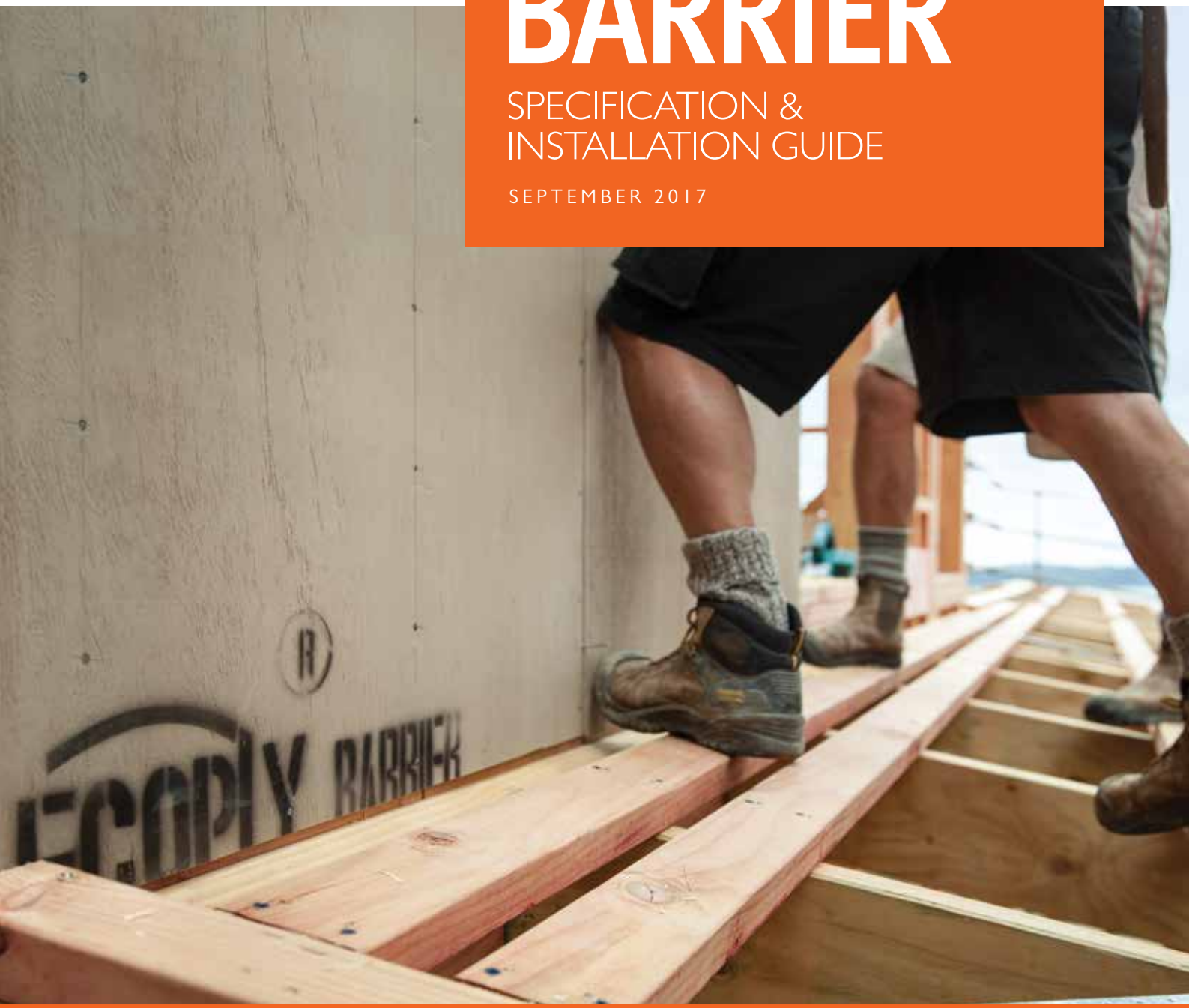
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ECOPLY® STRUCTURAL RIGID AIR BARRIER

BARRIER

SPECIFICATION & INSTALLATION GUIDE

SEPTEMBER 2017



CarterHoltHarvey Woodproducts New Zealand

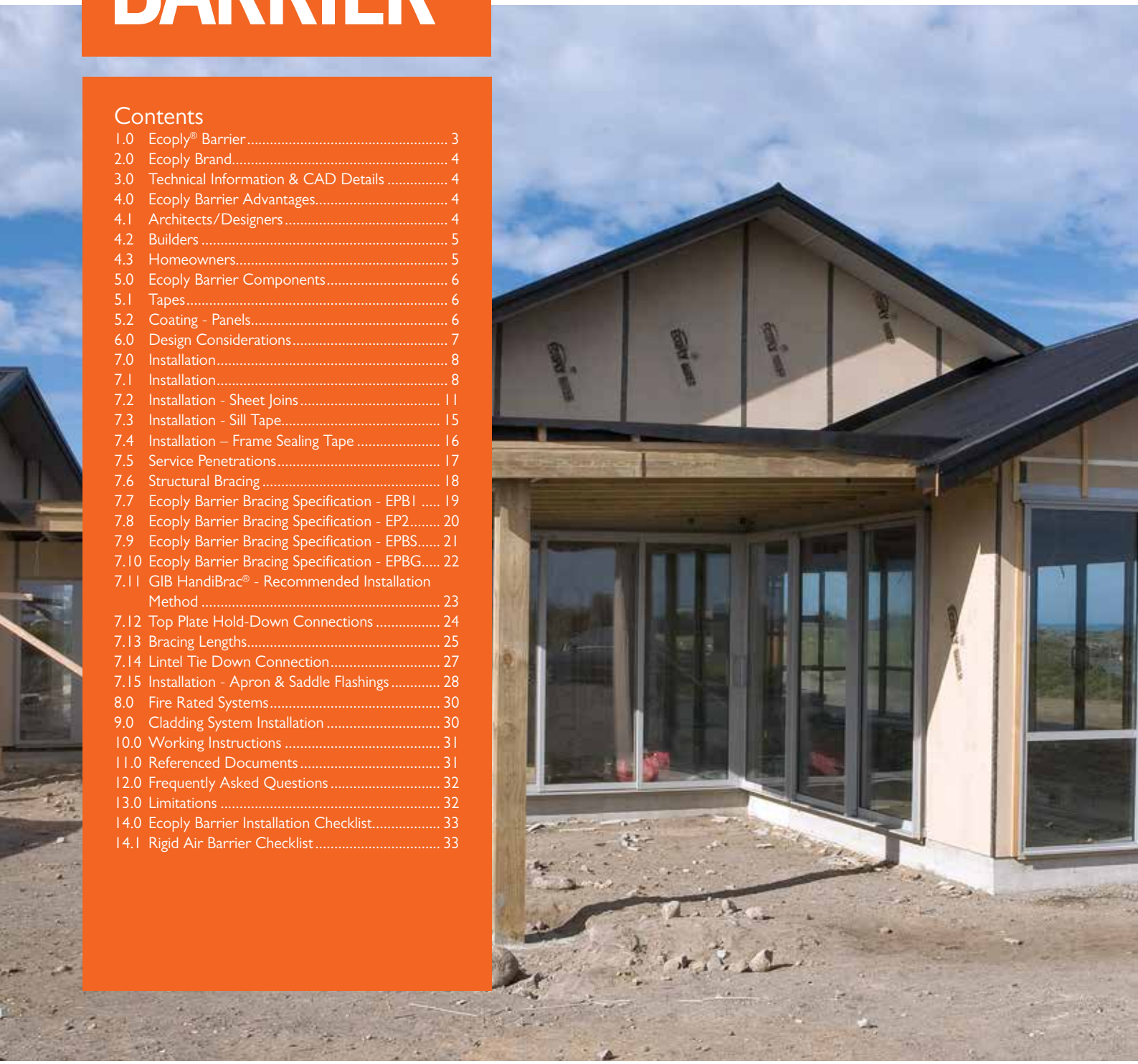
Information contained within is specific to Ecoply® Barrier structural plywood products and must not be used with any other plywood products, no matter how similar they may appear.

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BARRIER



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1.0 ECOPLY® BARRIER

Ecoply® Barrier provides a weathertight rigid air barrier system for drained and vented cavity systems outside the building frame, effectively replacing traditional building wrap in the cavity while providing structural bracing, and forming a strong secondary line of defence against moisture penetration into the building envelope.

Ecoply Barrier is suitable for use in both residential and commercial buildings and consists of a 7mm thick H3.2 CCA (Copper Chrome Arsenate) water borne treated structural plywood panel which is coated on the face and edges using a polyester powder coating process for increased sheet durability and protection from moisture penetration.

Ecoply Barrier meets the New Zealand Building Code (NZBC) requirements for rigid underlays as outlined in section 9.1.4, the performance requirements of Table 23 of NZBC Clause E2 External Moisture, Acceptable Solution (E2/AS1), and has been tested for wind speeds exceeding Extra High wind zone as defined in Standards New Zealand 3604 Timber Framed Buildings (NZS 3604). Testing has been completed to provide solutions for buildings outside the scope of NZS 3604. For details on this, please contact CHH Woodproducts for further information.

Ecoply Barrier is BRANZ appraised for use as a rigid sheathing and temporary weather-protecting sheathing on timber framed buildings.

Ecoply Barrier must be competently installed in accordance with good building practices and sound design principles to satisfy the requirements of the Building Act 2004, the New Zealand Building Code (NZBC), and applicable New Zealand Standards. This is the responsibility of building owners and the design professionals and builders that they engage.

This document contains information, limitations, and cautions regarding the properties, handling, installation, usage, and the maintenance of Ecoply Barrier. However, to the maximum extent permitted by law, Carter Holt Harvey Woodproducts New Zealand (CHH Woodproducts) assumes no legal liability to you in relation to such information.

Ecoply Barrier panels are engineered to allow the wall system to breathe and dry out, while also preventing the intrusion of exterior moisture. Once the full system has been installed, the system provides a lasting protective barrier.

What is a Rigid Air Barrier?

A rigid air barrier is a barrier against air pressure and water infiltration from the outside to the interior of the building. A rigid air barrier acts as a secondary line of defence against water penetrating into the wall system – the primary defence being the exterior wall cladding.

Definition of an Air Barrier:

- Impermeable to airflow — the system must be continuous (no holes, openings or penetrations) and resistant to air pressure differentials.
- Continuous over the entire building enclosure.
- Able to withstand the forces that may act on them during and after construction.

Ecoply Barrier is a full sheathing system developed to prevent unwanted air movement and replace traditional building wrap.

BRANZ Appraised
Appraisal No.827 [2014]

The information contained in this document is current as at September 2017. It is your responsibility to ensure you have the most up to date information available. The information contained in this publication relates specifically to Ecoply® Barrier manufactured by Carter Holt Harvey Woodproducts New Zealand and must not be used with any other plywood manufacturer's products no matter how similar they may appear. Alternative plywood products can differ in a number of ways which may not be immediately obvious and substituting them for Ecoply Barrier structural plywood products or Ecoply Barrier Tapes is not appropriate, and could in extreme cases lead to premature failure and/or buildings which do not meet the requirements of the New Zealand Building Code (NZBC).

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2.0 ECOPLY® BRAND

Ecoply® Barrier panels are manufactured in New Zealand by CHH Woodproducts under a third party audited quality control programme to monitor compliance with AS/NZS 2269 – Plywood Structural.

3.0 TECHNICAL INFORMATION & CAD DETAILS

Technical data sheets and CAD drawings referenced in this guide are available for download from www.chhwoodproducts.co.nz.

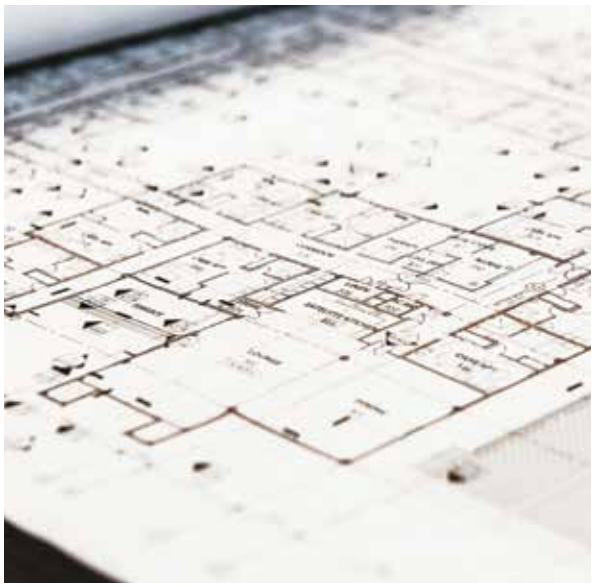
Ecoply Barrier (Rigid Air Barrier) is compliant with NZBC Clause B2.3.1 (a), for not less than 50 years, when used where the cladding durability requirement or serviceable life is not less than 50 years, e.g. structural bracing, and compliant with NZBC Clause B2.3.1 (b), for 15 years where the cladding durability requirement is 15 years when used as a temporary sheathing.

When specifying or installing Ecoply Barrier visit www.chhwoodproducts.co.nz or call 0800 326 759 to ensure you have current specification material and any relevant technical notes.

4.0 ECOPLY® BARRIER ADVANTAGES

4.1 ARCHITECTS / DESIGNERS

Modern construction practices are moving toward providing greater energy efficiency and an airtight building envelope. These principles of high performance building are common in nearly all current green building standards and construction codes. Proper sealing between wall assembly components prevents unwanted air movement in and out of conditioned air spaces.



Advantages:

- Ecoply Barrier can form an integral part of a weathertight system including two of the four 'Ds' of weathertightness; drying and drainage.
- A rigid air barrier provides a more robust cavity and prevents the insulation bulging, which would increase the chance of moisture bridging from the cladding to the framing line.
- Provides both structural support and protection from moisture. Structural bracing is achieved when installed in accordance with the Ecoply Barrier bracing specifications. Bracing benefits may result in cost savings by reducing internal lining bracing elements (Refer to section 7.6 on bracing).
- BRANZ appraised system, fully tested and code compliant rigid air barrier system.
- Manufactured from sustainable plantation pine and available FSC certified (SCS-COC-001316) upon request.
- Low formaldehyde emission level (E0).

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Appraisal No.827 [2014]

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4.2 BUILDERS

Ecoply® Barrier lets you say goodbye to flexible wall underlays forever. Builders no longer have to worry about installing traditional housewrap or building paper on a windy day or having to return for re-work due to rips, tears or wrap that has blown off the home. Ecoply Barrier can typically save up to 2-4* weeks off the total house build time*, by allowing a faster building close in, for an earlier interior start and a quicker overall build time.

Ecoply Barrier installs quickly with two easy steps – fasten the panels and tape the seams. Once completed, the system provides moisture protection both during and after construction.



Advantages:

- Immediate close-in of structure, allowing interior and exterior work to be completed in parallel.
- Reduced builder liability; strong secondary line of defence and solid material for sealing penetrations.
- Schedule your subcontractors sooner.
- No call backs for rips, tears or wrap that has blown off.
- Easy to work light material, simple and easy to install.
- Up to 180 day exposure during construction cycle. No hold-ups while the cladding has to be installed i.e. brick layers etc.

4.3 HOMEOWNERS

An airtight building envelope means less airflow into and out of the home. Since conditioned air is expensive air, homeowners can take comfort in knowing that Ecoply Barrier will provide a strong secondary line of defence against the elements.



Advantages:

- Get possession faster, builders building with Ecoply Barrier can typically reduce up to 2-4* weeks off a typical house build*.
- Structurally rigid home.

* Timeframes and efficiencies are indicative only. Construction production gains will differ with respect to individual builder's abilities and other contributing circumstances outside the control of CHH Woodproducts.

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5.0 ECOPLY® BARRIER COMPONENTS

Table 1: Product Range

Description	Weight (kg/m²)	Thickness	Width	Length
Ecoply® Barrier – structural plywood with factory applied proprietary coating to sheet surface and edges	Approx 4.0	7mm	1197mm	2440mm 2745mm
Sill Tape – one piece stretchable sill tape for window and door sills	-	2 Rolls per Box	150mm, 200mm	20m per roll
Frame Sealing Tape – for a permanent seal of all Ecoply® Barrier openings (Use in conjunction with Sill Tape)	-	2 Rolls per Box 1 Roll per Box	150mm 200mm	30m per roll
Sealing Tape – for a permanent seal of all Ecoply Barrier vertical joints	-	10 Rolls per Box	60mm	30m per roll

COMPONENTS NOT SUPPLIED BY CHH WOODPRODUCTS:

- PVC Horizontal Flashing: use Ecoply® Horizontal Jointer (Product Code RDZF7) supplied by E2 Flashing Solutions.
- Bracing Hold-Down Connectors: GIB HandiBrac® hold-down brackets manufactured by MiTek® complete with mechanical fastener with a minimum 15kN uplift capacity for concrete floors and 150mm x 12mm galvanised coach screw for timber floors.
- Fasteners.

5.1 TAPES

The Ecoply Barrier – Sill Tape, Frame Sealing Tape and Sealing Tape transform our sheathing plywood panels into a seamless protective barrier for your construction project. All tapes are proven to deliver an airtight and watertight seal. The Ecoply Barrier 'rigid air barrier system' tapes save you time and money on the job; and you can leave the site with confidence it will perform.



Table 2: Tapes

Technical Data	Sealing Tape	Sill Tape	Frame Sealing Tape
Description	For a permanent seal of Ecoply Barrier vertical joints	One piece stretchable sill tape, for use on all window / door frame sills	For a permanent seal of all Ecoply Barrier openings (Except window / door frame sill)
Carrier Paper	Special fleece made from PP	Butyl rubber with PE film	Special fleece made from PP
Width / Length	60mm x 30m	150mm x 20m 200mm x 20m	150mm x 30m (box of 2) 200mm x 30m (box of 1)
Release Paper	Siliconized Paper	Siliconized Foil (Split 90mm / 60mm) (Split 140mm / 60mm)	Siliconized Paper (Split 90mm / 60mm) (Split 140mm / 60mm)
Temperature Resistance	Long Term -40°C to +90°C	Long Term -40°C to +90°C	Long Term -40°C to +90°C
Processing Temperature	From -10°C	From -10°C	From -10°C
Colour	Grey	Black	Grey

Storage: All sealing tapes must be stored in clean dry conditions and not in an area with direct sunlight.

5.2 COATING - PANELS

The film formulation provides resistance to the effects of exposure to weathering including sun and moisture, typically experienced during the construction and normal service life of cavity substrate systems. The factory applied powder coat film is specifically formulated for use on Ecoply Barrier plywood panels.

- The film, formed by the powder coating process, helps resist moisture penetration.
- The edges of Ecoply Barrier sheets are coated and sealed.
- High film build (60–80 microns), delivers a smoother and more durable sheet surface allowing easier moisture drainage in cavity construction applications.
- Sealer coating contains low Volatile Organic Compounds (VOC).
- The beige coloured sealer coating can be exposed to the external environment for up to 180 days prior to cladding installation.

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6.0 DESIGN CONSIDERATIONS

Responsibility

Design responsibility lies with the building owner and the professionals that they engage. The Specifier for the project must ensure that the products and details in the specification are appropriate for the intended application and that additional detailing is provided for specific design or any areas that fall outside the scope and specifications of this literature.

Preservative Treatment

Ecoply® Barrier is treated in accordance with AS/NZS 1604.3 with H3.2 CCA (Copper Chrome Arsenate) water borne treatment. H3.2 CCA treated plywood in accordance with AS/NZS 1604.3 is described as suitable for: "outside above ground applications" and periodic moderate wetting.

Cut Sheets

Ecoply Barrier is envelope preservative treated. If a sheet end is cut, place the cut end to the top. Always have a sealed sheet end at the bottom to minimise potential moisture ingress into the panel. All other cuts and penetrations must be covered by Ecoply Barrier Sealing Tape and installed in accordance with the Ecoply Barrier literature. When installed as per the above requirements, cut edges and penetrations are not required to be retreated with a brush on preservative treatment however, if desired, CHH Woodproducts recommends the use of Holdfast® Metalex® Concentrated Timber Preservative Green (Holdfast® Metalex® Green).

Dimensional Sheet Change

Detailing and construction using Ecoply Barrier must allow for natural movement in line with normal cycles of moisture change occurring in the environment. The total expansion both along and across a 2440 x 1197mm panel can be in the order of 1.5mm to 3mm depending on the environment. Detailing and construction practice should take the potential for natural movement into consideration. Ecoply Barrier sheets may exhibit slight sheet bowing across the sheet resulting from the preservative treatment and surface coating processes. This is to be expected and will not affect the product's structural performance or weathertightness when installed as per the specifications.

Formaldehyde

Formaldehyde occurs naturally in the environment and is emitted by processes such as combustion, decay and naturally by all timber species. Ecoply Barrier meets the lowest formaldehyde emission classification (E0 – less than 0.5mg/ litre).

Wind Loadings

Ecoply Barrier meets the NZBC requirements for rigid underlays as outlined in section 9.1.4, the performance requirements of Table 23 of E2/ AS1, and has been tested for wind speed exceeding Extra High wind zone as defined in NZS 3604. Testing has been completed to assist in providing solutions for buildings outside the scope of NZS 3604. Contact CHH Woodproducts for further information.

Sustainability

Ecoply Barrier is manufactured from radiata pine, a plantation grown medium density softwood. It is grown on tree farms which are tended and harvested to provide wood for plywood manufacture. The crop is managed on a sustainable basis to yield millable trees. Ecoply Barrier is available Forestry Stewardship Council (SCS-COC-001316) certified upon request.

Health & Safety

Ecoply Barrier should be handled in accordance with the Safety Data Sheet (SDS) for H3.2 CCA treated Ecoply Barrier. Always wear safety glasses or non-fogging goggles when working with Ecoply Barrier. If wood dust exposure is not controlled when machining (sawing, drilling etc.) a P1 or P2 replaceable filter or disposable face piece respirator should be worn. Wear comfortable work gloves to avoid skin irritation and the risk of splinters. Wash hands with mild soap and water after handling panels.

Storage & Handling

Ecoply Barrier panels and tapes must be stored and handled with care to maintain good condition prior to installation:

- The storage area must be protected from sun, rain and wind that would otherwise bring about rapid changes in temperature and humidity.
- Support for the sheets must be provided at both ends and middle to avoid distortion. Ensure bearers in packs above are aligned over bearers below to avoid inducing curves in sheets.
- The stack must be kept dry and clear of ground contact, and placed so that it will not be exposed to mechanical damage.
- The sheets must be stacked flat, NOT on edge.

Maintenance

Ecoply Barrier will not normally require maintenance. However, if damage occurs to the cladding or lining protecting the Ecoply Barrier or to the Ecoply Barrier itself, repairs or replacement should be carried out to ensure the integrity of the rigid air barrier. Small perforations in the panels can be covered by the Frame Sealing Tape or Sealing Tape (200mm, 150mm or 60mm Width, Grey Colour).

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7.0 INSTALLATION

7.1 INSTALLATION

Step 1 Framing:

Install the Ecoply® Barrier sheathing panels positioned with the water resistant powder coat film facing outwards. The panels must be installed with the long side of each panel orientated vertically to the framing members.

All Ecoply Barrier sheet edges must be fully supported by being fastened to framing:

- Studs must not exceed 600mm centres.
- Nogs must be provided at 1350mm centres maximum.
- The minimum framing width for fixing Ecoply Barrier is 45mm at sheet joints.
- Framing must be kept as dry as possible at all times.
- Do NOT glue to frame.

All timber framing sizes and set outs must comply with NZS 3604 (or be specifically designed to NZS 3603:1993 – Timber Structures Standard), with stud and nog centres and timber widths required by this specification. Use kiln dried framing such as Laserframe® in accordance with timber framing manufacturers specification and treated in accordance with NZBC Clause B2 Durability, Acceptable Solution (E2/AS1) or Standards New Zealand 3602:2003 Timber and Wood based products for use in building (NZS 3602).

Step 2 Fastener Durability:

Fasten the panels to the framing members. It is of particular importance in coastal areas, areas subject to salt spray and other corrosive environments that the correct fastener is verified prior to installation.

Fasteners shall be a minimum of hot dip galvanised for all B and C zones excluding sea spray zone D where stainless steel fasteners are required. Where stainless steel is required, annular grooved nails must be used.

Step 3 Fasteners:

Fastener heads should be flush with the panel surface. It is not required to tape over over-driven fasteners unless the fastener head completely penetrates the thickness of the face veneer.

Cladding fasteners must be increased in length by a minimum of 7mm to achieve the required fastener pull out loadings. (Ecoply Barrier is 7mm thicker than building wrap).

Table 3: Fastener Type

Fixing Type	Minimum Nail Length
Hand Driven	50 x 2.8mm nails (flat head or round head), hot dipped galvanised or better
Power Driven – Paslode Pneumatic Cladding Coil Nailer	Paslode Impulse 50 x 2.8mm hot dipped galvanised or better, ring round head drive B20557

NOTE: Please refer to Step 2 Fastener Durability.

Step 4 Sheet Layout:

When using Ecoply Barrier, flexible wall underlay is not required. Ecoply Barrier has been BRANZ appraised and tested to demonstrate product performance against the requirements of Table 23 of Clause E2 / AS1 of NZBC. The sheets are jointed keeping an expansion gap of 2-3mm maximum between the plywood panels. Each plywood panel is 1197mm in width to allow for standard 400mm or 600mm stud spacing.

- All sheet edges must be supported by the framing.
- Use fastener pattern unless otherwise specified (refer to the bracing specifications in the Ecoply Specification and Installation Guide).
  - 150mm centres at sheet edges
  - 300mm centres within sheet body up to and including 'Very High' wind zone or;
  - 150mm centres within sheet body in 'Extra High' wind zone
- Sheets must overhang the bottom plate by a minimum of 25mm over timber and concrete foundations (Refer to BAR005: Overhang Clearances For Concrete Slab or Masonry) with a maximum overhang of 40mm.
- For brick cladding rebates, in addition to the 25 – 40mm sheet overhang, 40mm clearance must exist between the face of the Ecoply Barrier sheet and the brick cladding in accordance with E2/AS1 Section 9.2.6 Cavities (Refer to BAR005A: Brick Rebate Overhang Clearance).
- For cantilevered floor joists, sheets must overhang a minimum of 25mm, with claddings to extend a minimum of 50mm below the lowest part of the timber framing in accordance with E2/AS1 Table 18 (Refer BAR005B: Timber Floor Overhang Clearance For Cantilevered Joists).
- For timber sub-floor systems, sheets must overhang the bearer a minimum of 25mm, with claddings to extend a minimum of 50mm below the lowest part of the timber framing in accordance with E2/AS1 Table 18 (Refer BAR005C: Overhang Clearance for Timber Sub-Floors).

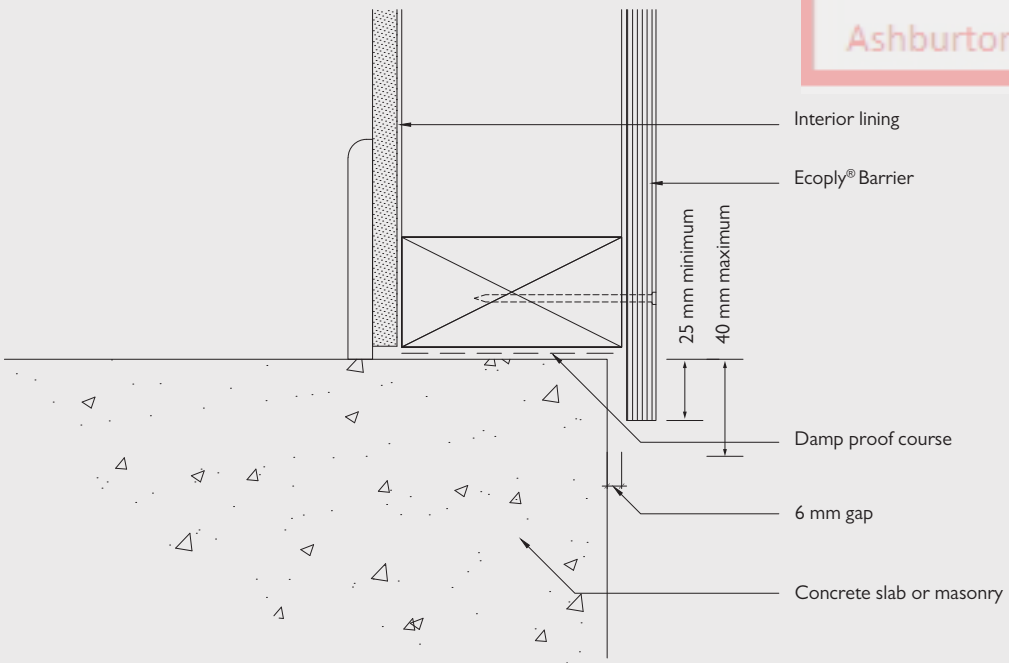
Ground Clearances:

Minimum ground clearances must be maintained for the cladding being installed in accordance with Clause E2/AS1 – Figure 65 and Table 18, and with NZS 3604 for timber floors. The adjacent ground must slope away from the building in accordance with NZBC requirements. Ecoply Barrier must not be installed where product will remain in contact with non-draining water, damp, or soil.

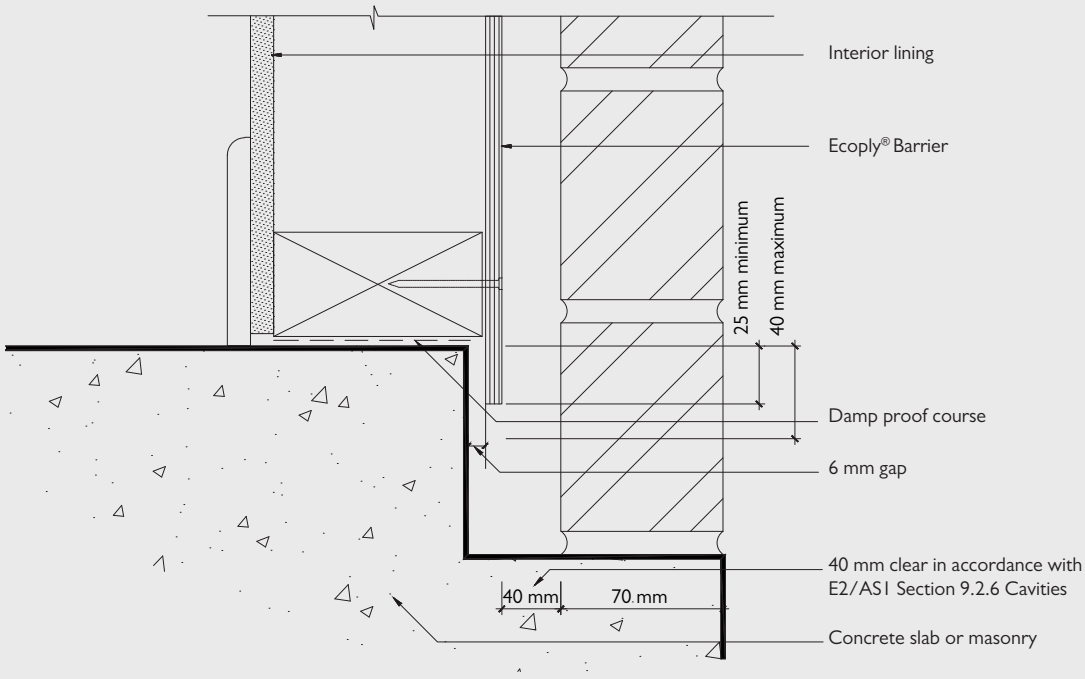
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BAR005: Overhang Clearances For Concrete Slab or Masonry



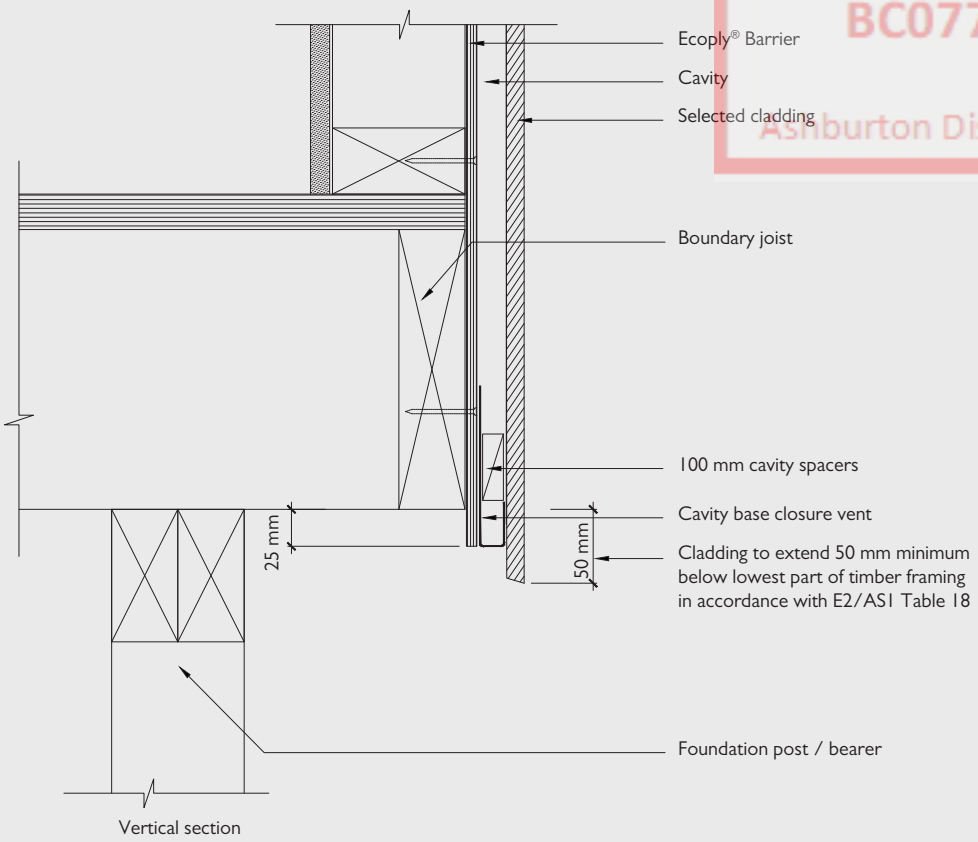
BAR005A: Brick Rebate Overhang Clearance



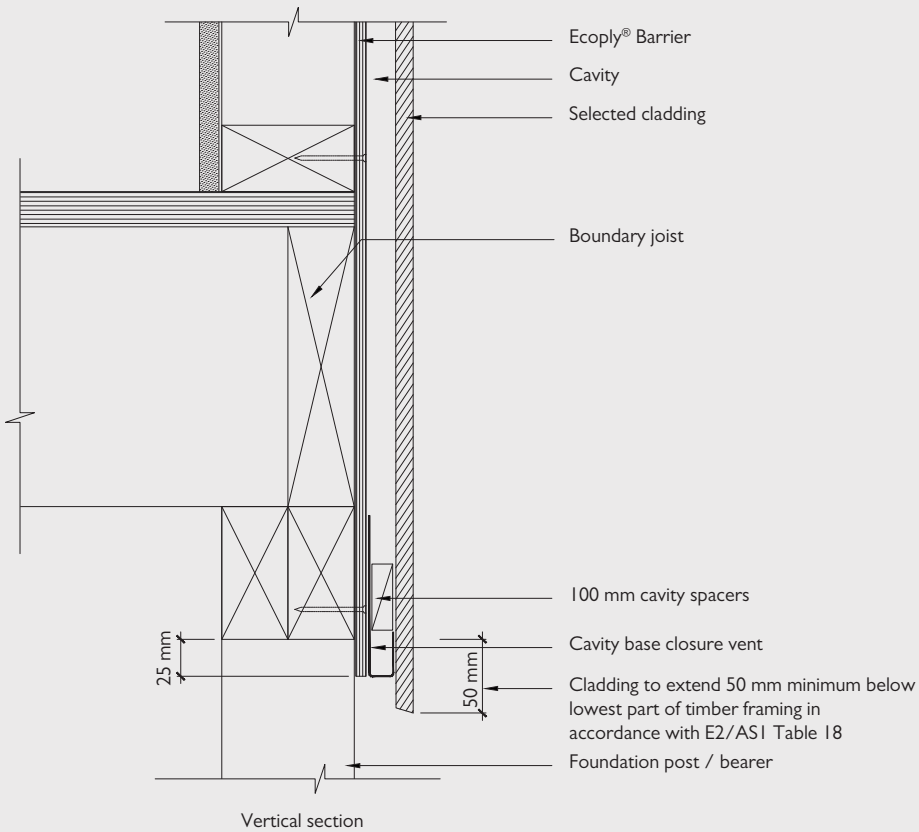
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BAR005B: Timber Floor Overhang Clearance for Cantilevered Joists



BAR005C: Timber Floor Overhang Clearance for Sub Floors



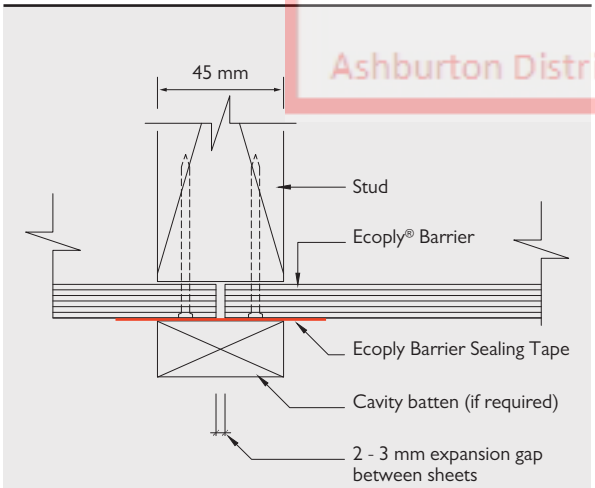
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7.2 INSTALLATION – SHEET JOINS

Apply Ecoply® Barrier Sealing Tape after all sheathing panels are fully fastened to wall framing members. Only designated Ecoply Barrier Sealing Tape should be used. Ensure that each panel is free of sawdust and dirt prior to taping. Ecoply Barrier Sealing Tape requires pressure for a secure seal. Make sure the tape is centred over the seam within +/- 20mm to provide adequate coverage and that wrinkles in tape are minimal.

BAR006: Vertical Sheet Joints



Vertical Sheet Joints:

- Seal vertical joints by running Ecoply Barrier Sealing Tape over the joints (60mm x 30m).
- Ecoply Barrier Sealing Tape must not be exposed to weathering for more than 180 days prior to installation of the exterior cladding system.

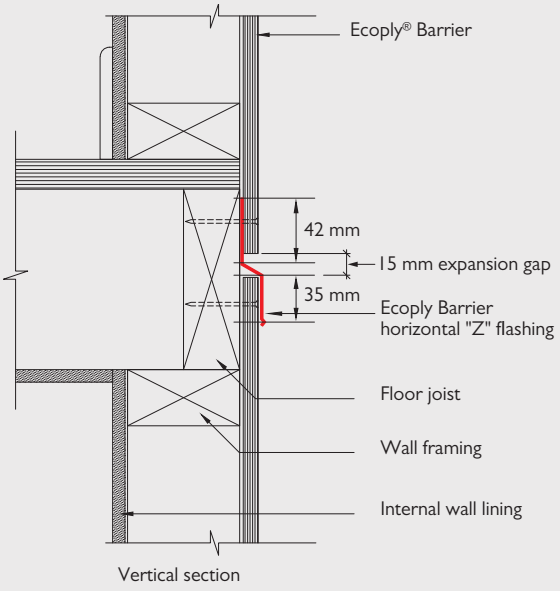
Horizontal Sheet Joins (Three Options):

- Ecoply Barrier PVC horizontal 'Z' Flashing (Product Code RDZF7) for horizontal sheet joints. Refer BAR007: Horizontal Sheet Joints (PVC Z Flashing).
- 'Z' taped joint using Ecoply Barrier 150mm OR 200mm Frame Sealing Tape. Refer BAR007A: Horizontal Sheet Joints (Tape Z Flashing).
- 'Face' seal joint using Ecoply Barrier 150mm OR 200mm Frame Sealing Tape. Refer to BAR007B: Face Sealed Horizontal Sheets Joins at Mid-floor or BAR007C: Face Sealed Horizontal Sheet Joins at Nog.

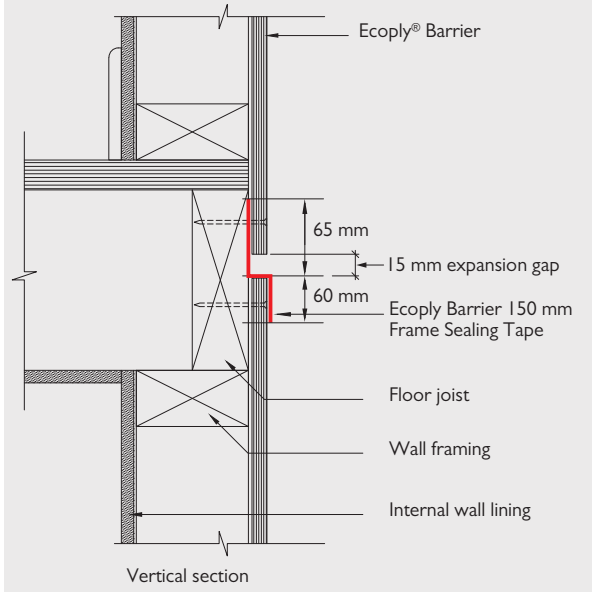
Tape Splices and Joints:

- Whenever tape splices occur at a junction, create an overlapping splice of at least 50mm.
- Make sure to apply adequate pressure for a secure bond between the plywood panel and the tape.
- Take special care to remove any wrinkles or voids at splice areas.

BAR007: Horizontal Sheet Joints (PVC Z Flashing)



BAR007A: Horizontal Sheet Joints (Tape Z Flashing)

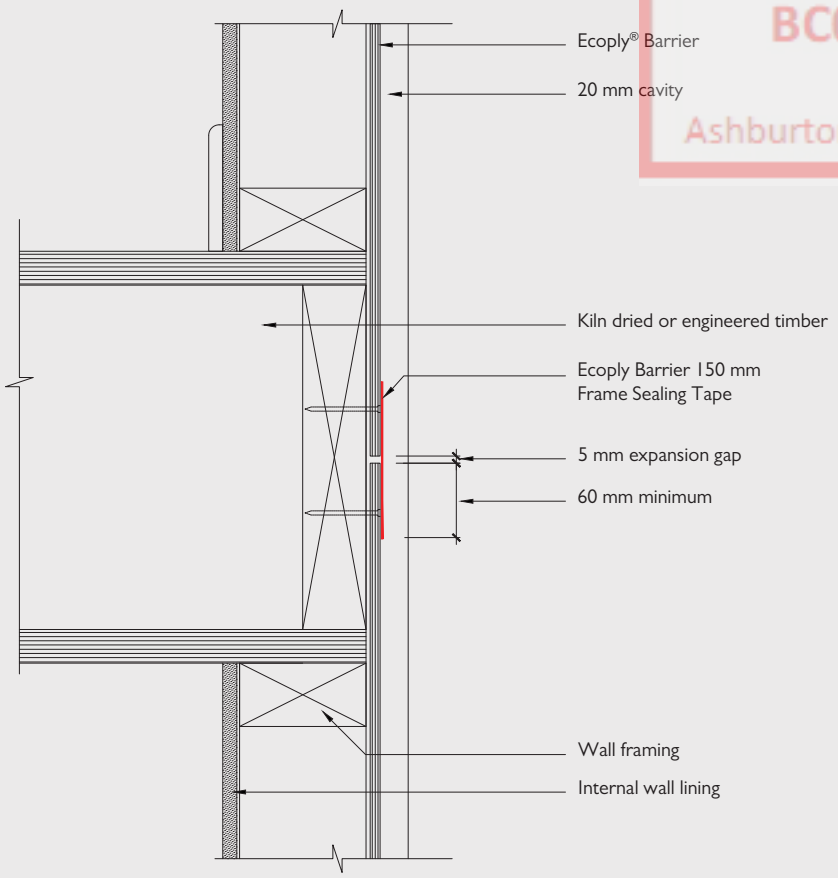


The Ecoply® Barrier PVC Horizontal 'Z' Flashing is manufactured by E2 Flashing Solutions. Contact E2 Flashing Solutions on (03) 358 5775 or visit www.e2flashingsolutions.co.nz for further information.

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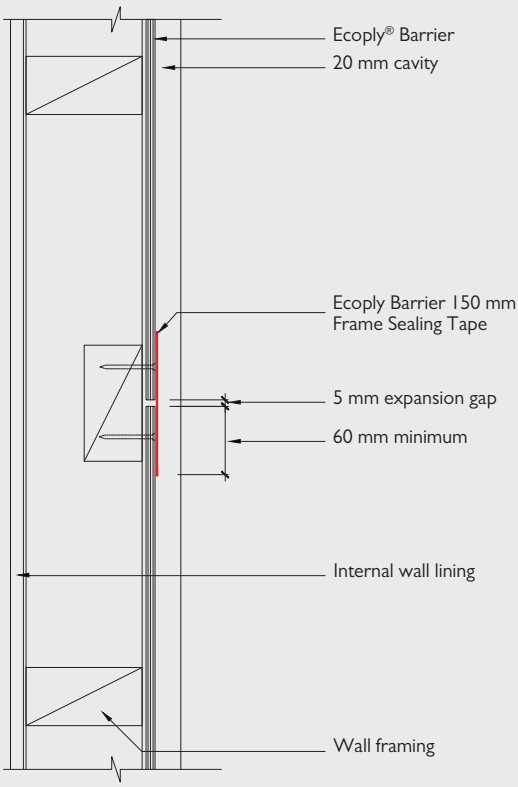
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BAR007B: Face Sealed Horizontal Sheet Joints at Mid-Floor



Vertical section

BAR007C: Face Sealed Horizontal Sheet Joints at Nog



Vertical section

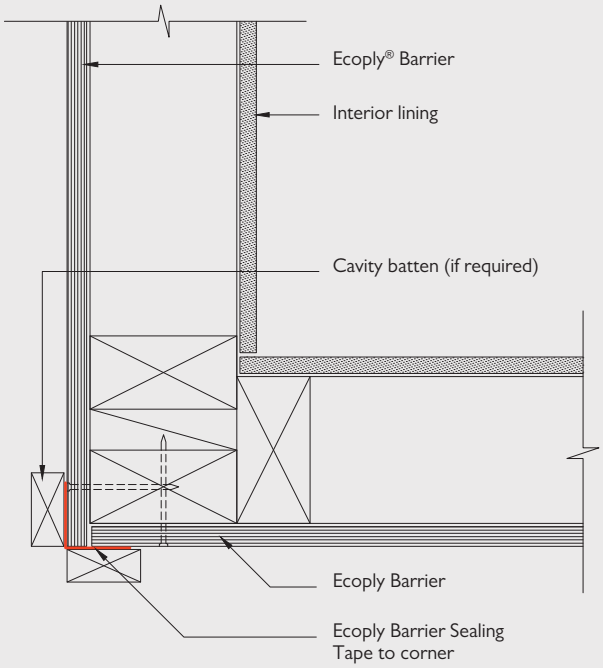
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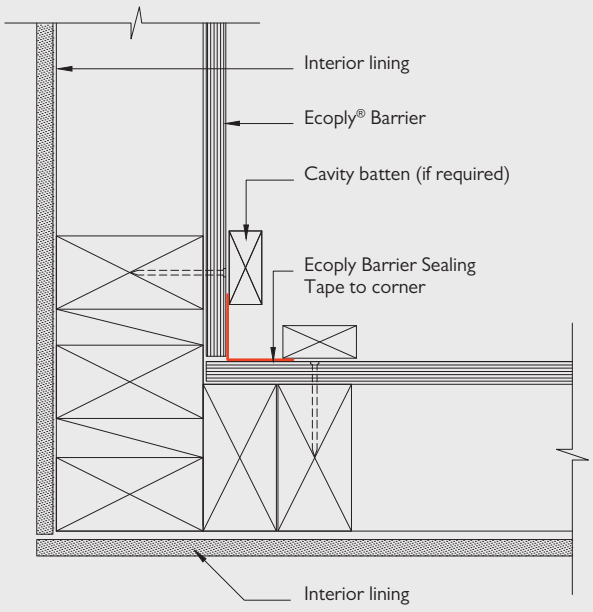
Internal and External Corners:

- Corners must be sealed with Ecoply® Barrier Sealing Tape (60mm Grey Colour). (Refer to BAR008 and BAR009: External and Internal Corner).

BAR008: External Corner



BAR009: Internal Corner



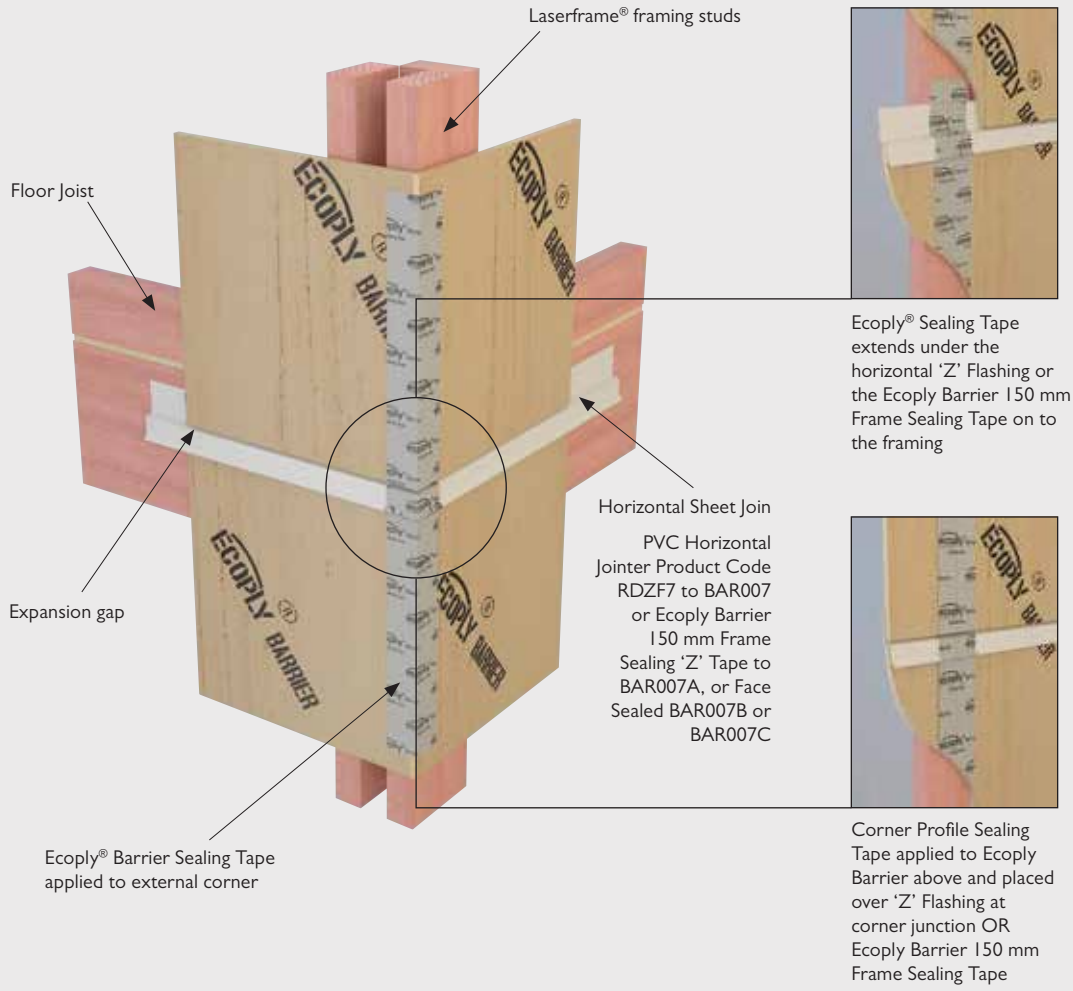
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Corner Junctions to Horizontal Joints

- Corners must be sealed with Ecoply® Barrier Sealing Tape (60mm Grey Colour).
- PVC Horizontal Z Flashings must be butted together, 60mm Ecoply Barrier Sealing Tape must overlap the PVC butt join entirely over the face and up stand of the PVC Flashing to form a weathertight joint where horizontal Flashings meet.
- Horizontal joins may also be completed using Ecoply Barrier Frame Sealing Tapes.

BAR010: External Corner to Horizontal Joint



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7.3 INSTALLATION - SILL TAPE

Apply Ecoply® Barrier Sill Tape to the horizontal trimmer section of the window or door opening. The exposed timber framing on the sill of the window opening must be totally covered with the Ecoply Barrier Sill Tape (150mm or 200mm Black Colour) – one continuous piece. The tape must be sealed over the face of the Ecoply Barrier.

Take special care to avoid any wrinkles or voids at corner junctions, Ecoply Barrier Sill Tape requires pressure for a secure seal.

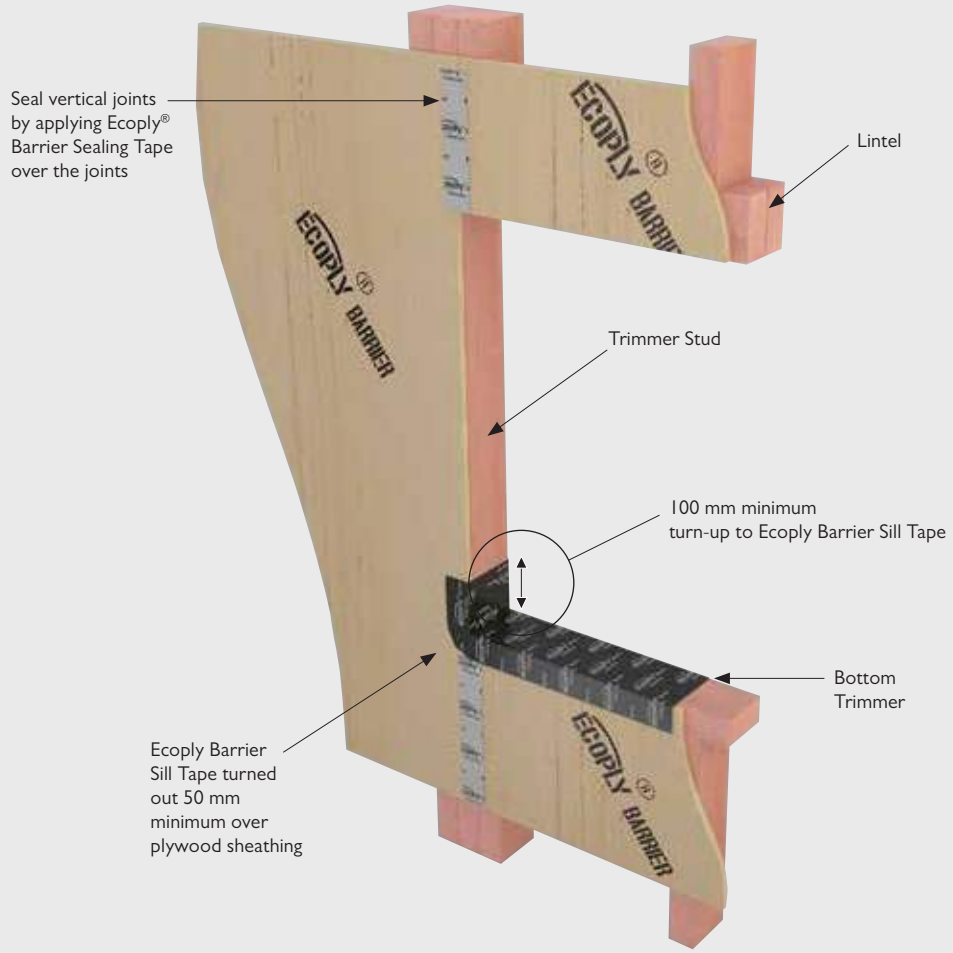


Horizontal Sill Flashing Detail:

- Cut the Ecoply Barrier Sill Tape 200mm longer than the horizontal window/door bottom trimmer.
- Ensure that the framing is free of sawdust and dirt prior to taping.
- Apply the Ecoply Barrier Sill Tape to cover the bottom of the opening, overhanging onto the Ecoply Barrier by at least 50mm and extending 100mm up trimmer stud.
- Carefully bend the Ecoply Barrier Sill Tape to mould into the corners providing a tight seal.

NOTE: Door openings are to be treated similarly to window openings. The bottom trimmer may be either a timber or concrete floor.

BAR012: Window Penetration Sill Tape Installation



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7.4 INSTALLATION - FRAME SEALING TAPE

Apply Ecoply® Barrier Frame Sealing Tape to the vertical trimmer stud and lintel of the window or door opening. The exposed timber framing must be covered with the Ecoply Barrier Frame Sealing Tape (150mm / 200mm Grey Colour). The tape is sealed over the face of the Ecoply Barrier panel.

Take special care to remove any wrinkles or voids at corner junctions, Ecoply Barrier Frame Sealing Tape requires pressure for a secure seal.



Vertical Jamb Detail:

- Cut the Ecoply Barrier Frame Sealing Tape 100mm longer than the vertical opening size.
- Ensure that the trimmer stud is free of sawdust and dirt prior to taping.
- Apply the Frame Sealing Tape to cover the entire trimmers' opening. The tape should extend a minimum of 100mm around the corner at the head of the window framing, and over-lap the Sill Tape on the trimmer stud by a minimum of 50mm.
- Carefully slit the tape from the corner to get a smooth adhesion to the plywood sheathing panel. Bend the Ecoply Barrier Frame Sealing Tape to mould into the corners providing a tight seal.
- Cut and apply a small 100mm strip to reinforce the corner using Ecoply Barrier 150mm Frame Sealing Tape.

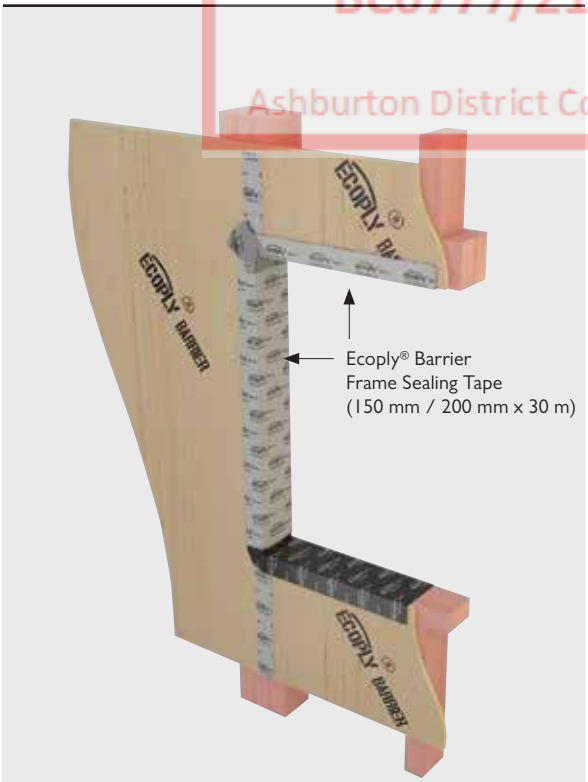
Horizontal Head Detail:

- Once both trimmer studs are installed, cut the Frame Sealing Tape for the horizontal head trimmer and Flashing to suit. Make sure to over-lap the existing tape from the trimmer by at least 50mm (Do not extend tape past the corner).
- Specific installation requirements pertaining to window and door systems should be sought from the joinery manufacturer.

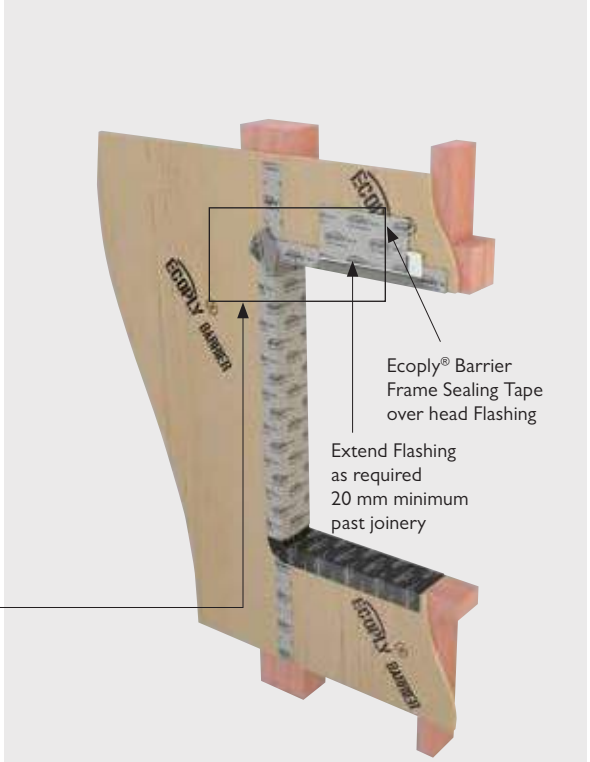
NOTE: Door frames are to be treated similarly to window openings.



BAR013: Window Penetration Sill Tape Installation



BAR014: Window Penetration Frame Sealing Tape Installation with Head Flashing



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7.5 SERVICE PENETRATIONS

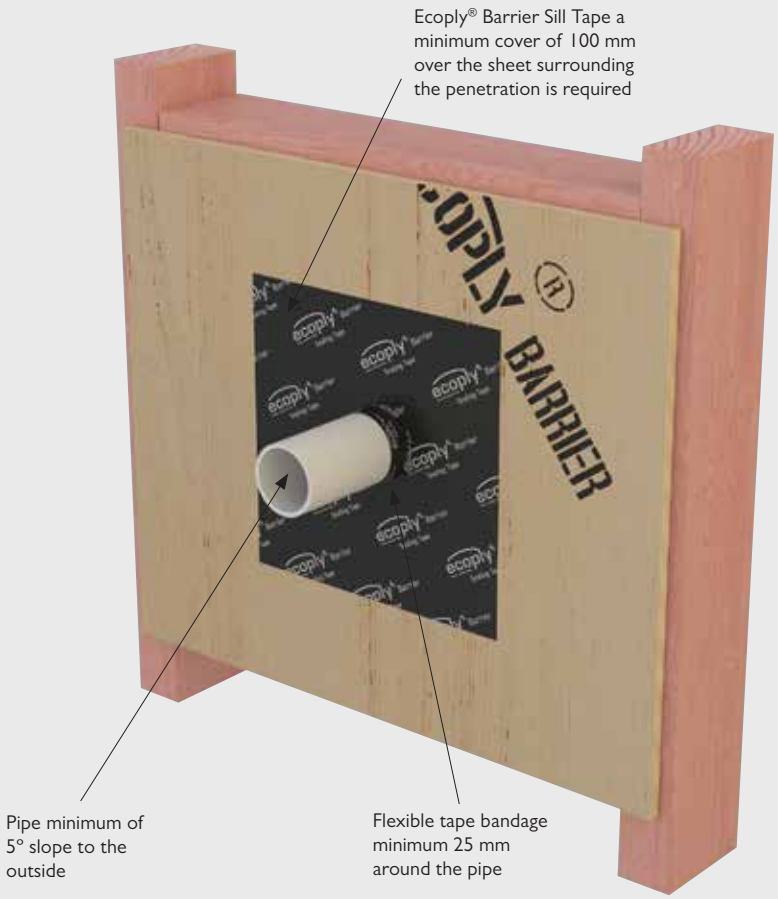
- Service penetrations must be sealed using a flexible Flashing tape. Ecoply® Barrier Sill Tape (150mm or 200mm Black Colour) is recommended for this purpose. (Refer to BAR011: Penetration and Services).
- A minimum cover of 100mm over the sheet surrounding the penetration is required.
- Use Ecoply Barrier Frame Sealing Tape to bandage around the pipe (25mm minimum width).



Service Penetrations in Bracing Elements

Small openings (e.g. power outlets) of 90 x 90mm or less maybe placed no closer than 90mm to the edge of the braced element, or waste pipe outlets of maximum 150mm diameter placed at no closer than 150mm to the edge of the braced element. Maximum one penetration per bracing panel.

BAR011: Penetration & Services



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7.6 STRUCTURAL BRACING

Ecoply Barrier is designed to comply with the New Zealand Building Code (NZBC).

Structure

NZS 3604 Timber Framed Buildings is listed as an Acceptable Solution under Clause 3.0 Timber in Acceptable Solution B1/AS1 Structure. CHH Woodproducts have developed a range of wall bracing elements tested using P21 testing methods referenced in NZS 3604.

Demand may be calculated by following section 5, Bracing Design of NZS 3604 or using the GIB EzyBrace® software, downloadable from www.gib.co.nz.

EPB bracing systems properties can be easily loaded into the EzyBrace software by way of a software patch downloadable from www.chhwoodproducts.co.nz together with loading instructions.

Specific Design

Ecoply® Barrier structural plywood panels are manufactured to AS/NZS 2269, and is suitable for design and use in earthquake and wind bracing systems constructed in accordance with NZS 3603 and AS/NZS 1170.

Structural plywood to AS/NZS 2269 is the only sheet brace material with properties defined in a published New Zealand timber design code, NZS 3603 Timber Structures, and so can be designed in compliance with Verification Method B1/VM1 under Clause 6.0 Timber for use in buildings over three storeys in height.

Timber Floors

When carrying out a bracing design for buildings with timber floor structures, the maximum bracing rating that can be accounted for when summing up the bracing units is 120BUs/m. This does not exclude the installation of bracing elements that are rated higher than 120BUs/m, however the extra bracing capacity can not be accounted for in the bracing design.

Specific design of floor and sub-floor framing is required for elements rated higher than 120BUs/m.

Durability

Ecoply Barrier plywood panels are manufactured to meet the requirements of NZS 3602 Timber and Wood based products for use in Buildings. If the product is used, handled and installed in accordance with CHH Woodproducts product literature it will meet the durability requirements of the NZBC.

Adjustments for Wall Height

Adjustment of bracing capacity of walls of different heights and walls with sloping top plates shall be obtained by the following method:

(a) For wall bracing elements of heights other than 2.4m, the bracing rating determined by test or from table below should be multiplied by 2.4 ÷ element height in metres, except that elements less than 2.4m high shall be rated as if they are 2.4m high.

(b) Walls of varying heights, should have their bracing capacity adjusted in accordance with section 5 of NZS 3604 using the average height.

(c) Wall heights <1.5m are to be subject to Specific Engineer Design (SED).

Joining Panels for Walls Higher than Maximum Sheet Length

Ecoply Barrier bracing panels must be fixed from top plate to bottom plate. For wall heights over 2.44m, Ecoply Barrier is available in 2.745m sheet lengths. Alternatively, a part sheet can be installed above a full sheet, in accordance with section 7.2 Installation - Sheet Joins (Three Options for Horizontal Sheet Joins) on a single row of common nogs with each sheet/part sheet independently nailed off as per the nail spacing in the Ecoply Barrier bracing specifications (e.g. 2.4m x 1.2m sheet with a 0.3 m x 1.2 m part sheet above it to give a 2.7m x 1.2m bracing element).

Table 4: Summary P21 Ratings for 2.4m High Ecoply® Barrier Wall Elements

Specification No.	Minimum Wall Length	Lining Requirements	Hold-Down	BUs/m Wind	BUs/m Earthquake
EPB1	0.4m	Ecoply® Barrier one side	Yes GIB HandiBrac®	80	95
	0.6m			95	105
	1.2m			120	135
EP2	0.6m	Ecoply Barrier or Ecoply each side	Yes GIB HandiBrac®	105	115
EPBS	0.4m	Ecoply Barrier one side	No additional fastening[1]	60	60
	0.6m			60	65
	1.2m			65	70
	2.4m			80	90
EPBG	0.4m	Ecoply Barrier one side and 10mm GIB® Standard plasterboard other side	Yes GIB HandiBrac®	100	115
	1.2m			150	150

[1] As per NZS 3604: 2011. No specific additional fastening required.

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7.7 ECOPLY® BARRIER BRACING SPECIFICATION – EPB1

Table 5: Sided Structural Plywood Brace

Specification No.	Minimum Wall Length	Lining Requirements	Hold-Down	BUs/m Wind	BUs/m Earthquake
EPB1	0.4m	Ecoply® Barrier one side	Yes GIB HandiBrac®	80	95
	0.6m			95	105
	1.2m			120	135

Framing

Wall framing must comply with:

- NZBC B1 - Structure: AS1 Clause 3 Timber (NZS 3604).
- NZBC B2 - Durability: AS1 Clause 3.2 Timber (NZS 3602).

Framing dimensions and height are as determined by the NZS 3604 stud and top plate tables for load bearing and non load bearing walls. Kiln dried verified structural grade timber must be used. Machine stress graded timber of minimum SG8, such as Laserframe®, is recommended.

Bottom Plate Fixing

Use GIB HandiBrac® hold-down connections at each end of the bracing element. Refer to manufacturer installation instructions supplied with the connectors for correct installation instructions and bolt types to be used for either concrete or timber floors. Within the length of the bracing element, bottom plates are fixed in accordance with the requirements of NZS 3604.

Lining

One layer of 7mm Ecoply® Barrier vertically fixed directly to framing. If part sheets are used, ensure nailing at required centres is carried out around the perimeter of each sheet or part sheet. A 2-3mm expansion gap should be left between sheets.

Fastening Ecoply® Barrier Panels

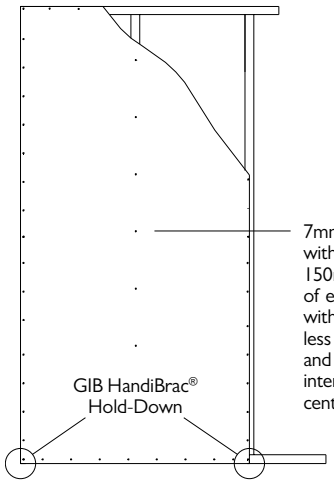
Fasteners

Fasten with 50 x 2.8mm galvanised or stainless steel flat head nails direct fix. Place fasteners no less than 7mm from sheet edges. Screws cannot be used. Power driven nails are suitable. Do not overdrive, nails must be full round head.

In certain circumstances stainless steel fasteners may be required. Refer to section 7.1 in the Ecoply Barrier Specification and Installation Guide for these circumstances and further fastener selection advice. Where stainless steel nails are required, annular grooved nails must be used.

Fastening Centres

Fasteners are placed at 150mm centres around the perimeter of each sheet and 300mm centres to intermediate studs or 150mm centres in Extra High wind zones. Where more than one sheet forms the brace element each sheet must be nailed off independently.



Ecoply® Bracing Systems are designed to meet the requirements of the New Zealand Building Code and have been tested and analysed using the P21 method referenced in NZS 3604:2011 listed as an acceptable solution B1/AS1 Structure. Testing was carried out using Ecoply Barrier manufactured by CHH Woodproducts and SG8 timber framing and GIB® products manufactured by Winstone Wallboards Ltd. Substituting materials may compromise performance of the system. GIB® and GIB HandiBrac® are registered trade marks of Fletcher Building Holdings Ltd.

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7.8 ECOPLY® BARRIER BRACING SPECIFICATION – EP2

Table 6: Sided Structural Plywood Brace

Specification No.	Minimum Wall Length	Lining Requirements	Hold-Down	BUs/m Wind	BUs/m Earthquake
EP2_0.6	0.6m	Ecoply® Barrier or Ecoply each side	Yes GIB HandiBrac®	105	115

Framing

Wall framing must comply with:

- NZBC B1 - Structure: AS1 Clause 3 Timber (NZS 3604).
- NZBC B2 - Durability: AS1 Clause 3.2 Timber (NZS 3602).

Framing dimensions and height are as determined by the NZS 3604 stud and top plate tables for load bearing and non load bearing walls. Kiln dried verified structural grade timber must be used. Machine stress graded timber, such as Laserframe® of SG8 stress grade minimum, is recommended.

Bottom Plate Fixing

Use GIB HandiBrac® hold-down connections at each end of the bracing element. Refer to manufacturer installation instructions supplied with the connectors for correct installation instructions and bolt types to be used for either concrete or timber floors. Within the length of the bracing element, bottom plates are fixed in accordance with the requirements of NZS 3604.

Lining Each Side

One layer of 7mm, 9mm or 12mm Ecoply® plywood or Ecoply Barrier vertically fixed directly to framing. If part sheets are used, ensure nailing at required centres is carried out around the perimeter of each sheet or part sheet. A 2-3mm expansion gap should be left between sheets.

Fastening the Ecoply® Barrier

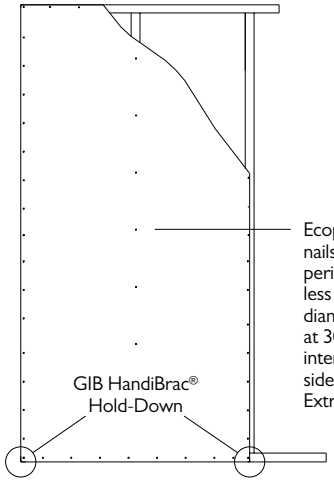
Fasteners

Fasten with 50 x 2.8mm galvanised or stainless steel flat head nails direct fix. Place fasteners no less than 7mm from sheet edges. Screws cannot be used. Power driven nails are suitable. Do not overdrive, nails must be full round head.

In certain circumstances stainless steel fasteners may be required. Refer to section 7.1 of the Ecoply Barrier Specification and Installation Guide for these circumstances and further fastener selection advice. Where stainless steel nails are required, annular grooved nails must be used.

Fastening Centres

Fasteners are placed at 150mm centres around the perimeter of each sheet and 300mm centres to intermediate studs or 150mm centres in Extra High wind zones. Where more than one sheet forms the brace element each sheet must be nailed off independently.



Ecoply® Bracing Systems are designed to meet the requirements of the New Zealand Building Code and have been tested and analysed using the P21 method referenced in NZS 3604:2011 listed as an acceptable solution B1/AS1 Structure. Testing was carried out using Ecoply manufactured by CHH Woodproducts and SG8 timber framing, and GIB® products manufactured by Winstone Wallboards Ltd. Substituting materials may compromise performance of the system. GIB® and GIB HandiBrac® are registered trade marks of Fletcher Building Holdings Ltd.

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7.9 ECOPLY® BARRIER BRACING SPECIFICATION – EPBS

Table 7: Single Sided Structural Plywood Brace No Additional Hold-Down

Specification No.	Minimum Wall Length	Lining Requirements	Hold-Down	BUs/m Wind	BUs/m Earthquake
EPBS	0.4m	Ecoply® Barrier one side	No additional fastening [1]	60	60
	0.6m			60	65
	1.2m			65	70
	2.4m			80	90

[1] As per NZS 3604: 2011. No specific additional fastening required.

Framing

Wall framing must comply with:

- NZBC B1 - Structure: AS1 Clause 3 Timber (NZS 3604).
- NZBC B2 - Durability: AS1 Clause 3.2 Timber (NZS 3602).

Framing dimensions and height are as determined by the NZS 3604 stud and top plate tables for load bearing and non load bearing walls. Kiln dried verified structural grade timber must be used. Machine stress graded timber of minimum SG8, such as Laserframe®, is recommended.

Bottom Plate Fixing

Bottom plates are fixed in accordance with the requirements of NZS 3604. No specific additional fastening required.

Lining

One layer of 7mm Ecoply® Barrier vertically fixed directly to framing. If part sheets are used, ensure nailing at required centres is carried out around the perimeter of each sheet or part sheet. A 2-3mm expansion gap should be left between sheets.

Fastening the Ecoply® Barrier

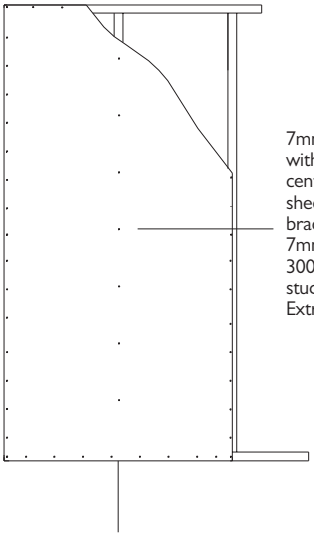
Fasteners

Fasten with 50 x 2.8mm galvanised or stainless steel flat head nails direct fix. Place fasteners no less than 7mm from sheet edges. Screws cannot be used. Power driven nails are suitable. Do not overdrive, nails must be full round head.

In certain circumstances stainless steel fasteners may be required. Refer to section 7.1 in the Ecoply Barrier Specification and Installation Guide for these circumstances and further fastener selection advice. Where stainless steel nails are required, annular grooved nails must be used.

Fastening Centres

Fasteners are placed at 150mm centres around the perimeter of each sheet and 300mm centres to intermediate studs or 150mm centres in Extra High wind zones. Where more than one sheet forms the brace element each sheet must be nailed off independently.



7mm Ecoply® Barrier fixed with 50 x 2.8mm nails at 150mm centres to perimeter of each sheet or part sheet within the bracing element at no less than 7mm from sheet edge and at 300mm centres to intermediate studs or 150mm centres in Extra High wind zones.

Bottom plate fixed in accordance with the requirements of NZS 3604.

Ecoply® Bracing Systems are designed to meet the requirements of the New Zealand Building Code and have been tested and analysed using the P21 method referenced in NZS 3604:2011 listed as an acceptable solution B1/AS1 Structure. Testing was carried out using Ecoply Barrier manufactured by CHH Woodproducts and SG8 timber framing and GIB® products manufactured by Winstone Wallboards Ltd. Substituting materials may compromise performance of the system. GIB® and GIB HandiBrac® are registered trade marks of Fletcher Building Holdings Ltd.

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7.10 ECOPLY® BARRIER BRACING SPECIFICATION – EPBG

Table 8: Ecoply® Barrier Structural Brace To One Side with 10mm GIB® To The Other

Specification No.	Minimum Wall Length	Lining Requirements	Hold-Down	BUs/m Wind	BUs/m Earthquake
EPBG	0.4m	Ecoply® Barrier one side and 10mm GIB® Standard plasterboard other side	Yes	100	115
	1.2m		GIB HandiBrac®	150	150

Framing

Wall framing must comply with:

- NZBC B1 - Structure: AS1 Clause 3 Timber (NZS 3604).
- NZBC B2 - Durability: AS1 Clause 3.2 Timber (NZS 3602).

Framing dimensions and height are as determined by the NZS 3604 stud and top plate tables for load bearing and non load bearing walls. Kiln dried verified structural grade timber must be used. Machine stress graded timber, such as Laserframe®, is recommended.

Bottom Plate Fixing

Use GIB HandiBrac® hold-down connections at each end of the bracing element. Refer to manufacturer installation instructions supplied with the connectors for correct installation instructions and bolt types to be used for either concrete or timber floors. Within the length of the bracing element, bottom plates are fixed in accordance with the requirements of NZS 3604.

Lining

Side 1: One layer of 7mm Ecoply® Barrier vertically fixed directly to framing. If part sheets are used, ensure nailing at required centres is carried out around the perimeter of each sheet or part sheet. A 2-3mm expansion gap should be left between sheets.

Side 2: One layer of 10 or 13mm GIB® Standard plasterboard vertically or horizontally fixed. Sheet joints are touch fitted and fastener heads and joints stopped in accordance with the GIB® Site Guide.

Fastening the Ecoply® Barrier

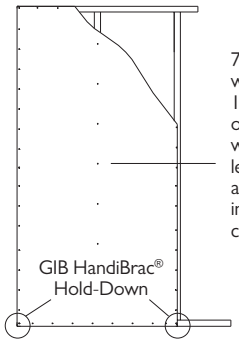
Fasteners

Fasten with 50 x 2.8mm galvanised or stainless steel flat head nails direct fix. Place fasteners no less than 7mm from sheet edges. Screws cannot be used. Power driven nails are suitable. Do not overdrive, nails must be full round head.

In certain circumstances stainless steel fasteners may be required. Refer to section 7.1 of the Ecoply Barrier Specification and Installation Guide for these circumstances and further fastener selection advice. Where stainless steel nails are required, annular grooved nails must be used.

Fastening Centres

Fasteners are placed at 150mm centres around the perimeter of each sheet and 300mm centres to intermediate or 150mm centres in Extra High wind zones. Where more than one sheet forms the brace element each sheet must be nailed off independently.



7mm Ecoply® Barrier fixed with 50 x 2.8mm nails at 150mm centres to perimeter of each sheet or part sheet within the bracing element at no less than 7mm from sheet edge and at 300mm centres to intermediate studs or 150mm centres in Extra High wind zones.

Fastening the GIB® Plasterboard

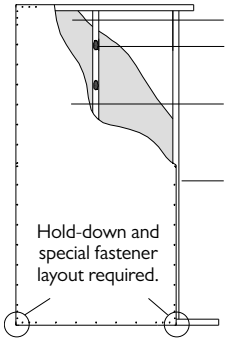
Fasteners

32mm x 6g GIB Grabber® Screws or 35mm GIB® Nails

Fastening centres

Fasten 50, 100, 150, 225 and 300mm from each corner and 150mm thereafter around the perimeter of the bracing element. For vertical fixing place fasteners at 300mm centres at intermediate sheet joints. For horizontal fixing place single fasteners in the tapered edge where sheets cross studs.

Place fasteners 12mm from paper bound edges and 18mm from cut sheet edges. GIB® plasterboard must be treated in every respect in accordance with relevant GIB® literature.



7mm Ecoply® Barrier.

Daubs of GIBFix® adhesive at 300mm centres to intermediate studs.

GIB® Standard plasterboard.

All four corners of a GIB® plasterboard bracing element must be fastened at 50mm, 100mm, 150mm, 225mm and 300mm from the edge of the sheet.

Bracing element perimeter is then fastened at 150mm centres.

Fasteners must be no closer than 12mm from the paper enclosed edge and no closer than 18mm from sheet ends or cut edges of sheets.

Ecoply® Bracing Systems are designed to meet the requirements of the New Zealand Building Code and have been tested and analysed using the P21 method referenced in NZS 3604:2011 listed as an acceptable solution B1/AS1 Structure. Testing was carried out using Ecoply Barrier manufactured by CHH Woodproducts and SG8 timber framing and GIB® products manufactured by Winstone Wallboards Ltd. Substituting materials may compromise performance of the system. GIB® and GIB HandiBrac® are registered trade marks of Fletcher Building Holdings Ltd.

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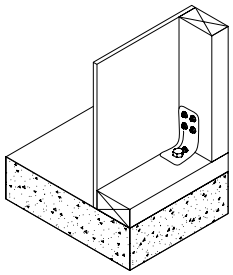
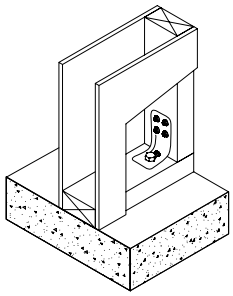
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7.11 GIB HANDIBRAC® - RECOMMENDED INSTALLATION METHOD

Developed in conjunction with MiTek®, the GIB HandiBrac® has been tested for use as a hold-down in all EPB bracing elements.

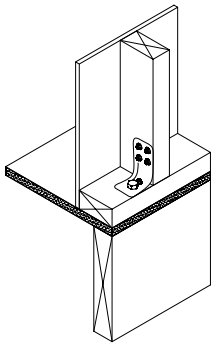
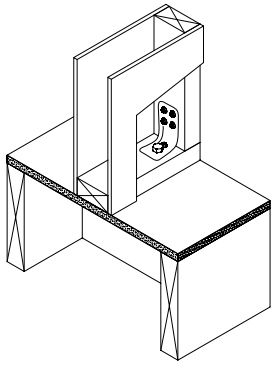
- The GIB HandiBrac® registered design provides for quick and easy installation.
- The GIB HandiBrac® provides a flush surface for the wall linings because it is fitted inside the framing. There is no need to check in the framing as recommended with conventional straps.
- The GIB HandiBrac® is suitable for both new and retrofit construction.
- The design also allows for installation and inspection at any stage prior to fitting internal linings.

Concrete Floor

External Walls	Internal Walls
	
Position GIB HandiBrac® as close as practicable to the internal edge of the bottom plate.	Position GIB HandiBrac® at the stud/ plate junction.
Hold-down Fastener Requirements	
A mechanical fastening with a minimum characteristic uplift capacity of 15kN or screw bolt supplied with the bracket.	

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Timber Floor

External Walls	Internal Walls
	
Position GIB HandiBrac® in the centre of the perimeter joist or bearer.	Position GIB HandiBrac® in the centre of the floor joist or full depth solid block.
Hold-down Fastener Requirements	
M12 x 150mm galvanised coach screw or screw bolt supplied with the bracket.	

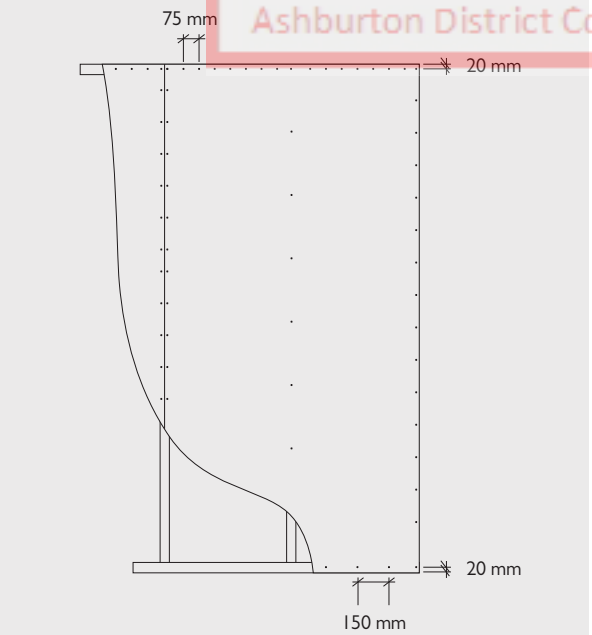
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7.12 TOP PLATE HOLD-DOWN CONNECTIONS

Additional nailing of the Ecoply® Barrier to the top and bottom plates in accordance with the details shown in Figure 1 and described below will provide sufficient top plate hold-down capacity to comply with a Type B fixing or 4.7kN uplift capacity as listed in Table 8.18, NZS 3604.

Figure 1: Top Plate Hold-Downs Connections using Ecoply® Barrier



Fastening

Nails must be 50mm x 2.8mm flat head hot dip galvanised or stainless steel as described in the Ecoply Barrier Specification and Installation Guide for Fastener Durability (Section 7.1).

Nailing to the top plate is at 75mm centres and 20mm from the sheet edge.

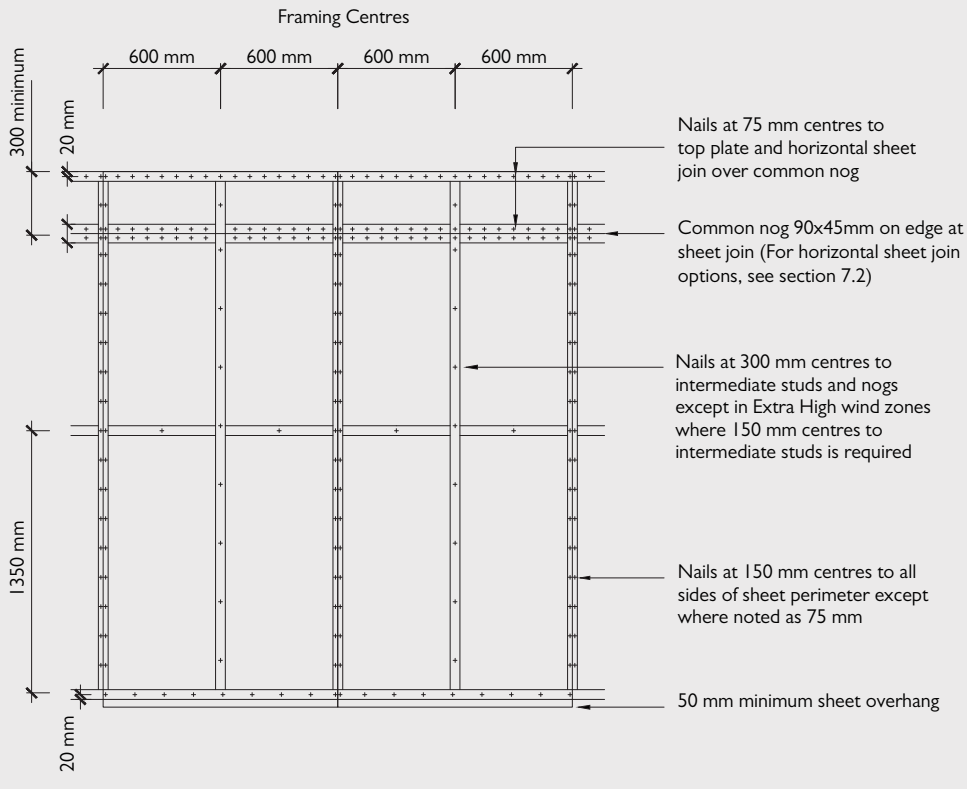
The remainder of the sheet perimeter is fastened at 150mm centres no less than 7mm from the sheet edge and 300mm at intermediate studs (or 150mm centres for Extra High wind zones) as with standard nailing for Ecoply Barrier.

Standard nailing of the Ecoply Barrier to the top plate in accordance with the Ecoply Barrier literature will provide a top plate hold-down capacity that exceeds a Type A fixing or 0.7kN uplift capacity as listed in Table 8.18, NZS 3604.

Horizontal Sheet Joints and Top Plate Hold-Down

Where horizontal sheet jointing is required and top plate hold-down connections are completed using Ecoply Barrier, nailing to the noggin at 75mm centres and 20mm from the sheet edge is also required at the sheet joins. Refer Figure 1B Top Plate Hold-Downs and Horizontal Sheet Joins.

Figure 1B: Top Plate Hold-Downs and Horizontal Sheet Joints



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7.13 BRACING LENGTHS

Length of Ecoply® Barrier Bracing Elements (EPB1, EPBG and EP2).

Ecoply® Barrier bracing elements can be used when the overall bracing element length is >400mm.

The length and capacity of an EPB1, EPBG or an EP2 type element is not only determined by the plywood, but also the placement of the GIB HandiBrac® hold-down fixing. The GIB HandiBrac® must be installed to a continuous stud at the perimeter of the bracing element, refer to Figure 1C: Framing/ Handibrac installation, 1D: Bracing Panel Installation, 1E: Bracing Panel Installation – long and 1F: Bracing Panel Installation at Lintel.

Note: If used for Bracing purposes GIB HandiBrac® should not form part of lintel tie down solution.

Bracing Panel and Hold-down Location at Lintels and 90° Wall Junctions such as Garage Door Openings.

Ecoply Barrier bracing panels can be installed up to lintels and 90° wall junctions such as garage door openings where the element length is > 400mm. See Figure 1E: Bracing Panel Installation at Lintel for bracing element length, and correct GIB Handibrac® location.

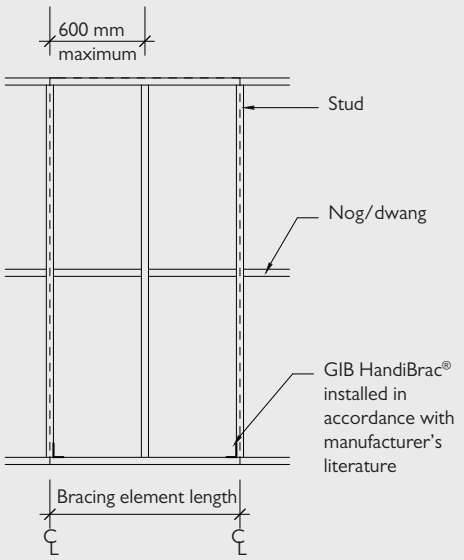
Note: Designers need to be aware of the framing requirements and not try to specify bracing elements based on length only. Framing requirements may mean bracing lengths are not practically achievable as designed and tested and developed due to framing layout.

When lintels share jamb studs with bracing elements, alternate hold-down will be required (the GIB HandiBrac® forming part of the bracing solution must not form part of the lintel hold-down).

Length of EPBS Elements

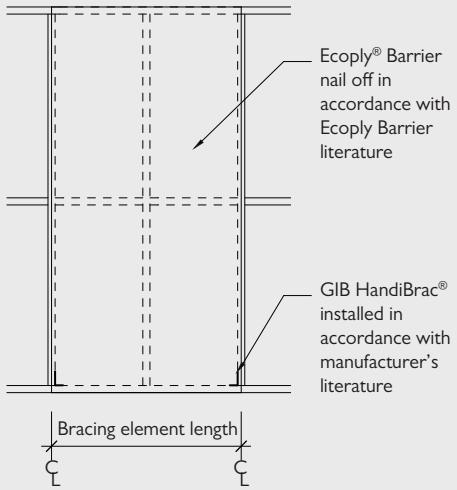
The length of the EPBS element (requiring standard NZS 3604:2011 bottom plate connections) can be taken as full frame length measure from the outside of the end stud to the opening face as illustrated in Figure 1G: EPBS Bracing panel Installation – Long. The length of the bracing element shall be >400mm.

Figure 1C: Framing/HandiBrac Installation



*Note: Bracing panel not shown for clarity

Figure 1D: Bracing Panel Installation



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Figure 1E: Bracing Panel Installation - Long

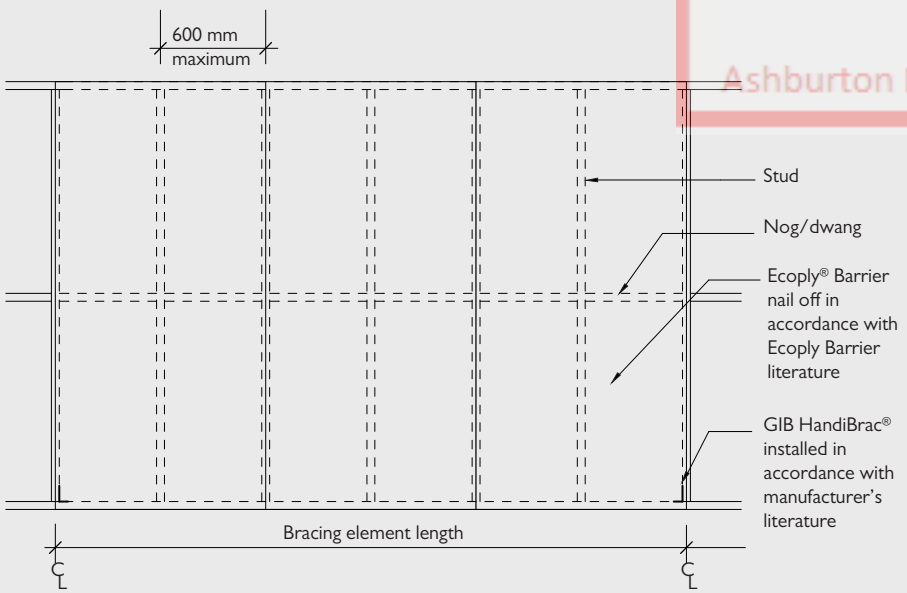
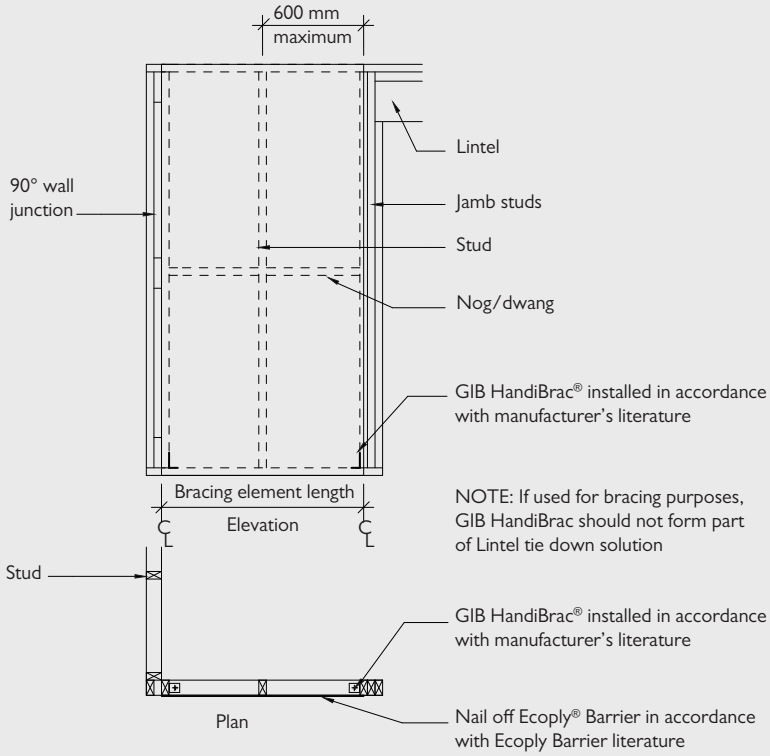


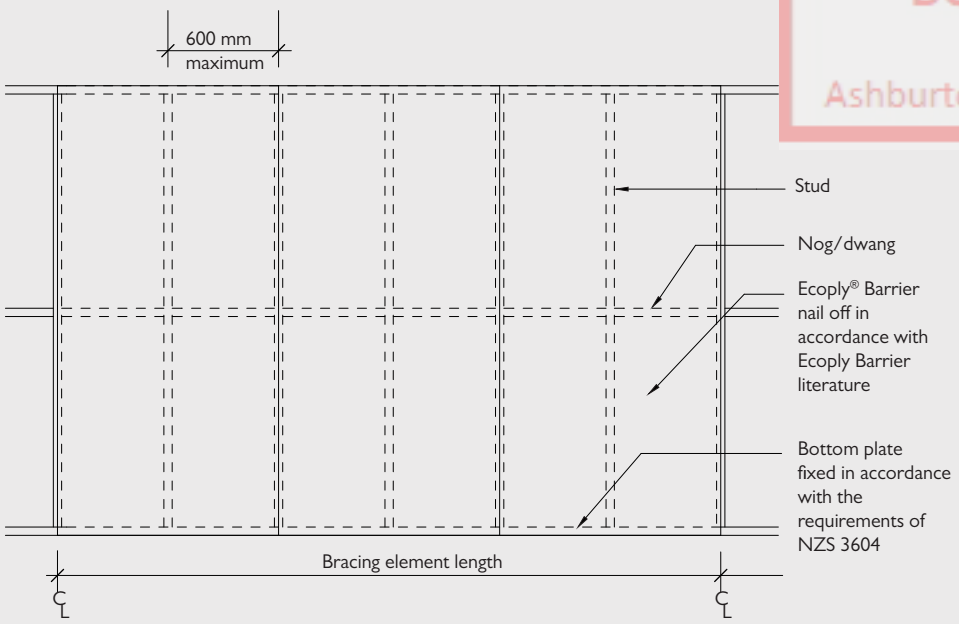
Figure 1F: Bracing Panel Installation at Lintel



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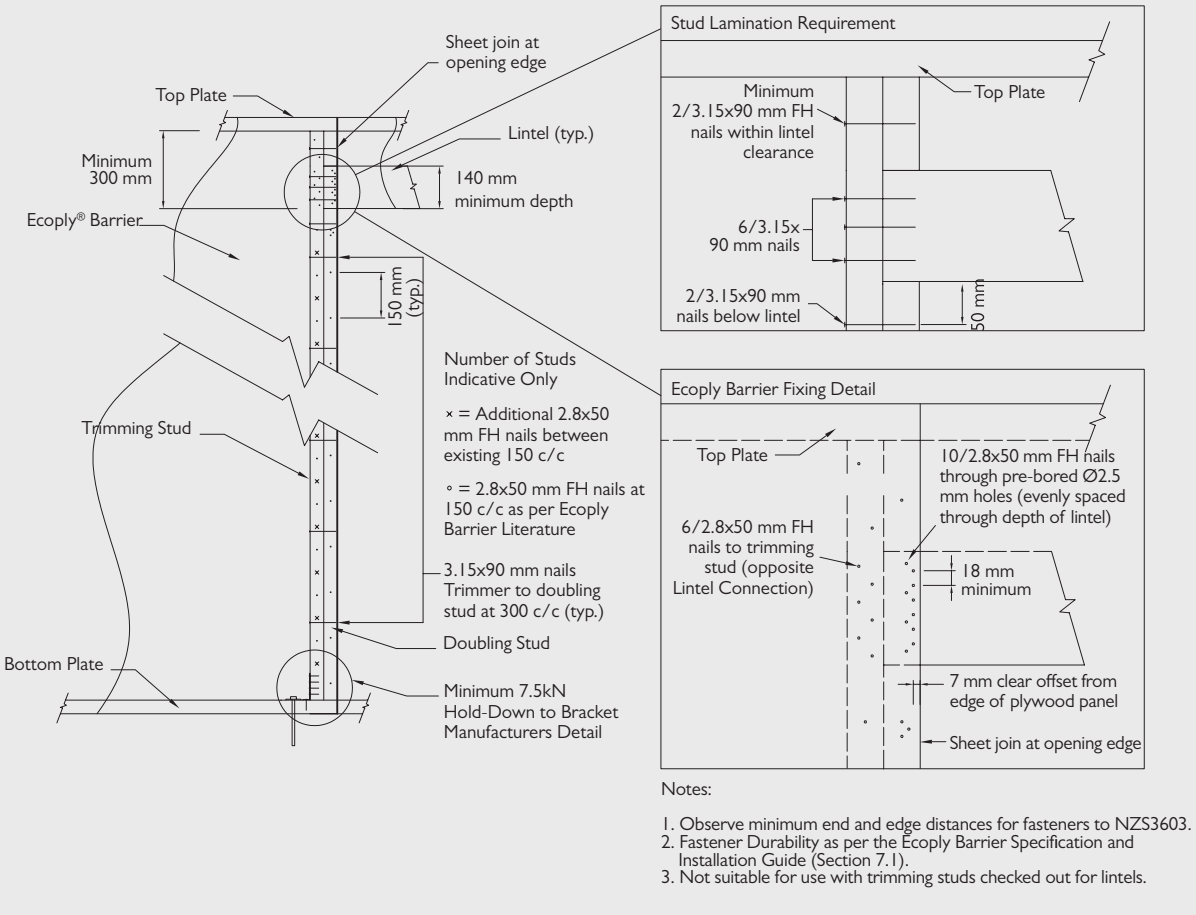
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Figure 1G: EPBS Bracing Panel Installation



7.14 LINTEL TIE DOWN CONNECTION

Figure 2: Lintel Connection Detail (For Uplifts Not Exceeding 7.5kN) as Detailed in Clause 8.6.1.8 of NZS 3604



Notes:

1. Observe minimum end and edge distances for fasteners to NZS3603.
2. Fastener Durability as per the Ecoply Barrier Specification and Installation Guide (Section 7.1).
3. Not suitable for use with trimming studs checked out for lintels.

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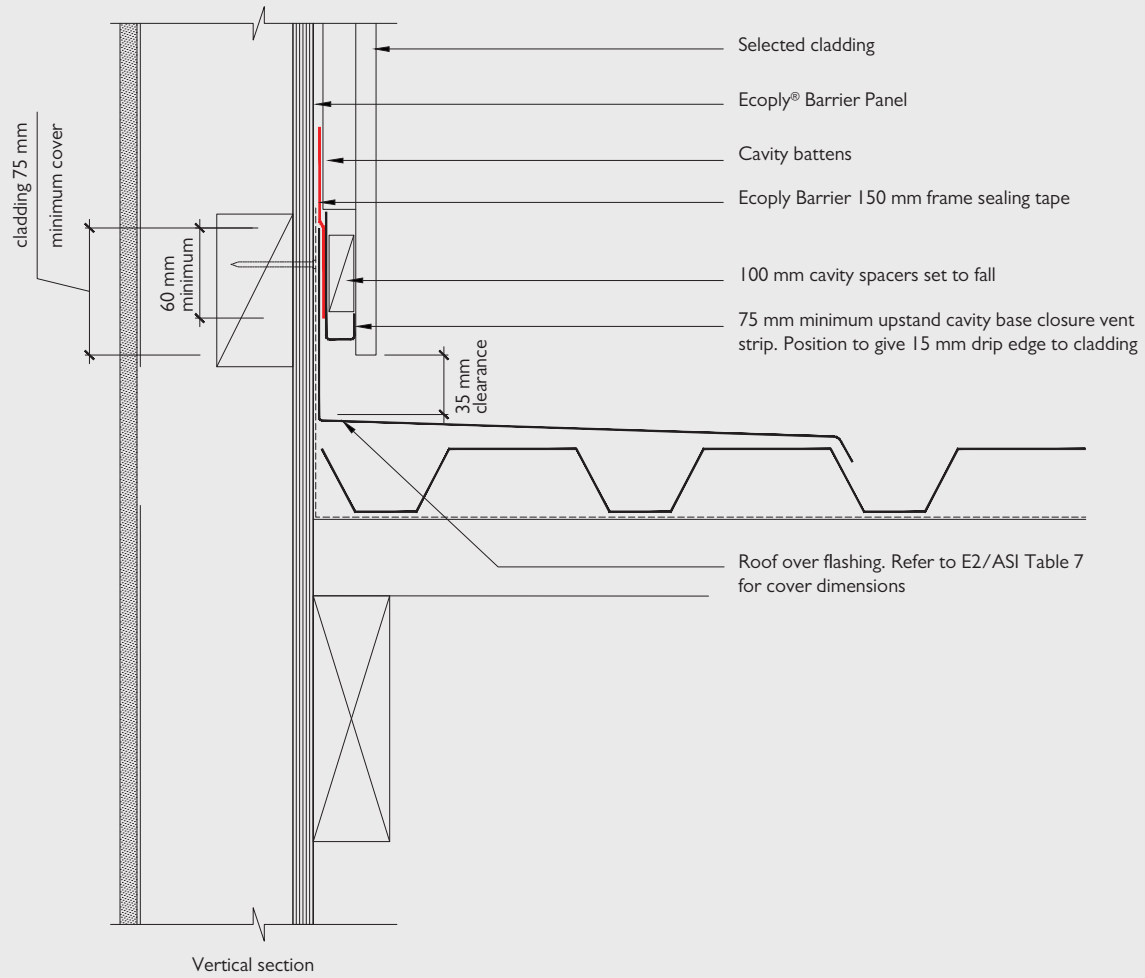
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7.15 INSTALLATION – APRON & SADDLE FLASHINGS

Apron Flashings

Ecoply® Barrier panels must extend past apron Flashing and roofing and have Ecoply Barrier Frame Sealing Tape over an E2/AS1 compliant apron Flashing with minimum 60mm cover as detailed. Refer BAR015 Apron Flashing Junction.

BAR015: Apron Flashing Junction



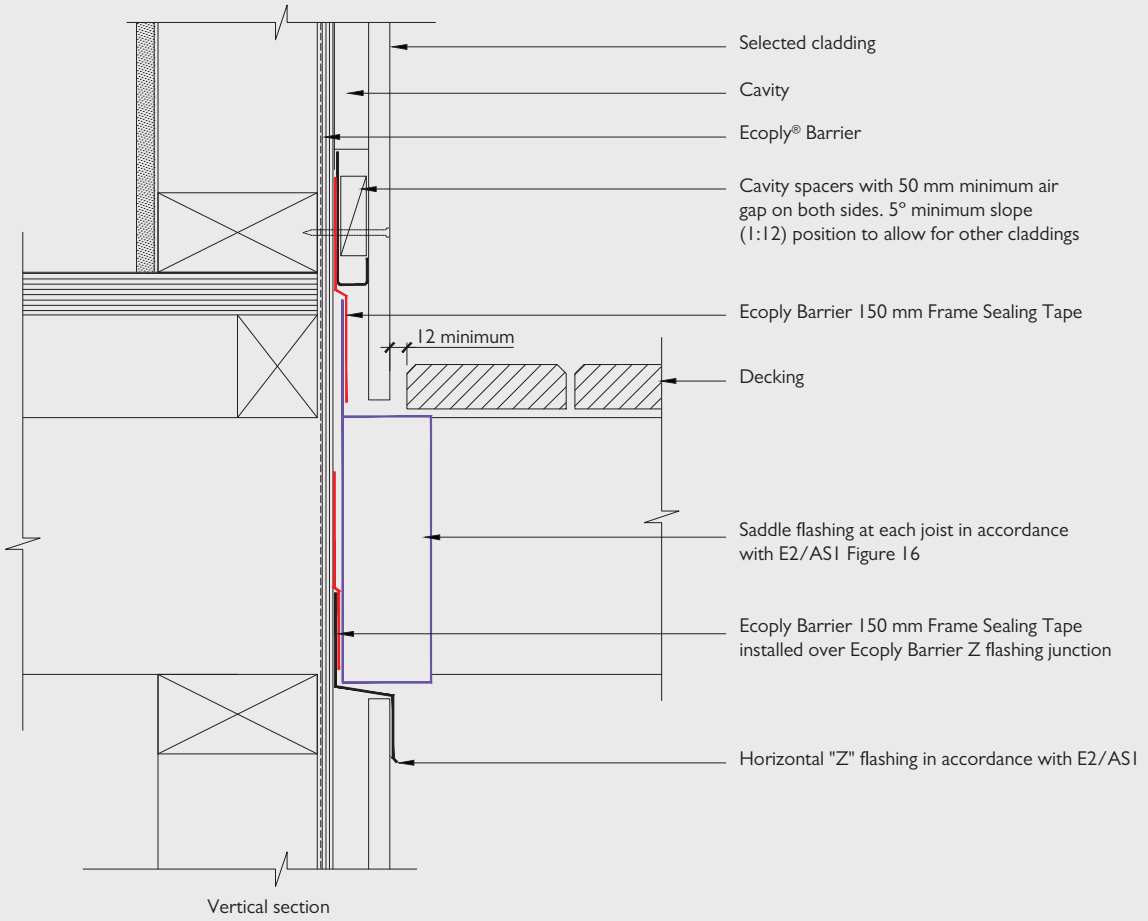
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Saddle Flashings

Apply Ecoply® Barrier Frame Sealing Tape over an E2/AS1 compliant saddle Flashing with minimum 60mm cover as detailed. Where required, Ecoply Barrier Frame Sealing Tape should be applied over the top of horizontal Flashings. Refer BAR016 Ecoply Barrier Saddle Flashing.

BAR016: Ecoply® Barrier Saddle Flashing



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8.0 FIRE RATED SYSTEMS

Where compliance with NZBC Clauses C3 – Spread of Fire and Clause C4 – Structural Stability is required CHH Woodproducts recommends the use of GIB® Fire Rated Systems overlaid directly with the Ecoply® Barrier rigid air barrier system.

Refer to the current GIB® Fire Rated System literature for specifications and installation requirements downloadable from www.gib.co.nz.

Where Ecoply Barrier overlays GIB® fire rated panels fastener lengths for the fixing of Ecoply Barrier panels must be increased by the thickness of the GIB® panel to ensure the required fastener pull out loadings are achieved.

9.0 CLADDING SYSTEM INSTALLATION

- Cladding must be installed as soon as possible.
- Claddings must comply and be installed in line with NZBC and cladding supplier specifications.
- Cladding maintenance advice should be sought from the cladding manufacturer.
- Cladding fastener lengths must be increased by a minimum of 7mm to ensure the required fastener pull out loadings are achieved.

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10.0 WORKING INSTRUCTIONS

Always use safe working practices when handling and installing Ecoply® Barrier plywood Sheathing. For further information refer to Safety Data Sheets available online from www.chhwoodproducts.co.nz.

Hole Forming - Making Penetrations in Ecoply® Barrier Sheets.

- Mark the centre of the hole on the sheet.
- Pre drill a pilot hole.
- Using the pilot hole as a guide, cut the hole to the appropriate diameter with a hole saw fitted to a electric drill.
- For irregular rectangle or circular holes a perforation in the sheet can be made by drilling a series of smaller holes around the perimeter of the hole, then tapping out the waste piece from the plywood sheathing or cut using a jig-saw.

Cutting Sheets - Making Cuts to Ecoply Barrier Sheets.

- Ecoply Barrier can be cut using any circular-saw or hand-saw tool.
- When sawing, clamp a straight edge to the sheet as a guide. Run the saw base along the straight edge to make a precise cut.

11.0 REFERENCED DOCUMENTS

NZBC B1/AS1 Structure

NZBC B2/AS1 Durability

NZBC E2/AS1 External Moisture

AS/NZS 1170.2: 2011 Structural design actions – Wind Actions

NZS 1170.5: 2004 Structural design actions – Earthquake actions – New Zealand

AS/NZS 1604.3: 2012 Specification for preservative treatment – Plywood

AS/NZS 2269: 2012 Plywood Structural Specifications

NZS 3602: 2003 Timber and Wood based products for use in Building

NZS 3603: 1993 Timber Structures Standard

NZS 3604: 2011 Timber Framed Buildings

IBC AC148 Acceptance Criteria for Flexible Flashing Materials

CHH Woodproducts Product Technical Statement – Ecoply Barrier: Rigid Air Barrier

CHH Woodproducts Safety Data Sheet - Ecoply Barrier

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12.0 FREQUENTLY ASKED QUESTIONS

Q: Do fastener heads need to be taped over?

A: Fastener heads are not required to be taped over, unless the fastener head completely penetrates the thickness of the face veneer.

Q: Do I need to tape all of the seams between the Ecoply® Barrier plywood panels?

A: Yes. All seams between the panels must be taped with Ecoply® Barrier Sealing Tape (60mm width Grey Colour) to ensure that it functions as a structural rigid air barrier system.

Q: Can Ecoply Barrier Sealing Tape, Sill Tape and Frame Sealing Tape be installed in the rain?

A: Yes. The tapes require pressure for a secure seal, and will require an extra period of time to fully adhere to the surface.

Q: What is permeance, and why is it important?

A: Permeance is a property that defines the ease at which water molecules diffuse through a material, typically measured in "perms." While water resistant barriers are designed to keep liquid water out of the wall system, they are also generally designed to allow moisture vapour to pass through so that the wall system can "breathe" meaning moisture vapour will not accumulate and condense in the wall system.

Q: How long can I leave Ecoply Barrier panels exposed before I install roof and wall coverings?

A: Ecoply Barrier panels can be left exposed for up to 180 days, however it is recommended to install roof and wall coverings as soon as possible.

Q: What is the weight of an Ecoply Barrier panel?

A: 2440mm panel = 11.7kg, 2745mm panel = 13.2kg (guidelines only).

Q: What is the R-value of Ecoply Barrier?

A: The thermal resistance or insulating effectiveness of plywood panels can be calculated using NZS 4214. Plywood has a conductivity (K) of 0.13W/mC so a 7mm panel has a thermal resistance R = 0.007/0.13 = 0.05.

Q: How much space should be left for expansion?

A: Allow 2-3mm expansion gap between square edges of Ecoply Barrier Panels. Ecoply Barrier is provided in 1197mm widths to account for this.

Q: Where can I purchase Ecoply Barrier panels and tapes from?

A: Ecoply Barrier is available from all leading building merchants in New Zealand.

Q: Can I use Ecoply Barrier on steel frame?

A: For use on steel framing please use Ecoply Barrier for Steel and the use the Ecoply Barrier for Steel Specification and Installation Guide.

13.0 LIMITATIONS

The information contained in this document is current as at September 2017 and is based on data available to CHH Woodproducts at the time of going to print.

All photographic images are intended to provide a general impression only and should not be relied upon as an accurate example of Ecoply Barrier products installed in accordance with this document or the NZBC compliance documents.

This publication replaces all previous CHH Woodproducts' design information and literature relating to Ecoply Barrier structural plywood products and tapes. CHH Woodproducts reserves the right to change the information contained in this document without prior notice. It is your responsibility to ensure that you have the most up to date information available, including at the time of applying for a building consent. You can call toll free on 0800 326 759 or visit www.chhwoodproducts.co.nz to obtain current information.

CHH Woodproducts has used all reasonable endeavours to ensure the accuracy and reliability of the information contained in this document. However, to the maximum extent permitted by law, CHH Woodproducts assumes no responsibility or liability for any inaccuracies, omissions or errors in this information nor for any actions taken in reliance on this information.

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14.0 ECOPLY® BARRIER INSTALLATION CHECKLIST

14.1 RIGID AIR BARRIER CHECKLIST

The below installation areas are considered critical to the successful installation of Ecoply® Barrier when used as a rigid air barrier.

Using this sheet as a checklist during installation will aid in problem free product installation and long term product durability post construction.

Task	Tick when checked
Prior to Specification and Installation	
Read the Ecoply® Barrier Specification and Installation Guide in its entirety	☐
Install	
Position Ecoply Barrier panels with the water resistant powder coat film facing outwards	☐
Sheet edges fully supported by framing	☐
Sheet Cuts	
Cut sheet ends are placed to the top	☐
Fastener Material Type	
Galvanised fasteners or better used (Stainless steel annular groove nails required in sea spray zones or other corrosive environments – Zone D)	☐
Sheet Fastener Pattern	
Around sheet edge – maximum 150mm centre spacing	☐
At intermediate framing – maximum 300mm centre spacing or 150mm in Extra High wind zone	☐
Expansion Gap Between Sheets (Vertical sheet joints)	
2-3mm gap between vertical edges of sheets	☐
NOTE: Expansion gaps are required between vertical edges of sheets to accommodate natural expansion and contraction of sheets	
Ground Clearances	
Ground clearances maintained for claddings in accordance with E2/AS1 and NZS 3604	☐
Sheets overhang the bottom plate by a minimum of 25mm & maximum 40mm over timber and concrete foundations	☐
Vertical Sheet Joints	
Seal all vertical joints including corners with Ecoply Barrier Sealing Tape (60mm x 30m) or Frame Sealing Tape (150mm / 200mm x 30m)	☐
All vertical window and door frames sealed with Ecoply Barrier Frame Sealing Tape	☐
Horizontal Sill Flashing Detail	
Apply Ecoply Barrier Sill Tape to the horizontal sill section of a window or door opening	☐
Make sure the tape extends 100mm up both window / door studs	☐
Horizontal Sheet Joints	
Use Ecoply Barrier PVC horizontal Z Flashing (Product code RDZF7) OR Ecoply Barrier 150mm OR 200mm Frame Sealing Tape.	☐
Service Penetrations	
Waste pipe outlets of maximum 150mm diameter placed at no closer than 150mm to the edge of braced element	☐
Use a flexible sealing tape to seal the service penetration: minimum cover 100mm, 25mm minimum width around the pipe penetration	☐

Refer to the current Ecoply® Barrier Specification and Installation Guide for full installation specifications and suggested details.

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BRANZ Appraised
Appraisal No. 1079 [2020]

GAMMA WALL BRACING SYSTEMS



Appraisal No. 1079 (2020)

BRANZ Appraisals

Technical Assessments of products for building and construction.

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Product

1.1 Gamma Wall Bracing Systems are a range of wall bracing systems based on the use of Gamma Bracing Frames. Gamma Wall Bracing Systems are used to resist earthquake and wind loads on timber frame buildings designed and constructed in accordance with NZS 3604: 2011 or to a specific engineering design (SED). The Gamma Bracing Calculator Software provides an electronic means of calculating bracing demand and resistance.

Scope

2.1 Gamma Wall Bracing Systems have been appraised for design and use as interior and exterior wall bracing systems in buildings within the scope limitations of NZS 3604: 2011 or to a specific engineering design (SED).

Building Regulations

New Zealand Building Code

3.1 **In the opinion of BRANZ, Gamma Wall Bracing Systems, if designed, used and installed in accordance with the statements and conditions of this Appraisal, will meet the following provisions of the NZBC:**

Clause B1 STRUCTURE: Performance B1.3.1, B1.3.2 and B1.3.4 Gamma Wall Bracing Systems meet the requirements for loads arising from earthquake and wind [ie B1.3.3 (f), and (h)]. See Paragraphs 8.1 to 8.3.

Clause B2 DURABILITY: Performance B2.3.1 (a) not less than 50 years. Gamma Wall Bracing Systems meet this requirement. See Paragraph 9.1.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1 Gamma Wall Bracing Systems meet this requirement and will not present a health hazard to people.

3.2 The bracing demand calculation and bracing distribution rules contained in the Gamma Wall Bracing Systems Software are in accordance with Section 5 of NZS 3604. Bracing resistance is provided by bracing element ratings determined in accordance with NZS 3604, Paragraph 8.3.1.2.

3.3 Bracing Resistance is provided by bracing element ratings determined in accordance with NZS 3604, Paragraph 8.3.1.2.

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Technical Specification

4.1 Gamma Bracing Frames are fabricated from 0.75 mm thick G550 Galvsteel® which is punched and folded into the frame components. The side and top channels are riveted together to form the outer frame. GBF220 frames comprise a flat steel sheet riveted to the frame. GBF400 and GBF600 frames have diagonal braces riveted within the outer frame. Hold down brackets are temporarily attached to the frame for transportation. All frames have service holes to allow electrical and plumbing services to be installed in the wall.

The frames are manufactured in 6 sizes as follows:

- GBF220 frames - 218 mm wide x 2010 and 2310 mm high.
- GBF400 frames - 353 mm wide x 2010 and 2310 mm high.
- GBF600 frames - 553 mm wide x 2010 and 2310 mm high.

4.2 System components and accessories supplied by Gamma Bracing Technologies Limited are as follows:

- 12 g x 40 mm Tek screws to secure Gamma Bracing frames to timber studs and plates.
- 12 g x 70 mm Tek Screws to secure GBF535 frames to the top plate.
- GBF Hold Down Brackets - 155 x 100 x 5 mm galvnised steel
- Slotted washer - 50 x 50 x 8 mm galvanised steel

4.3 Accessories used with Gamma Wall Bracing Systems that are supplied by the building contractor are as follows:

- M12 x 150 mm or M10 x 140 mm screw bolts for fixing to concrete floors.
- M12 x 200 mm galvanised coach screws for fixing to timber floors
- 7 mm thick DD grade structural grade plywood (for GBPF)
- 50 x 2.8 mm galvanised flat head nails (for GBPF)
- 300 x 25 mm galvanised straps (for GBPF)

Handling and Storage

5.1 Gamma Bracing Frames and accessories should be stored in a clean, dry area until they are used. Should the metal components get wet they should be separated and dried to prevent premature corrosion.

Technical Literature

6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for Gamma Wall Bracing Systems. The Technical Literature should be read in conjunction with this Appraisal. All aspects of design, use and installation contained in the technical literature and with in the scope of this appraisal must be followed.

Design Information

General

7.1 Gamma Wall Bracing Systems are for use to provide structural bracing for both residential and light commercial buildings for both new and existing buildings which may not require additional, speciality bracing linings.

7.2 Gamma Bracing Frames are supplied in three different widths, each in two different heights. GBF220S, GBF400S and GBF600S are designed for short walls 2.1m high. GBF220, GBF400 and GBF600 frames can be used for walls between 2.4 and 3.0 m high. For walls above 2.4 m high, additional timber blocking is required above the GBF. Some bracing systems require additional studs to achieve the required bracing ratings. Refer to the Technical Literature for further details.

7.3 Gamma Bracing System is for use in a closed environment and requires the supporting timber framing moisture levels to comply with NZS 3604 and NZS 3602.

7.4 Gamma Wall Bracing Systems once installed can eliminate the majority of temporary bracing.

7.5 Gamma Wall Bracing Systems can be installed in wet areas and unlined areas.

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7.6 Gamma Wall Bracing Systems can be used with either timber framed floors or concrete slab-on-ground floors.

7.7 Gamma Wall Bracing Systems can be used in combinations with other bracing systems such as plywood or plasterboard.

Gamma Portal Frames

7.8 Pairs of GBF220 frames can be used in conjunction with a 300 x 90 mm or 2 x 290 x 45 mm SG8 lintel to form a portal frame for large openings such as garage doors. Refer to the Technical Literature for further details.

Framing

7.9 Timber framing grade, spacing and construction must comply with NZS 3604 or be to a SED. Timber treatment must comply with NZBC Acceptable Solution B2/AS1.

7.10 Gamma Bracing Technologies Ltd recommends the use of kiln-dried stress-graded framing timber. The minimum actual framing dimensions are 90 x 45 mm.

Structure

Bracing

8.1 The Technical Literature provides comprehensive construction and hold-down details. These include options for timber and concrete floors.

8.2 The Gamma Bracing Software contains design procedures and an electronic calculation method for bracing demand calculated in accordance with NZS 3604: 2011, Section 5. Floor loadings can be selected in accordance with either NZS 3604, Bracing Demand Tables 5.5 - 5.10 for 2 kPa floor loads or less, or Tables 14.1 - 14.3 for 3 kPa floor loads.

8.3 NZS3604 Section 5 contains design procedures and a manual calculation method for calculating bracing demand. Refer to NZS 3604, Bracing Demand Tables 5.5 - 5.10 for 2kPa floor loads and Tables 14.1 - 14.3 for 3kPa floor loads. The bracing ratings given in Table 1 of this Appraisal are for manual calculations.

Table 1: Gamma Bracing Systems Bracing Ratings

Gamma Bracing System Reference	Performance Bracing Units (BU's)		Wall Heights	
	Wind	Earth	Min Wall Height	Max Wall Height
GBF220S/2100	45	53	2100	2400
GBF220/2400	37	44	2400	2700
GBF400S/2100	51	63	2100	2400
GBF400/2400	45	55	2400	2700
GBF400/2700	40	40	2700	3000
GBF400/3000	35	40	3000	3300
GBF535S/2100	79	86	2100	2400
GBF535/2400	69	75	2400	2700
GBF535/2700	61	67	2700	3000
GBF535/3000	55	60	3000	3300
GBF600S/2100	90	90	2100	2400
GBF600/2400	84	90	2400	2700
GBF600/2700	70	70	2700	3000
GBF600/3000	55	60	3000	3600
GBPF/2400	124	137	2400	2400
GBPF/2700	110	122	2700	2700

Note: Timber Floors - A limit of 120 BU/m applies to NZS 3604 timber floors and 150BU/m for concrete floors.

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Durability

9.1 Gamma Wall Bracing Systems are expected to have a serviceable life of at least 50 years. The ability for the systems to remain durable is dependant of them remaining dry in service.

Maintenance

10.1 Gamma Wall Bracing Systems should be kept dry during service. The building envelope should be maintained to prevent the components getting wet. Any damage to the envelope must be repaired immediately.

10.2 System components that are damaged must be replaced as soon as possible.

Prevention of Fire Occurring

11.1 Separation or protection must be provided to Gamma Wall Bracing Systems from heat sources such as fireplaces, heating appliances and chimneys. Part 7 of NZBC Acceptable Solution C/AS1, C/AS2 and NZBC Verification Method C/VM1 provide methods for separation and protection of combustible materials from heat sources.

Installation Information

Installation Skill Level Requirement

12.1 All design and building work must be carried out in accordance with the Gamma Wall Bracing Systems Technical Literature and this Appraisal by competent and experienced tradespersons conversant with bracing systems. Where the work involves Restricted Building Work (RBW) this must be completed by, or under the supervision of, a Licensed Building Practitioner (LBP) with the relevant License class.

12.2 Once the positions of the Gamma Bracing Frames (GBF's) have been determined from the bracing design remove any dwangs where the GBFs are to be installed. Ensure the inside dimension of the framing provides a suitable fit for the GBFs. A tolerance of +2.0 mm and -0 mm between the GBF and the timber framing is acceptable. The GBFs need to fit snuggly into the framing.

12.3 For wall heights of 2.7m and 3.0m install the required timber framing members as detailed in the Technical Literature.

12.4 If thermal insulation is to be installed then cut the thermal insulation to fit snugly within the timber framing and Gamma Frame members.

12.5 If interior sheet linings are to be installed fix in accordance with the manufacturer's instructions or in accordance with AS/NZS 2589.

Concrete Floors

12.6 Where the GBFs are located in external walls position the GBFs flush with the inside face of the timber framing to ensure the hold down fastener is away from the edge of the concrete slab (minimum edge distance = 60 mm). For internal walls the GBFs can be positioned centrally within the framing.

Timber Floors

12.7 Where the GBFs are located in external walls and internal walls the GBFs must be positioned within the framing ensuring the position of the hold down bolt is secured in to solid timber framing.

12.8 Once the GBFs are positioned mark the positions for the hold down fasteners through the slot in the hold down bracket and on to the bottom plate. Remove the GBF or where possible swing the GBF to one side to allow access for drilling the holes for the hold down fasteners. To swing the GBF to one side it is useful to install a single Tek screw fastener into each stud (do not fully tighten these until the GBF is fully installed). Drill the holes for the hold down fasteners.

Frame Fixing

12.9 Fix the perimeter of the GBF to the surrounding framing with nine 12 g x 40 mm Tek Screws. Screw each hold down bracket to the adjacent stud with eight 12 g x 40 mm Tek screws. Place slotted washer on hold down bracket and fix the GBF down with selected hold-down.

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Health and Safety

13.1 Gamma Wall Bracing Systems should be handled in accordance with the manufacturer's instructions. Accessories and other components of Gamma Wall Bracing Systems must also follow the relevant manufacturer's instructions for safe handling.

Basis of Appraisal

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

Tests

14.1 Bracing tests were carried out by SCION and BRANZ in accordance with BRANZ Technical Paper P21 to determine the performance of Gamma Wall Bracing Systems when the building is subject to lateral wind or earthquake loading.

Other Investigations

14.2 The Gamma Wall Bracing Systems Technical Literature has been examined by BRANZ and found to be satisfactory.

14.3 Site inspections were carried out by BRANZ to examine the practicability of the installation of the systems, and to view completed installations.

14.4 An assessment was made of all structural and durability testing by BRANZ technical experts and found to be satisfactory.

Quality

14.5 The manufacture of Gamma Wall Bracing Systems has been examined by BRANZ, including methods adopted for quality control. Details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory.

14.6 Gamma Bracing Technologies Limited is responsible for the quality of the product being supplied.

14.7 The quality of installation on site is the responsibility of the building contractor.

14.8 Designers are responsible for the design of the building.

14.9 Building owners are responsible for the maintenance of the product in accordance with the instructions of Gamma Bracing Technologies Ltd.

Sources of Information

- AS/NZS 2589: 2017 Gypsum Linings - Application and Finishing
- BRANZ Technical Paper P21: 2010 A wall bracing test and evaluation procedure.
- NZS 3602: 2003 Timber and wood-based products for use in building.
- NZS 3604: 2011 Timber-framed buildings.
- Ministry of Business Innovation and Employment Record of amendments - Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992

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BRANZ

In the opinion of BRANZ, Gamma Wall Bracing Systems are fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided it is used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to Gamma Bracing Technologies Limited, and is valid until further notice, subject to the Conditions of Appraisal.

Conditions of Appraisal

1. This Appraisal:
   a) relates only to the product as described herein;
   b) must be read, considered and used in full together with the Technical Literature;
   c) does not address any Legislation, Regulations, Codes or Standards, not specifically named herein;
   d) is copyright of BRANZ.
2. Gamma Bracing Technologies Limited:
   a) continues to have the product reviewed by BRANZ;
   b) shall notify BRANZ of any changes in product specification or quality assurance measures prior to the product being marketed;
   c) abides by the BRANZ Appraisals Services Terms and Conditions;
   d) warrants that the product and the manufacturing process for the product are maintained at or above the standards, levels and quality assessed and found satisfactory by BRANZ pursuant to BRANZ's Appraisal of the product.
3. BRANZ makes no representation or warranty as to:
   a) the nature of individual examples of, batches of, or individual installations of the product, including methods and workmanship;
   b) the presence or absence of any patent or similar rights subsisting in the product or any other product;
   c) any guarantee or warranty offered by Gamma Bracing Technologies Limited.
4. Any reference in this Appraisal to any other publication shall be read as a reference to the version of the publication specified in this Appraisal.
5. BRANZ provides no certification, guarantee, indemnity or warranty, to Gamma Bracing Technologies Limited or any third party.

For BRANZ

Chelydra Percy
Chief Executive

Date of Issue:
28 February 2020

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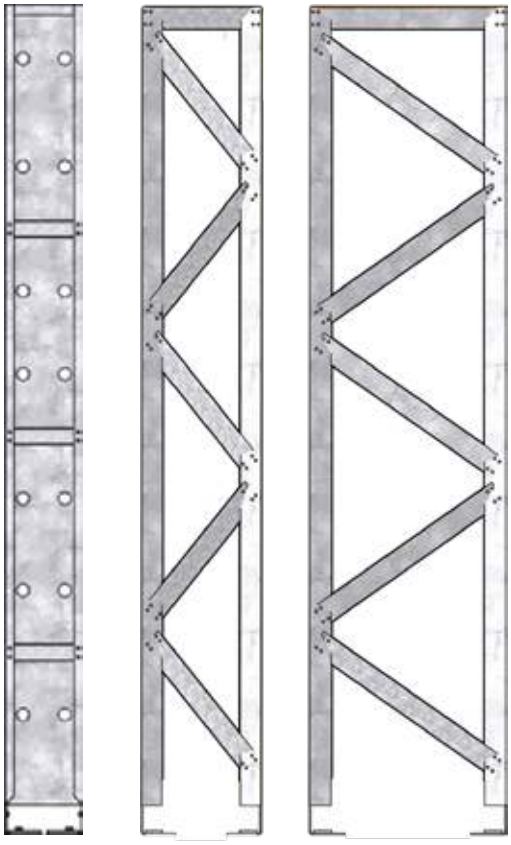
GAMMA BRACING TECHNOLGIES LIMITED

TECHNICAL INSTALLATION MANUAL

CodeMark™ New Zealand

NEW ZEALAND'S MOST ADVANCED BRACING SYSTEM FOR TIMBER FRAME CONSTRUCTIONS

ISSUE MARCH 2019



GBF220 GBF400 GBF600

DESIGNED BY GAMMA TECHNOLOGIES LTD

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1.0 General Information

1. Gamma withstands multiple wind and/or earthquake traumas and maintains its structural integrity.
2. Gamma has a high "Ductility" so it can flex without failure.
3. Gamma's are best installed early in the construction to immediately provide bracing performance.
4. Gamma's eliminate the majority of temporary bracing.
5. It's fast and easy to install either onsite or in a frame & truss plant.
6. Gamma comes with pre-punched fixing & service holes.
7. Gamma's are lightweight and of a robust construction (12.5kg).
8. Gamma's are suitable for remedial work for buildings affected by leaky building syndrome.
9. Gamma's can be installed in wet area's and area's where no linings are installed.
10. Gamma's provide up to 150 Bu's per metre (1 kN = 20 BU's).
11. Gamma's have a conditional 50 year B2 durability.
12. Gamma's are cost competitive within the total construction costs.
13. Gamma's are suitable for standard timber framing, either 600, or 400/450 or 220mm stud widths.
14. Effective on both Concrete and Timber bases.
15. Designed and manufactured for New Zealand environments.
16. 100% Recycable so very small environmental footprint.
17. Will provide structural bracing for the lifetime of the building.
18. It is fully compliant with New Zealand Building Codes.
19. Gamma's may be used in combination with other bracing systems, eg. plasterboard and plywood.

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1.0 General Information

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1.1. Introduction

Gamma Bracing system technology has been specifically designed and rigorously tested in New Zealand to provide structural bracing for both residential and light commercial buildings within the scope and limitations of NZS3604:2011.

The Gamma Bracing System has been tested in accordance with the New Zealand Building Code, verification method B1/VM p21 {2010} racking test limited states design; cited in NZS3604 Timber Framed Buildings to determine wind and earthquake ratings of bracing elements. This aligns with the new loadings standard AS/NZS 1170.

CodeMark Certification

Having met New Zealand's stringent standards, the Gamma Bracing system is the future solution for wall bracing requirements within timber framed buildings.

1.2. Warranty

The Gamma Bracing system carries the following warranty. This warranty is given by Gamma Bracing Technology Ltd ("The Manufacturer")

The manufacturer warrants that the products produced by the manufacturer shall be free of defects in materials and manufacture. If the products produced by the manufacturer do not meet the manufacturers standards, they will replace with the equivalent product. The manufacturer advises that only products, components and systems recommended by Gamma Bracing Technologies Ltd be used. At all times these must be used in accordance with the relevant product manufacturers usage recommendations.

If this is not done, the manufacturer will need to be satisfied that any defect in it's product is attributable to the failure of the manufactured product to meet the manufacturers standard (and not another clause) before this warranty applies. This warranty excludes all other warranties and liability for damage or loss in connection with the defects in the manufacturers product other than those imposed by legislation.

1.3. Benefits of using Gamma Bracing System

The design of the Gamma Bracing system allows for easy installation for both new and existing buildings. No additional, specialty bracing linings are required other than to provide standard interior finishings.

Once the Gamma Bracing system has been installed, the bracing requirements of the building are completed and therefore the need for temporary timber bracing is significantly reduced; saving time and cost as well as providing a safer working environment.

Inspection by the Building Consent Authority of the bracing system can be done early in the construction programme. No further inspections of bracing elements are required, thus another saving of time and money.

Using the Gamma Bracing System removes the need for other types of bracing such as galvanised straps, which connect the stud with the bottom plate. By removing the need for these straps a flatter surface is provided for the installation of the interior lining.

Provided the timber frame moisture levels, as detailed in NZS3604:2011 and NZS3602; are followed and the Gamma Bracing system is used in a closed environment, the Gamma Bracing frames once installed do not require maintenance. Provided the requirements of NZ Steel's GalvsteelTM (Axxis 550) Durability Statement are met, the Gamma Bracing frames are unaffected by weather conditions.

Gamma Bracing frames are provided with a warning label advising that the structural integrity of the building must be maintained at all times. This is to prevent the possible removal or modification of the Gamma Bracing system during renovation work.

Each Gamma Bracing frame provides significant bracing values for both wind and earthquake demand. Total bracing integrity can be achieved wherever Gamma Bracing frames are positioned throughout the buildings structure.

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2.1. The New Zealand Building Code (NZBC)

The Gamma Bracing System when installed in accordance with the installation details will comply with the New Zealand Building Code requirements as detailed in this document.

2.1.1. Clause B1 Structure

B1.1 Objective

The objective of this provision is to:

a) Safeguard people from injury caused by structural failure.

b) Safeguard people from loss of amenity caused by structural behaviour.

c) Protect other property from physical damage caused by structural failure.

B1.2 Functional Requirements

Buildings and building elements and site works must withstand the combination of loads that they are likely to experience during construction or alteration and throughout their lives.

B1.3 Performance

B1.3.1 Buildings, building elements and sitework shall have a low probability of rupturing, becoming unstable, losing equilibrium, or collapsing during construction, alteration and throughout their lives.

B1.3.2 Buildings, building elements and sitework shall have a low probability of causing loss of amenity through undue deformation, vibratory response, degradation, other physical characteristics throughout their lives, or during construction of alteration when building is in use.

2.1.2. Clause B2 Durability

B2.1 Objective

The objective of this provision is that the building will throughout it's life will continue to satisfy the other objectives of the code.

B2.2 Functional Requirement

Building materials, components and construction methods shall be sufficiently durable to ensure that the building, without reconstruction or major renovations, satisfies the other functional requirements of the code throughout the life of the building.

B2.3.1 Performance

From the time a code compliance certificate is issued, building elements shall, with only normal maintenance, continue to satisfy the performance of this code for the lesser of the specified intended life of the building, if stated or:

a) The life of the building, being not less than 50 years if:

(i) Those building elements (including floors, walls and fixings) provide structural stability to the building, or

(ii) Those building elements are difficult to replace, or

(iii) Failure of those building elements to comply with the building code would go undetected during both normal use and maintenance of the building.

2.1.3. Clause F2 Hazardous Building Materials

F2.1 Objective

The objective of this provision is to safeguard people from injury and illness caused by exposure to hazardous building materials.

F2.2 Functional Requirements

Building materials which are potentially hazardous shall be used in ways that avoid undue risk to people.

F2.3.1 Performance

The quantities of gas, liquid, radiation or solid particles emitted by materials used in the construction of buildings, shall not give rise to harmful concentrations at the surface of the material where the material is exposed, or in the atmosphere of any space.

2.2. Purpose of product

To provide a durable, reliable and cost effective building element for the structural and bracing performance levels as specified within this manual.

2.3 Scope of acceptable use

Acceptable use as structural bracing systems for both residential and light commercial buildings and within the scope and limitations of NZS3604:2011.

If the Gamma Bracing system is to be considered for installation other than in accordance with the trademark certificate, specific engineering will be required.

The Gamma Bracing frame is located within the cavity of the wall and is not to be exposed to external weather conditions. The frame is manufactured from materials that have protective coatings to resist corrosion during the construction period.

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2.4. Limitations of use

For use:

- In the interior cavity of internal and external walls in accordance the manufacturers installation instructions.
- To be used within the scope and limitations of NZS3604:2011
- To be installed by or the installation to be supervised by a licensed building practitioner with the appropriate license class where the building work has been identified as Restricted Building Work.

2.5. Who may install the Gamma Bracing system

Installation of the Gamma Bracing system must be undertaken or the installation be installed by a Licensed Building Practitioner with the appropriate license category where the building work has been identified as Restricted Building Work.

2.6. Health & Safety

It is important to follow good site practice at all times and to ensure appropriate safety precautions are taken when installing the Gamma Bracing system and all supporting components.

2.7. Compatibility with associated products

The Gamma Bracing system and its components are compatible with most associated building products, however it is recommended that the installer refers to NZS3604:2011 Section 4 Durability to ensure compatibility with other materials.

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The performance and construction of the Gamma Bracing systems is detailed in Table 2. The values for wind and earthquake are obtained from testing and evaluation that has been carried out in accordance with NZS3604:2011 and P21[2010] test and evaluation procedures.

GBF 220 S

- GBF — Gamma Bracing Frame
- 220 — Gamma Frame/Wall Length
- S — Short (Wall Height)
- P - Portal

3.1 SYSTEM SUMMARY TABLE

TABLE 1	Performance Bracing Units (BU's)		Performance & Construction						
			Stud Qty & Configuration (Min Stud Size 90 x 45mm)			System Size Including Framing			
Gamma System Reference	Wind	Earth	Stud Centres (mm)	Left Side	Right Side	Minimum Wall length (mm)	Minimum Wall Height (mm)	Maximum Wall Height (mm)	Page #
GBF220S/2100	45	53	310	2	2	400	2100	2400	14
GBF220/2400	37	44		2	2		2400	2700	16
GBF400S/2100	51	63	400	1	1	445	2100	2400	18
GBF400/2400	45	55		1	1		2400	2700	20
GBF400/2700	40	40		1	1		2700	3000	21
GBF400/3000	35	40	400	1	1	490	3000	3300	22
GBF450S/2100	65	74		1	2		2100	2400	23
GBF450/2400	57	65		1	2		2400	2700	24
GBF450/2700	50	57		1	2		2700	3000	25
GBF450/3000	45	52	400	1	2	535	3000	3300	26
GBF535S/2100	79	86		2	2		2100	2400	27
GBF535/2400	69	75		2	2		2400	2700	28
GBF535/2700	61	67		2	2		2700	3000	29
GBF535/3000	55	60	600	2	2	600	3000	3300	30
GBF600S/2100	90	90		1	1		2100	2400	32
GBF600/2400	84	90		1	1		2400	2700	34
GBF600/2700	70	70		1	1		2700	3000	35
GBF600/3000	55	60		1	1		3000	3600	36
GBPF/2400	124	137	n/a	n/a	n/a	6000	2400	2400	37
GBPF/2700	110	122					2700	2700	38

COMBINATIONS OF GBF TYPES - TYPICAL SYSTEMS SEE BELOW

GBF220 + GBF600	39 + 84 - 44 + 90	**2**	220mm + 645mm	2400mm	123	134
GBF400/600	45 + 84 - 55 + 90	1	220mm + 645mm	2400mm	129	145
GBF220/535	39 + 69 - 44 + 75	2	45mm + 535mm	2400mm	108	144

OR ANY OTHER COMBINATION TO MEET DESIRED DESIGN AND BRACING REQUIRED.

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The Gamma Bracing System provides bracing performance to resist and achieve Wind and Earthquake demands. To calculated both the Wind and Earthquake demands Gamma Bracing Technologies Ltd has developed a spread sheet calculator that is in accordance with the requirements of the NZS3604:2011 Standard. This section details the method of calculating both the demand and achieved requirements using the Gamma spread sheet calculator. The Gamma Bracing Technologies Ltd spread sheet calculator can be easily downloaded from the Gamma web site **www.gammabracing.co.nz**.

4.1 Demand

The Gamma Bracing Calculator Software has been designed to work in conjunction with NZS3604:2011.

The Demand and Achieved sheets within the Gamma Bracing Calculator software allow for a fast and simple way to calculate the structural bracing requirements of a timber framed structure.

The Gamma Bracing Software is preloaded with Gamma bracing systems values. The software allows the user to use other bracing systems. (Other bracing system values will require loading into the designated calculation sheets by the user – refer to terms and conditions).

It is currently acceptable to use a combination of different bracing systems along the same bracing line. However it is not permitted to place more than one bracing element in the same position.

Designing the structural aspects of a building require a good knowledge and understanding of the principles of building timber framed structures.

Instructions

Project Details

Type in the name of the owner and the property address details including the Lot number and the DP number. Details for the Architect, Designer and Engineer can also be added should they be required.

Calculating the Demand

Input the information of the building into the required cells. Cells with drop down lists provide options to choose from – choosing the "specify" option allows for a custom option or value to be loaded.

Building dimensions, roof and wall cladding weights need to be inputted to enable a bracing demand to be calculated. Incorrect information or information not inputted will not provide a result and a warning notification will be indicated.

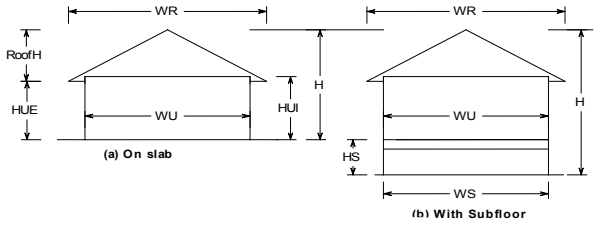
Wind demand requirements can be further refined by choosing from the drop down lists in the Yellow panel.

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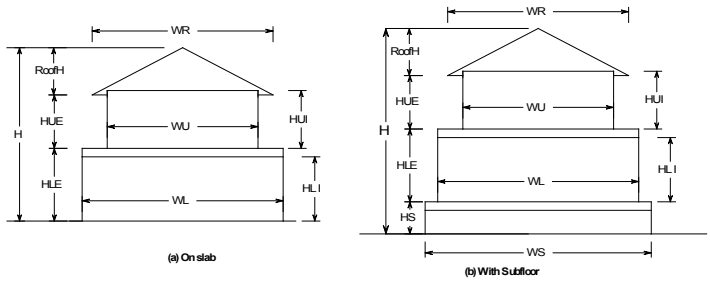
Job Description - what is typed here will be reproduced on print sheet.

Warning. This spreadsheet calculates the bracing rating for the building defined. It does not check that the building defined complies NZS 3604 scope.

Building and roof description	
How many storeys above slab or subfloor?	Two storey
Foundation type	Subfloor
RoofH = Roof height above eaves (m)	0.00
LR = Maximum roof length (m)	0.00
WR = Maximum roof width (m)	0.00
Roof pitch (degrees)	0 to 25 degrees
Specified maximum pitch (degrees) option	0.00
Room in roof space?	No
Roof cladding weight	Light
Specified roof cladding weight option (kg/m^2)	0.00
Floor live load	2 kPa
Specified floor loading option (kPa)	2.20
Upper or single storey details	
Average exterior wall cladding weight	Light
Specified wall cladding weight option (kg/m^2)	0.00
LU = Building length (m)	0.00
WU = Building width (m)	0.00
Gross building plan area (m^2)	0.00
HUI = Interior wall height (m)	0.00
HUE = Exterior wall height (m)	0.00
Lower storey details	
Average exterior wall cladding weight	Medium
Specified wall cladding weight option (kg/m2)	0.00
LL = Building length (m)	0.00
WL = Building width (m)	0.00
Gross building plan area (m2)	0.00
HLI = Interior wall height	0.00
HLE = Exterior wall height	0.00
Subfloor details	
Average exterior wall cladding weight	Light
Specified wall cladding weight option (kg/m2)	0.00
LS = Building length (m)	0.00
WS = Building width (m)	0.00
Gross building plan area (m2)	0.00
HS = Subfloor height	0.00



Single storey building definitions



Two storey building definitions

Wind speed

Choose which option you wish to use to specify wind speed. (a) Specify the wind zone such as from Table 5.4 of NZS 3604.

(a) Specify the wind zone such as from Table 5.4 of NZS 3604. High

(b) Specify the wind speed in m/sec directly in the adjacent blue cell. Wind speed = 50.0 **m/sec**

(c) Get the wind speed calculated in the yellow zone below as per Table 5.1 of NZS3604.

Wind Zone	
Wind Region from Figure 5.1 of NZS 3604	A
Roughness from Section 5.2.3 of NZS 3604	Open
Exposure from Section 5.2.4 of NZS 3604	Sheltered
Is it a Lee Zone - see Figure 5.1 of NZS 3604?	Yes a Lee Zone
Topography from Section 5.2.5 of NZS 3604	T1
Earthquake Zone from Figure 5.4 of NZS 3604	1
Subsoil classification from Section 5.3.3 of NZS 3604	D

Wind zone determined = Very High

Summary of bracing demand and resistance:

	Upper storey		Lower storey		Subfloor	
Total Wind Demand/Provided in BU's	Demand	Provided	Demand	Provided	Demand	Provided
Wall along direction	0	0	4	0	4	0
Wall across direction	0	0	0	0	0	0
Total EQ Demand/Provided in BU's	Demand	Provided	Demand	Provided	Demand	Provided
Wall along direction	#DIV/0!	0	#DIV/0!	0	#DIV/0!	0
Wall across direction	#DIV/0!	0	#DIV/0!	0	#DIV/0!	0
Check of bracing capacity						
Wall along direction	OK		Inadequate		Inadequate	
Wall across direction	OK		OK		OK	

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4.2 Gamma Bracing Software - Achieved

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CALCULATING THE ACHIEVED

The bracing calculation sheets listed below are available within the Gamma Bracing software to calculate the bracing achieved requirements for house types that are accordance with the NZS3604:2011 standard. Depending on the type of house refer to Table 2 when choosing the achieved sheets

Subfloor Along Sheet
Subfloor Across Sheet
Lower Along Sheet
Lower Across Sheet
Upper Along Sheet
Upper Across Sheet

Each achieved sheet allows the option to choose from the preferred Gamma Bracing systems individual bracing elements as well as the bracing systems listed below. These systems will require the correct references and values to be inputted prior to being used in each of the achieved sheets.

Strictly follow the manufacturer's instructions and ensure the correct Wind and Earthquake values are used. When panel or sheet bracing systems are used the wall length will be required to calculate the bracing values of each bracing element.

Foundations
Plywood
Plasterboard
User Defined (Customer bracing systems)

The wind and earthquake demand values from the demand sheet are displayed cells at the top of the achieved sheet. Calculate the bracing achieved until the demand value is achieved or exceeded.

For exterior wall bracing lines load in the exterior wall length in meters and ensure the demand value detailed for that bracing line is achieved.

A warning note will be visible if the demand is not achieved.

PRINT SHEET

The Print Sheet automatically stores data from the Main Menu and each of the Along and Across sheets to provide a print version of the bracing calculations. Once the calculations have been completed go to the Print Sheet to print off the information.

TABLE 2 House Type	Achieved Sheets to use
Single level on concrete	Upper along/across
Two levels on concrete	Lower along/across & Upper along/across
Single level on timber floor	Subfloor along/across & Upper along/across
Two levels on timber floor	Subfloor along/across, Lower along/across & Upper along/across

Achieved Sheet

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Upper or single storey bracing walls
This sheet defines bracing walls in the along direction

	Wind BU's	EQ BU's
Total bracing achieved	0	0
Total bracing required	0	0
	OK	OK

							Values achieved			Check minimum bracing rating in Section 5.4.7 of NZS 3604				
Line name	Bracing element label	Source of published bracing rating	Bracing wall type	1 or wall length in metres	Wall Height (metres)	Wall angle in degrees	Wind BU's	EQ BU's	Is bracing element length specified less than minimum?	Bracing line bracing capacity BU's	If external wall give length (m)	Requirement for internal walls	Requirement for external walls	
A	A1	None	None	1	2.4	0	0	0	OK	0	0			
	A2	None	None	1	2.4	0	0	0	OK					
	A3	None	None	1	2.4	0	0	0	OK					
	A4	None	None	1	2.4	0	0	0	OK					
	A5	None	None	1	2.4	0	0	0	OK					
	A6	None	None	1	2.4	0	0	0	OK					
B	B1	None	None	1	2.4	0	0	0	OK	0	0			
	B2	None	None	1	2.4	0	0	0	OK					
	B3	None	None	1	2.4	0	0	0	OK					
	B4	None	None	1	2.4	0	0	0	OK					
	B5	None	None	1	2.4	0	0	0	OK					
	B6	None	None	1	2.4	0	0	0	OK					
C	C1	None	None	1	2.4	0	0	0	OK	0	0			
	C2	None	None	1	2.4	0	0	0	OK					
	C3	None	None	1	2.4	0	0	0	OK					
	C4	None	None	1	2.4	0	0	0	OK					
	C5	None	None	1	2.4	0	0	0	OK					
	C6	None	None	1	2.4	0	0	0	OK					
D	D1	None	None	1	2.4	0	0	0	OK	0	0			
	D2	None	None	1	2.4	0	0	0	OK					
	D3	None	None	1	2.4	0	0	0	OK					
	D4	None	None	1	2.4	0	0	0	OK					
	D5	None	None	1	2.4	0	0	0	OK					
	D6	None	None	1	2.4	0	0	0	OK					
E	E1	None	None	1	2.4	0	0	0	OK	0	0			
	E2	None	None	1	2.4	0	0	0	OK					
	E3	None	None	1	2.4	0	0	0	OK					
	E4	None	None	1	2.4	0	0	0	OK					
	E5	None	None	1	2.4	0	0	0	OK					
	E6	None	None	1	2.4	0	0	0	OK					
F	F1	None	None	1	2.4	0	0	0	OK	0	0			
	F2	None	None	1	2.4	0	0	0	OK					
	F3	None	None	1	2.4	0	0	0	OK					
	F4	None	None	1	2.4	0	0	0	OK					
	F5	None	None	1	2.4	0	0	0	OK					
	F6	None	None	1	2.4	0	0	0	OK					
G	G1	None	None	1	2.4	0	0	0	OK	0	0			
	G2	None	None	2.5	2.4	0	0	0	OK					
	G3	None	None	1	2.4	0	0	0	OK					
	G4	None	None	1	2.4	0	0	0	OK					
	G5	None	None	1	2.4	0	0	0	OK					
	G6	None	None	1	2.4	0	0	0	OK					

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Detailed within Table 3 is the procedure for installing the Gamma Bracing Frames (GBF's). The installation procedure is designed for onsite installations however the GBF's can also be installed at the pre nail framing stage of the construction. Should the GBF's be installed at the pre stage the GBF's will have temporary fasteners installed to hold them in place for the purpose of transportation to the job site. Completion of the installation of the GBF's must be carried out once the pre nail framing has been erected using the same procedures as detailed within Table 3.

TABLE 3 GAMMA INSTALLATION PROCEDURE	
1	Once the positions of the Gamma Bracing Frames (GBF's) have been determined from the bracing design remove any cross noggins/dwangs where the GBF's are to be installed. Ensure the inside dimension of the framing provides a suitable fit for the GBF's. A tolerance of +2.0mm and – 0.0mm between the GBF and the timber framing is acceptable. The GBF's s need to fit snuggly into the framing.
2	For wall heights of 2.7m and 3.0m install the required timber framing members as detailed.
3	**Concrete Floors – External & Internal Walls** Where GBF's are located in external walls position the GBF's flush with the inside face of the timber framing to ensure the hold down fastener is away from the edge of the concrete slab (minimum edge distance = 60mm). For internal walls the GBF's can be positioned centrally within the framing. **Timber Floors – External & Internal Walls** Where GBF's are located in external walls and internal walls the GBF's can be positioned anywhere within the framing ensuring the position of the hold down bolt is secured in to solid timber framing. Once the GBF's are positioned mark the positions for the hold down fasteners through the slot in the hold down bracket and on to the bottom plate. Remove the GBF or where possible swing the GBF to one side to allow access for drilling the holes for the hold down fasteners. To swing the GBF to one side it is useful to install a single Tek screw fastener into each stud (do not fully tighten these until the GBF is fully installed). Drill the holes for the hold down fasteners.
4	**Concrete Floors – Hold Down Anchors** Use M12 x 150mm masonry fasteners or M10 x 140mm Masonry Screw in Anchors (Refer Section 16.2 for recommended types of anchor). **Timber Floors – Hold Down Anchors** Use M12 x 200mm galvanized coach screw to be fastened into solid timber framing (Refer Section 16.2 for recommended types of anchor).
5	Reposition the GBF in between the studs ensuring that the slotted holes in the brackets are aligned with holes in the bottom plate.
6	Install the slotted washer provided and install the hold down anchor and tighten.
7	Each of the hold-down brackets are secured to the GBF framing to allow for shipping and have been pre drilled with 8 holes. Using the 12g x 40mm Tek screws fasten each bracket to the timber framing (8 screws per bracket). It is permitted to adjust the brackets up to no greater than 50.0mm and down by no greater than 39mm to allow for any small deviation in wall framing height. (Refer section 15.8 for further details on height adjustment).
8	Using 12g x 40mm Tek screws provided fix through the pre punched holes located in the GBF's and into the timber framing.
9	If thermal insulation is to be installed then cut the thermal insulation to fit within the timber framing and Gamma framing members and ensure that insulation protrudes from both sides of the Gamma Bracing Frame (Refer Section 16.3).
10	If interior sheet linings are to be installed fix as per the manufactures instructions or as per AS/NZS 2589:2017. Minimum drywall fixing centres to be no greater than 300mm.

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1 If receiving the framing from the Pre nail manufacture with the Gamma Bracing Frames pre-installed there will be 4, 12g x 40mm Tek screws securing the Gamma Bracing Frame within the timber framing. 2 screws positioned at the upper part of the Gamma Bracing Frame and 1 screw in each of the brackets. Mark the position of the hold down bolt hole on to the timber base plate for each bracket.

When installing Gamma Bracing Frame directly on site position the Gamma Bracing Frame within the timber framing and mark the timber base plate as previously described.

Please note: Observe edge distance requirements for external walls on concrete floors.



2 Remove the 2 screws from the brackets only to allow the Gamma Bracing Frame to be swung to one side to allow access for drilling the holes for the hold down bolts.

Drill holes for the hold down bolts for each bracket. Ensure correct size drill bit is used and the correct depth of the hole is achieved.



3 Reposition the Gamma Bracing Frame within the framing.



4 Install the 2 washers provided, 1 for each bracket.



5 Position the hold down bolts in each bracket, 2 per Gamma Bracing Frame (not provided).

Refer to Section 16.2, Table 4 to when choosing the correct hold down bolt.



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6 Install the hold down bolts to secure Gamma Bracing Frame to the substrate. A socket drive extension can be positioned through the access hole in the lower trellis to enable the hold down bolt to be tightened.



7 Fully tighten the hold down bolts



8 Install the 12g x 40mm Tek screws in each Bracket. (Provided)



9 Quantity of 8 screws per bracket. (Provided)



10 Install the 12g x 40mm Tek screws to the Gamma Bracing Frame. Pre punched holes are positioned in the up-right sections and the top end cap of the Gamma Bracing Frame provided.

The Gamma Bracing Frame is now fully installed and providing its structural performance.

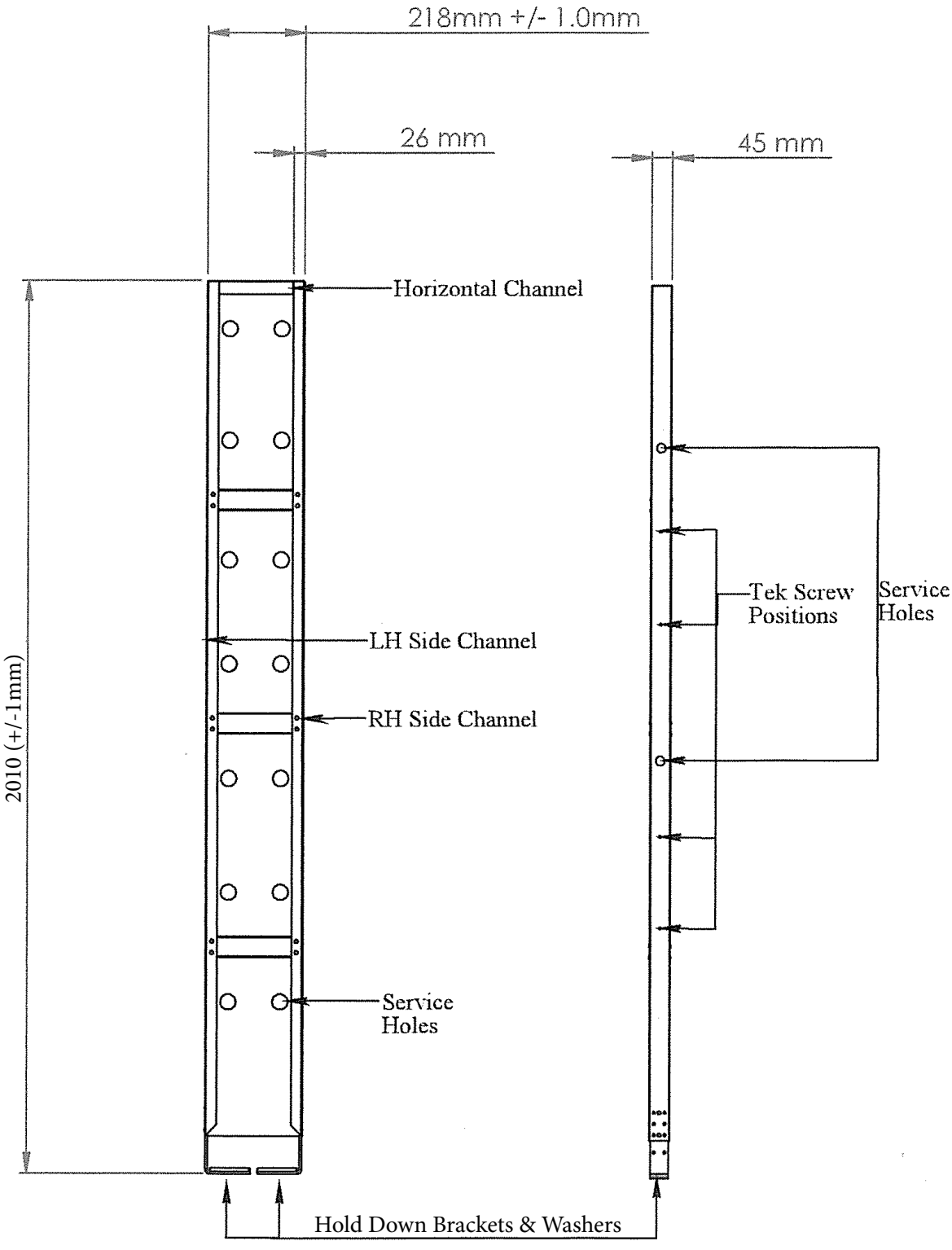


Document Set ID: 683756
Version: 1, Version Date: 04/11/2023

6.0 Gamma Bracing Frame GBF220S

Approved Building Consent Documents
BC0777/21
Ashburton District Council

Detailed in the drawing below is the Gamma Bracing Frame GBF220S as it is supplied

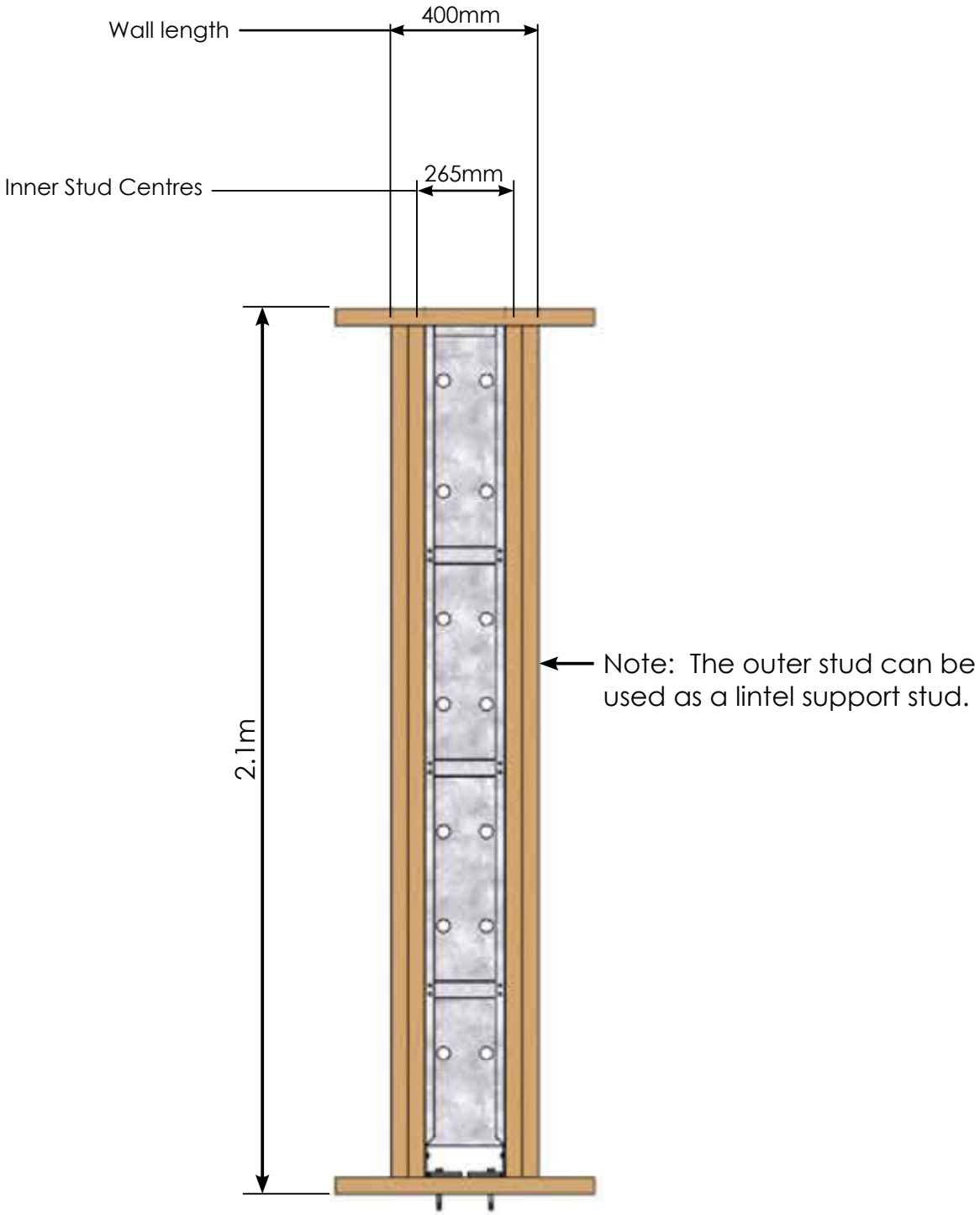


Document Set ID: 683756
Version: 1, Version Date: 04/11/2023

Approved Building
Consent Documents
BC0777/21
Ashburton District Council

Detailed in the drawing below is the GBF220S as it must be constructed to provide the described wind and earthquake performance values.

Performance - Wind 45BU - Earthquake 53BU



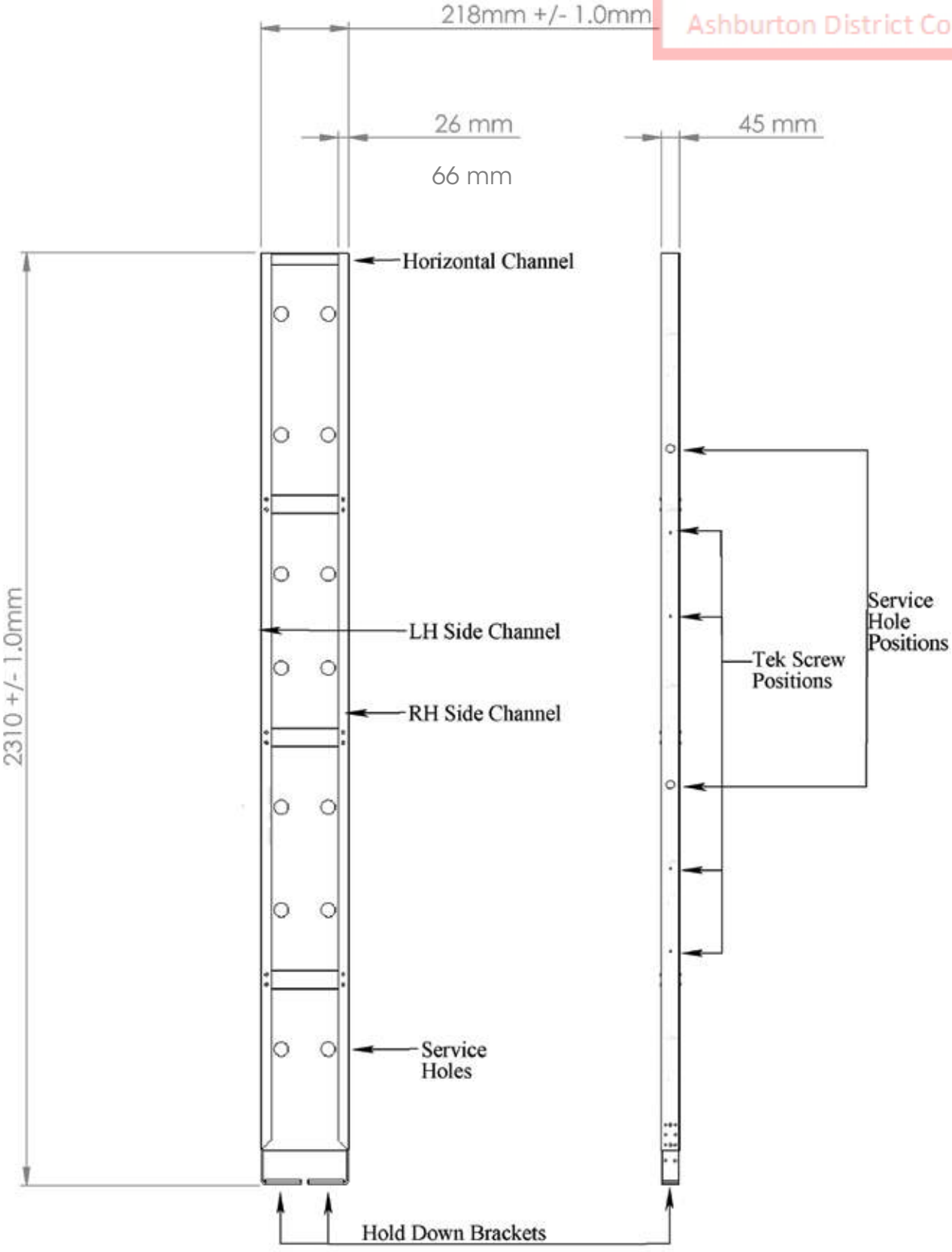
GBF220S (Wall Height 2.1m)

Document Set ID: 683756
Version: 1, Version Date: 04/11/2023

7.0 Gamma Bracing Frame GBF220

Approved Building Consent Documents
BC0777/21
Ashburton District Council

Detailed in the drawing below is the GBF220 as it is supplied.

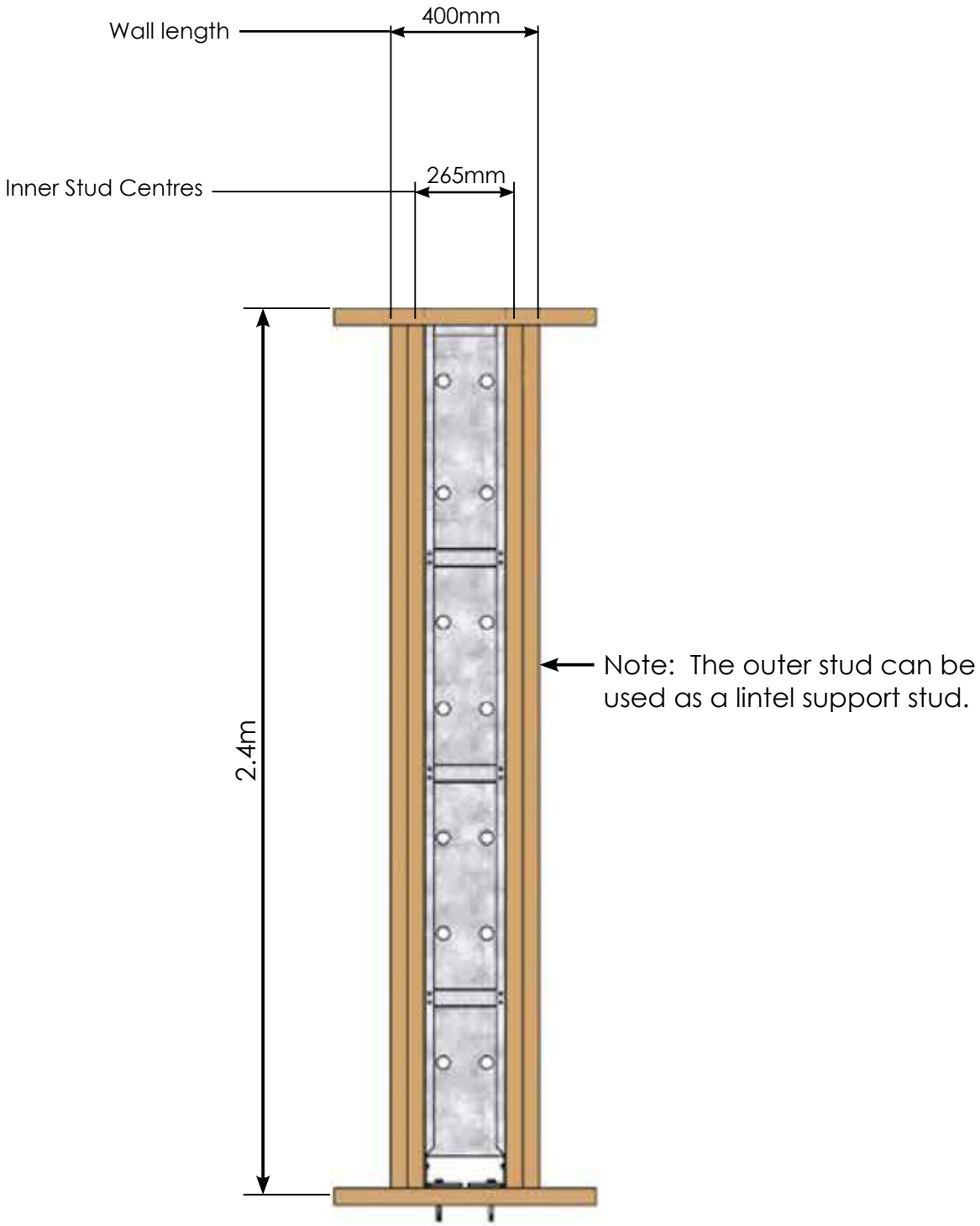


Document Set ID: 683756
Version: 1, Version Date: 04/11/2023

Approved Building
Consent Documents
BC0777/21
Ashburton District Council

Detailed in the drawing below is the GBF220 as it must be constructed to provide the described wind and earthquake performance values.

Performance - Wind 37BU - Earthquake 44BU



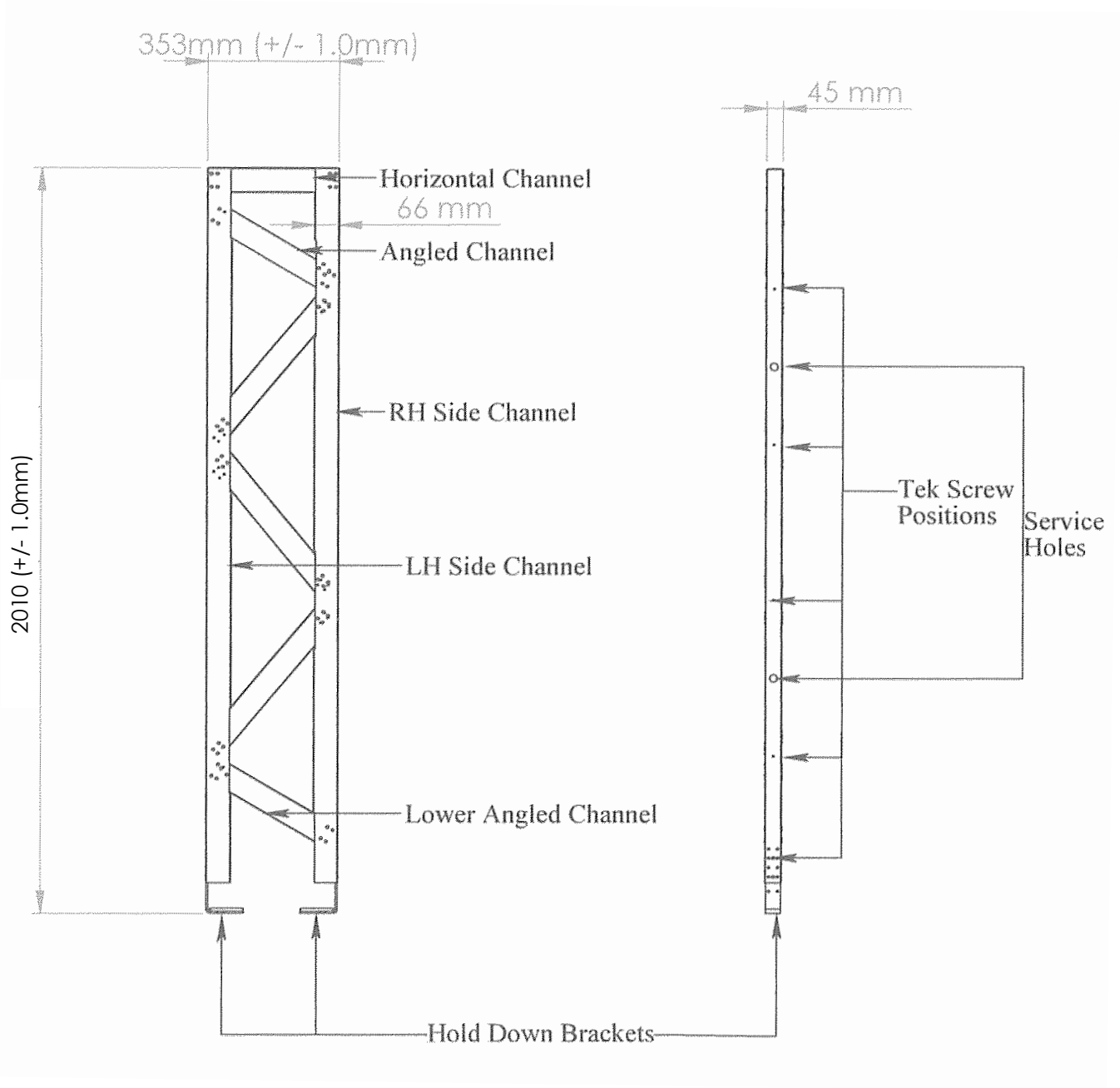
GBF220 (Wall Height 2.4m)

Document Set ID: 683756
Version: 1, Version Date: 04/11/2023

8.0 Gamma Bracing Frame GBF400S

Approved Building Consent Documents
BC0777/21
Ashburton District Council

Detailed in the drawing below is the GBF400S as it is supplied.



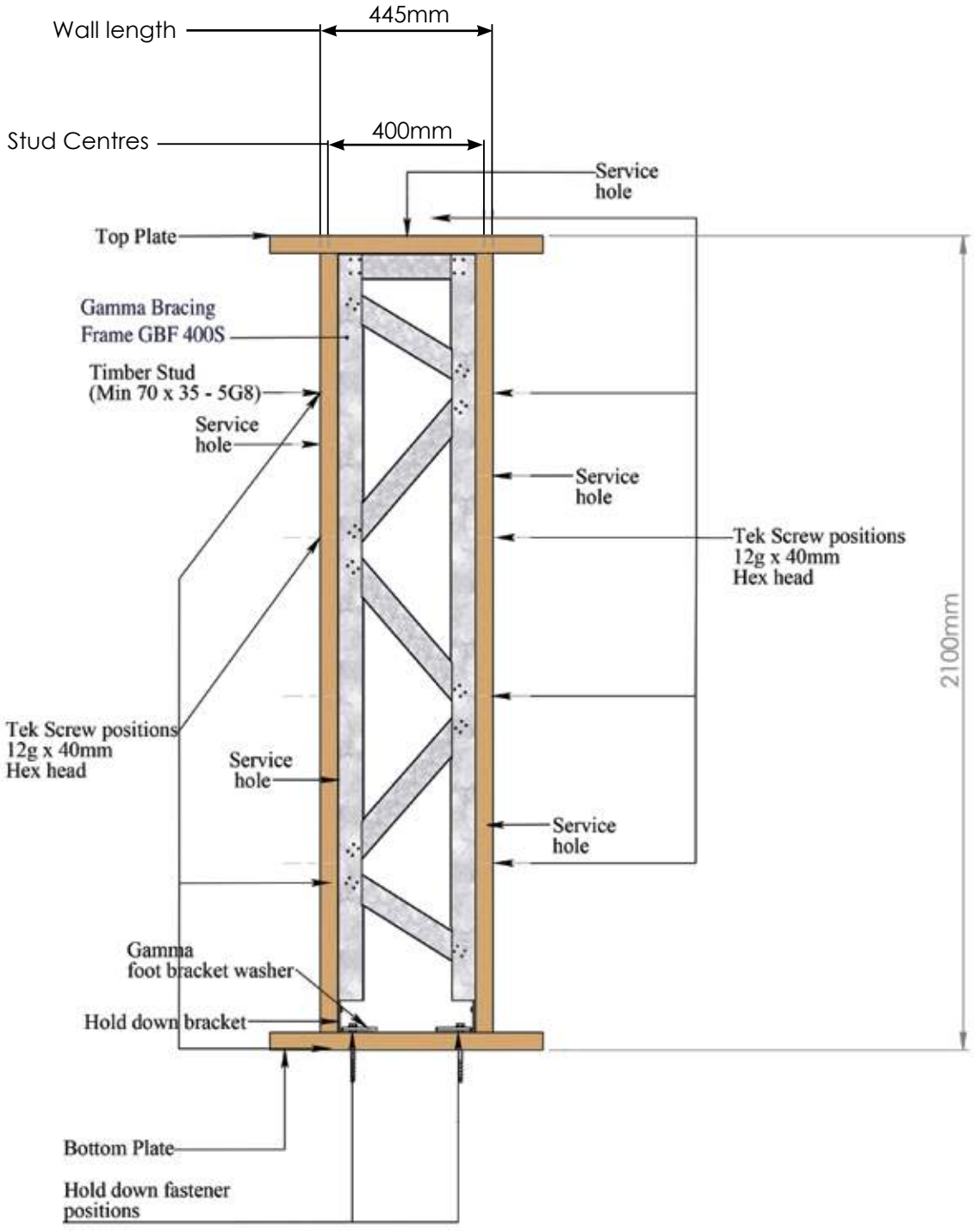
PROOF

Document Set ID: 683756
Version: 1, Version Date: 04/11/2023

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Consent Documents
BC0777/21
Ashburton District Council

Detailed in the drawing below is the GBF400S as it must be constructed to provide the described wind and earthquake performance values.

Performance - Wind 51BU - Earthquake 63BU

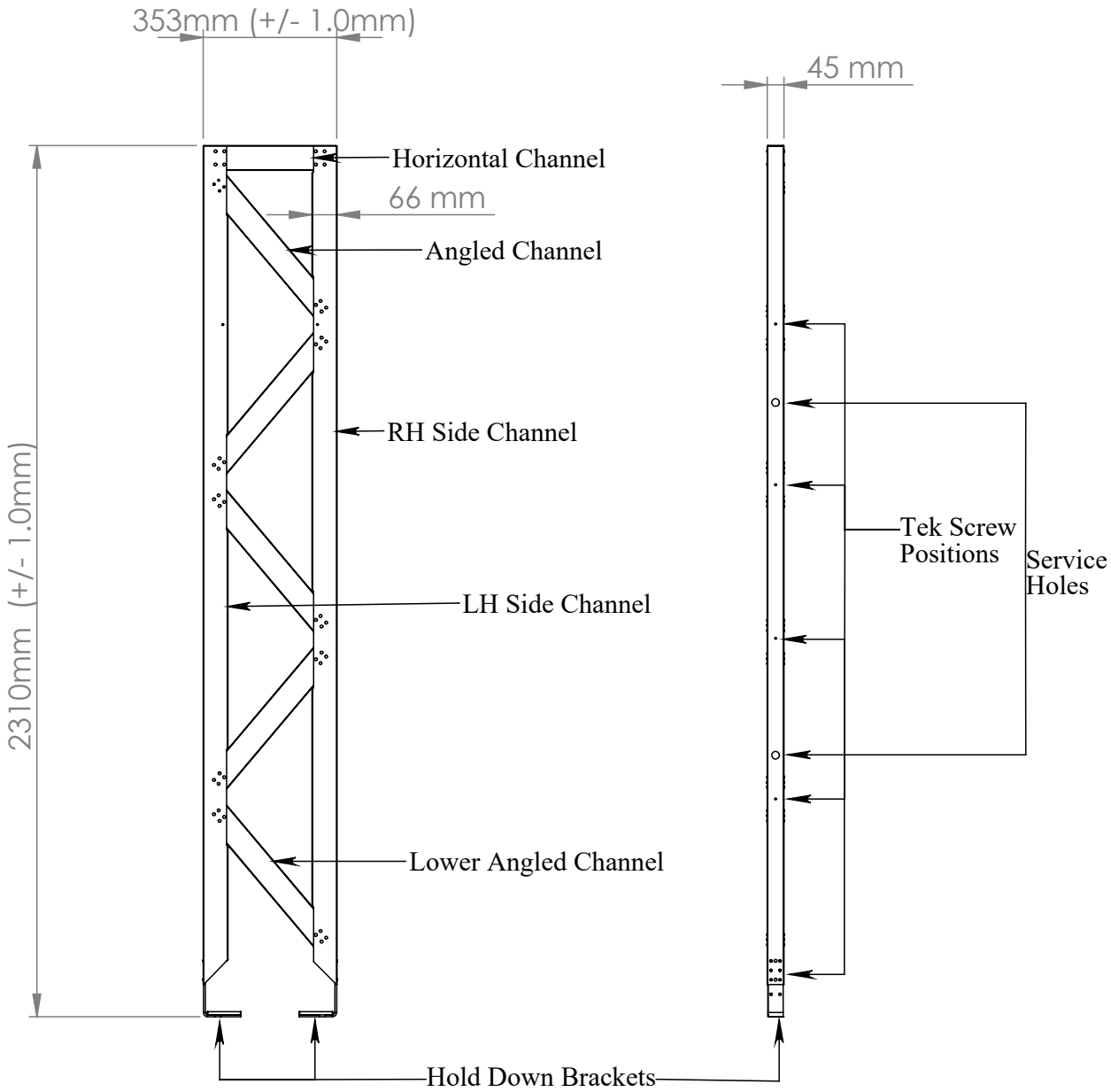


GBF400S (Wall Height 2.1m)

Document Set ID: 683756
Version: 1, Version Date: 04/11/2023

Approved Building Consent Documents
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Ashburton District Council
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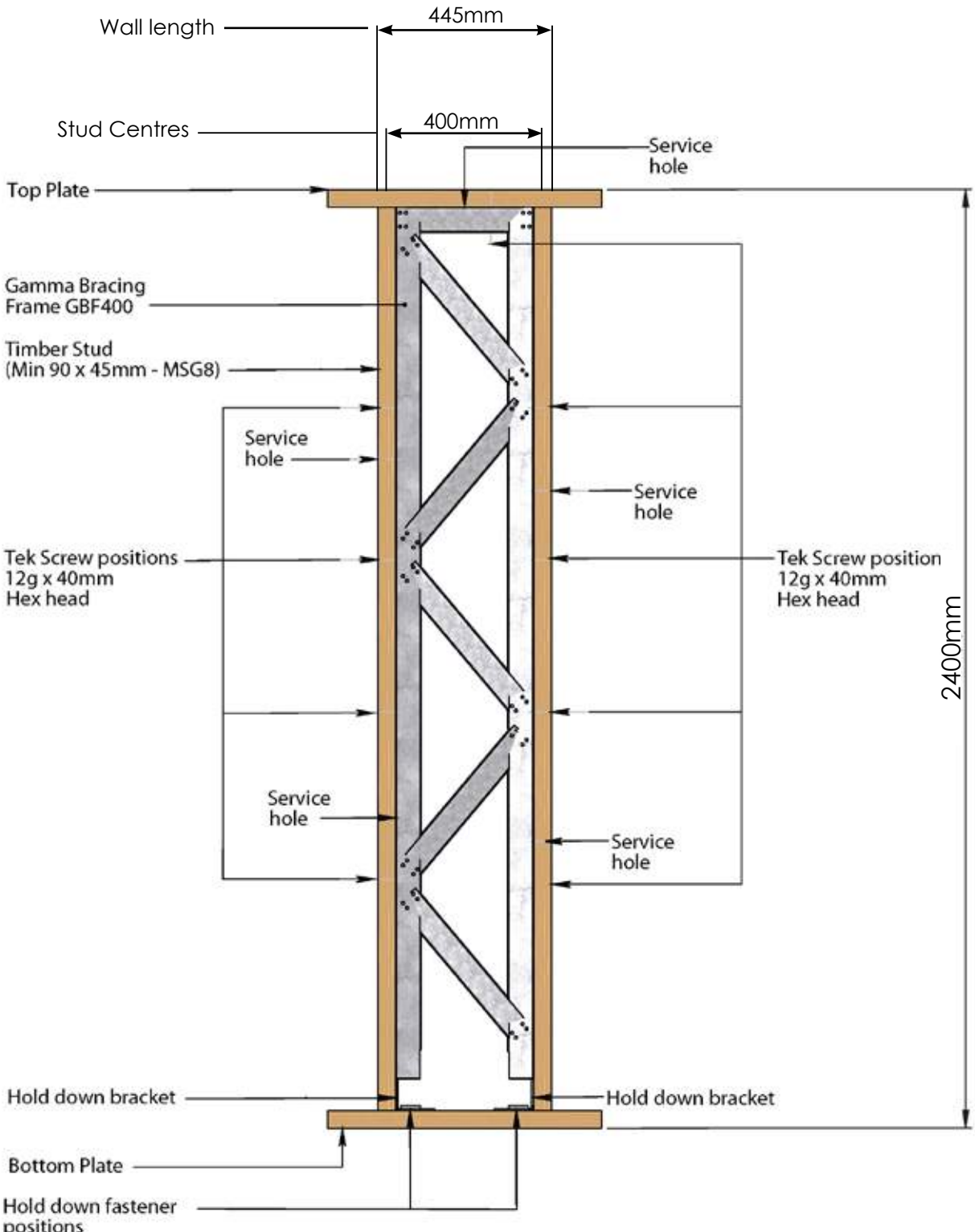
Detailed in the drawing below is the GBF400 as it is supplied.



Approved Building Consent Documents
BC0777/21
Ashburton District Council

Detailed in the drawing below is the GBF400 as it must be constructed to provide the described wind and earthquake performance values.

Performance - Wind 45BU - Earthquake 55BU



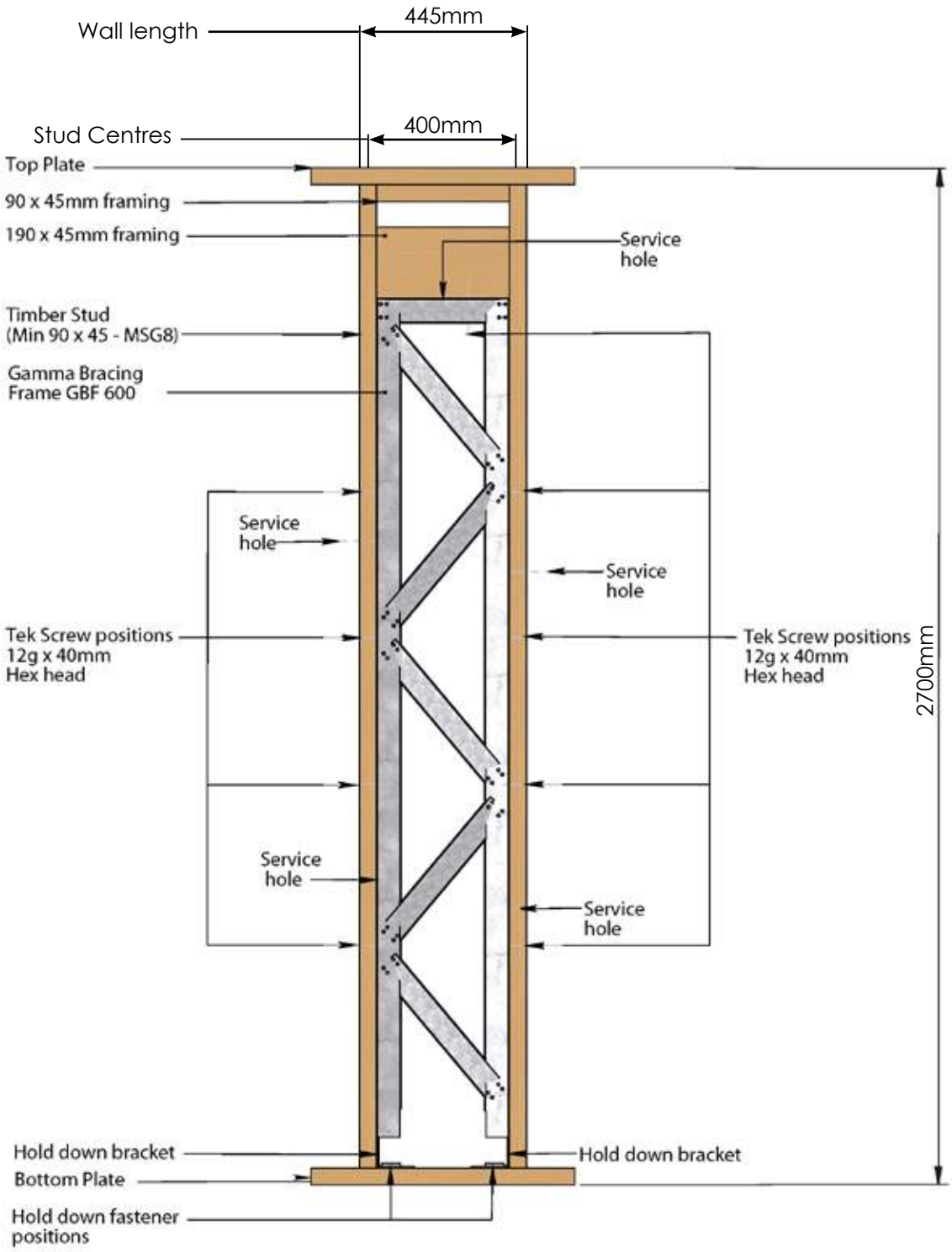
GBF400 (Wall Height 2.4m)

Document Set ID: 683756
Version: 1, Version Date: 04/11/2023

Approved Building Consent Documents
BC0777/21
Ashburton District Council

Detailed in the drawing below is the GBF400 as it must be constructed to provide the described wind and earthquake performance values.

Performance - Wind 40BU - Earthquake 40BU



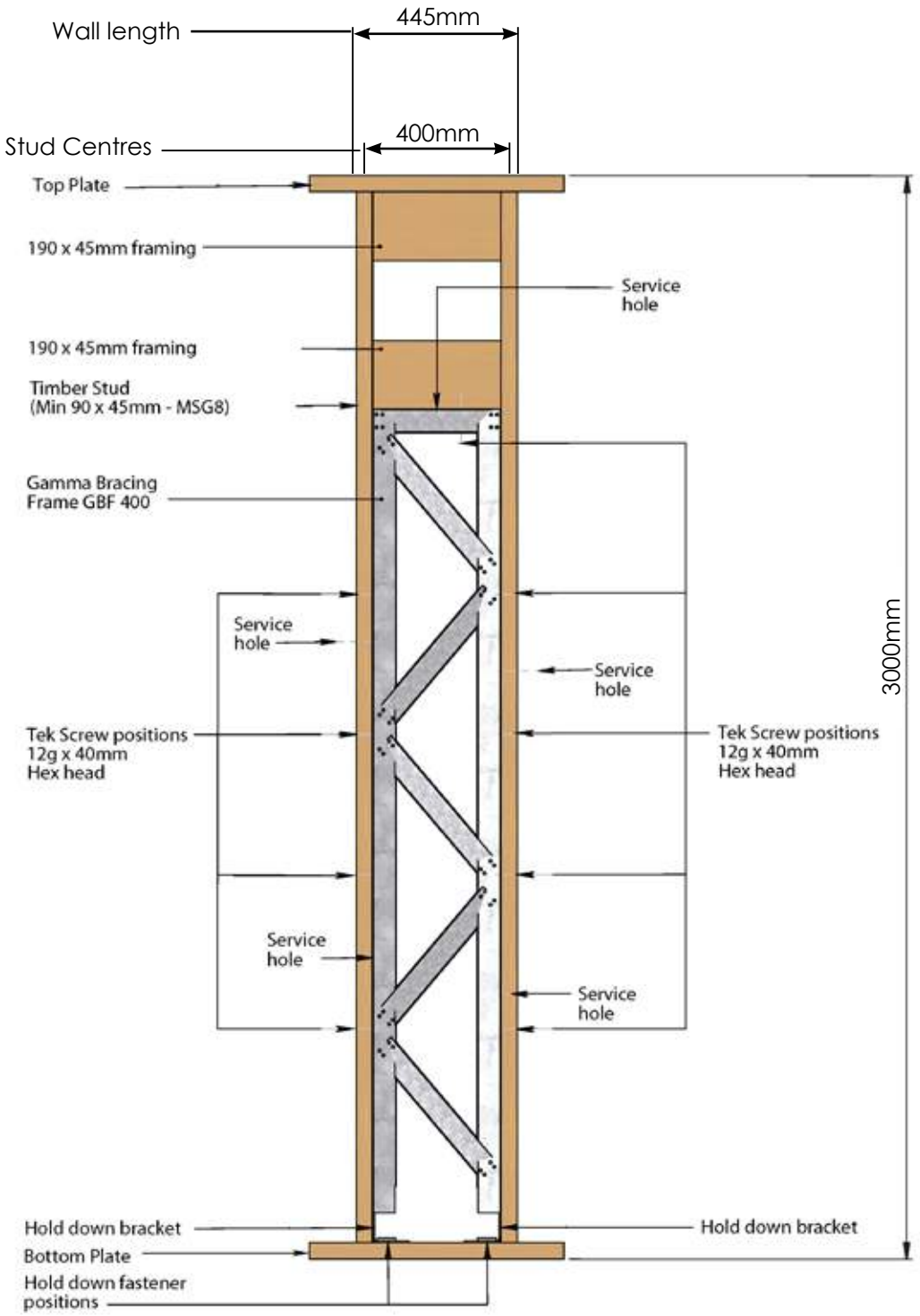
GBF400 (Wall Height 2.7m)

Document Set ID: 683756
Version: 1, Version Date: 04/11/2023

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Consent Documents
BC0777/21
Ashburton District Council

Detailed in the drawing below is the GBF400 as it must be constructed to provide the described wind and earthquake performance values.

Performance - Wind 35BU - Earthquake 40BU



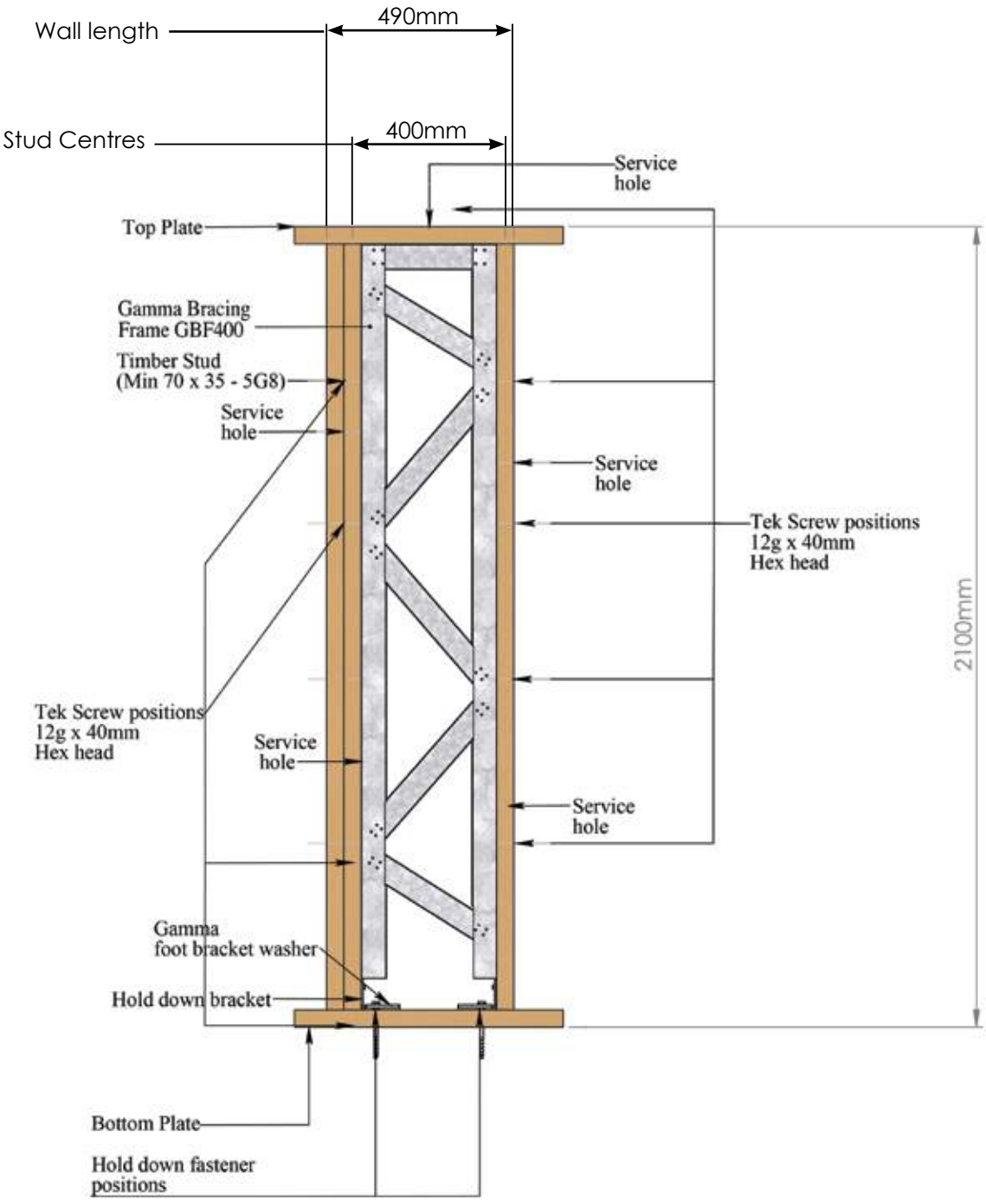
GBF400 (Wall Height 3.0m)

Document Set ID: 683756
Version: 1, Version Date: 04/11/2023

Approved Building Consent Documents
BC0777/21
Ashburton District Council

Detailed in the drawing below is the GBF450S as it must be constructed to provide the described wind and earthquake performance values.

Performance - Wind 65BU - Earthquake 74BU



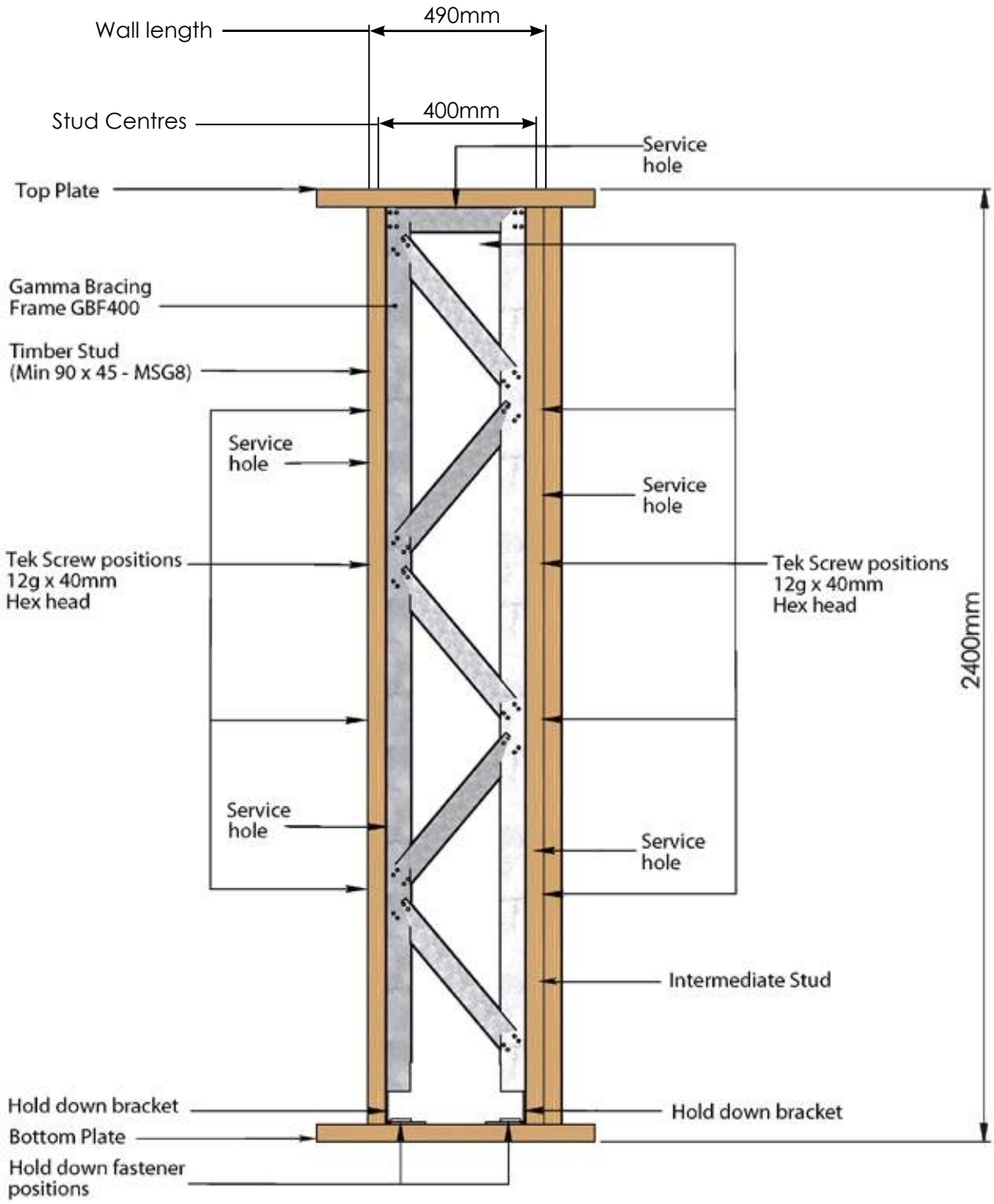
GBF450S (Wall Height 2.1m)

Document Set ID: 683756
Version: 1, Version Date: 04/11/2023

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Consent Documents
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Ashburton District Council

Detailed in the drawing below is the GBF450 as it must be constructed to provide the described wind and earthquake performance values.

Performance - Wind 57BU - Earthquake 65BU



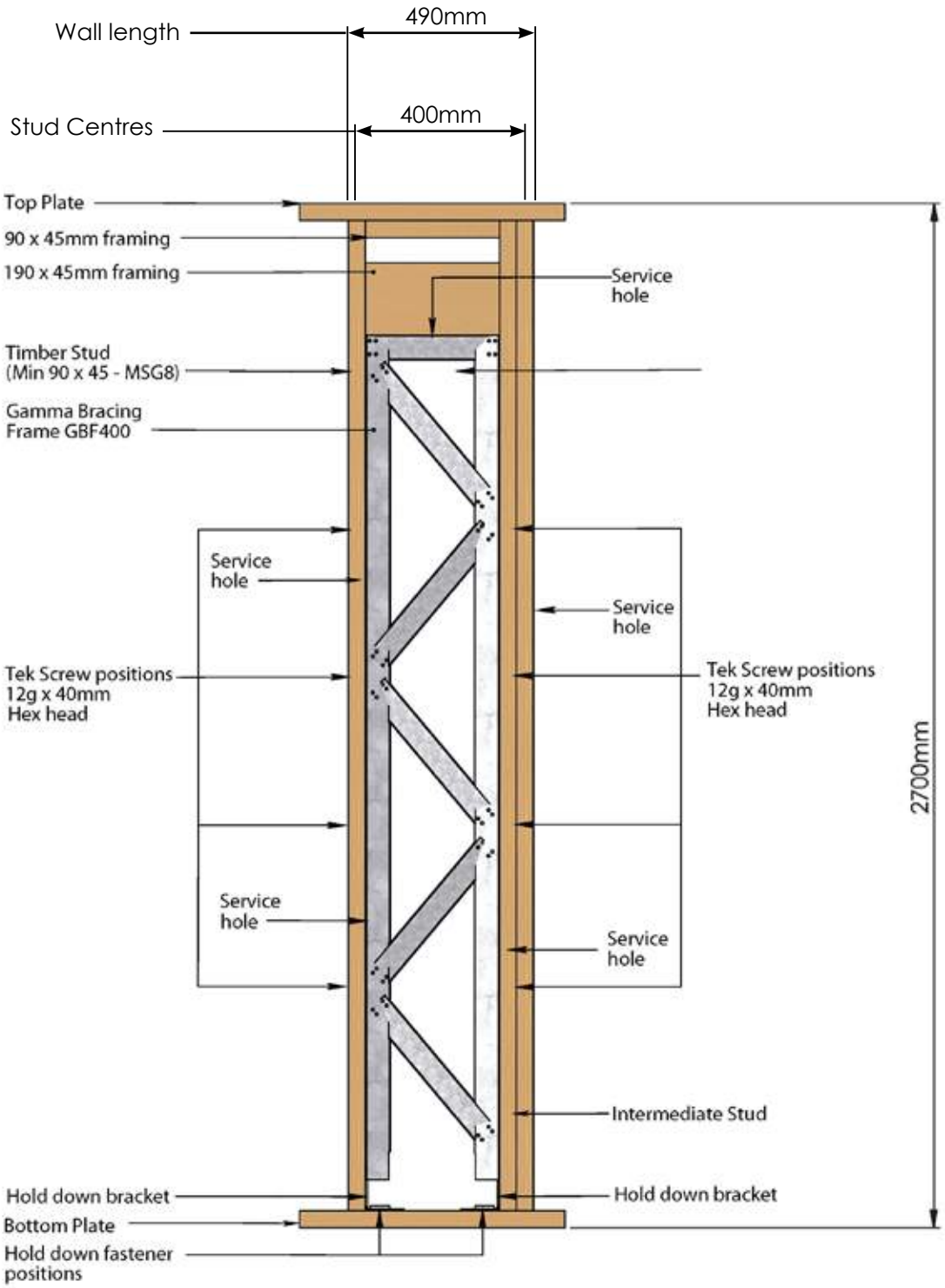
GBF450 (Wall Height 2.4m)

Document Set ID: 683756
Version: 1, Version Date: 04/11/2023

Approved Building Consent Documents
BC0777/21
Ashburton District Council

Detailed in the drawing below is the GBF450 as it must be constructed to provide the described wind and earthquake performance values.

Performance - Wind 50BU - Earthquake 57BU



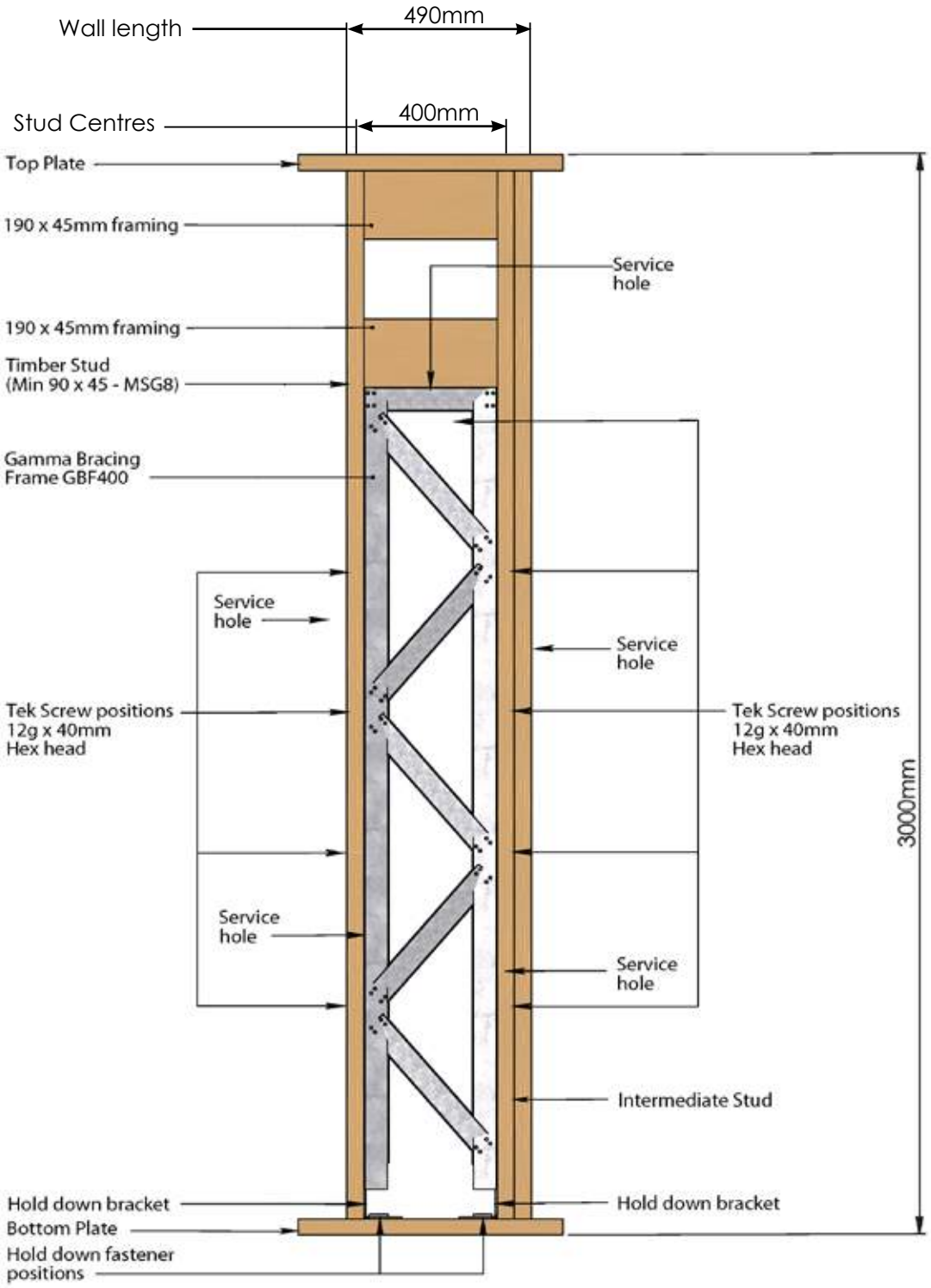
GBF450 (Wall Height 2.7m)

Document Set ID: 683756
Version: 1, Version Date: 04/11/2023

Approved Building
Consent Documents
BC0777/21
Ashburton District Council

Detailed in the drawing below is the GBF450 as it must be constructed to provide the described wind and earthquake performance values.

Performance - Wind 45BU - Earthquake 52BU



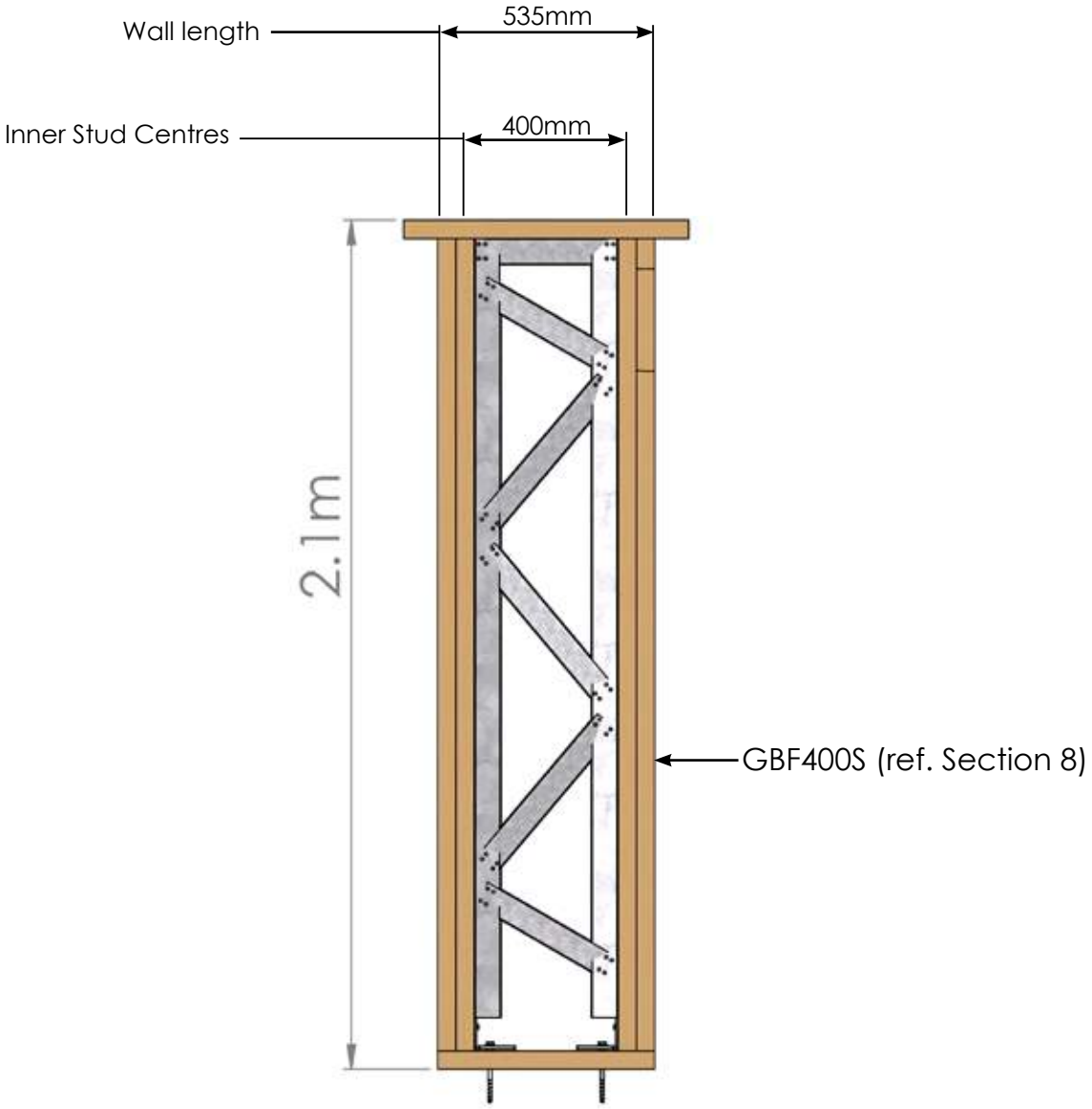
GBF450 (Wall Height 3.0m)

Document Set ID: 683756
Version: 1, Version Date: 04/11/2023

Approved Building Consent Documents
BC0777/21
Ashburton District Council

Detailed in the drawing below is the GBF535S as it must be constructed to provide the described wind and earthquake performance values.

Performance - Wind 79BU - Earthquake 86BU



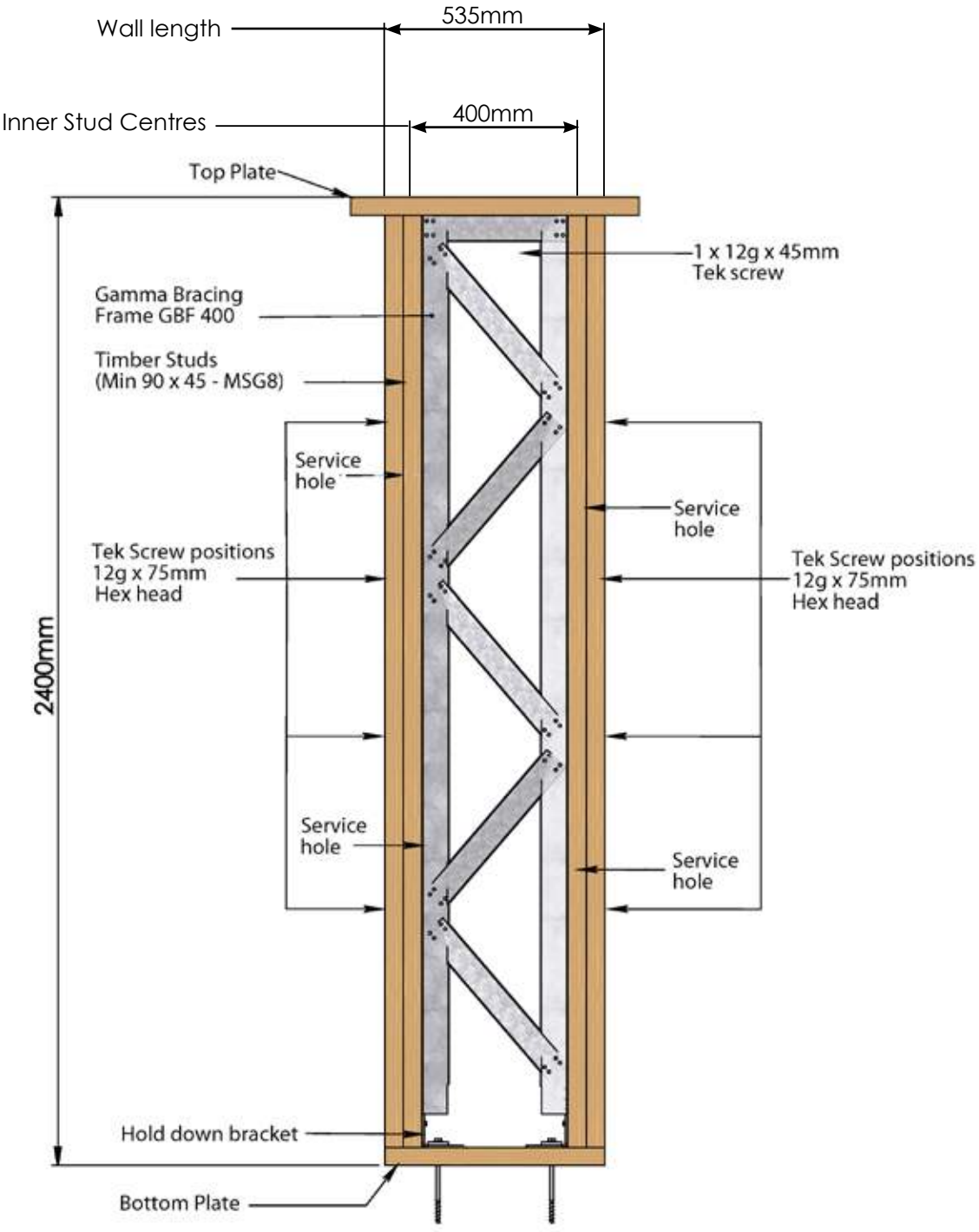
GBF535S (Wall Height 2.1m)

Document Set ID: 683756
Version: 1, Version Date: 04/11/2023

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Consent Documents
BC0777/21
Ashburton District Council

Detailed in the drawing below is the GBF535 as it must be constructed to provide the described wind and earthquake performance values.

Performance - Wind 69BU - Earthquake 75BU



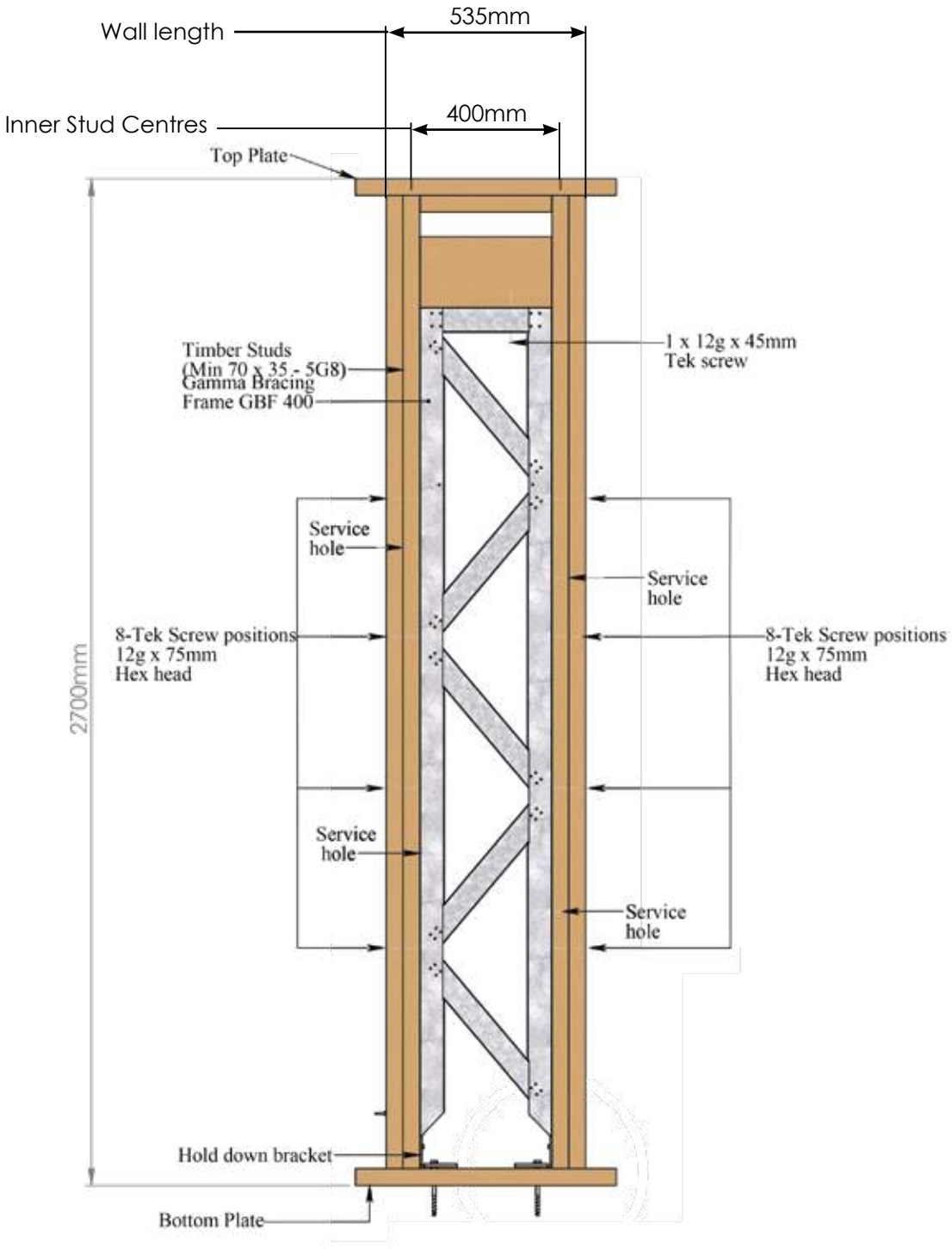
GBF535 (Wall Height 2.4m)

Document Set ID: 683756
Version: 1, Version Date: 04/11/2023

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BC0777/21
Ashburton District Council

Detailed in the drawing below is the GBF535 as it must be constructed to provide the described wind and earthquake performance values.

Performance - Wind 61BU - Earthquake 67BU



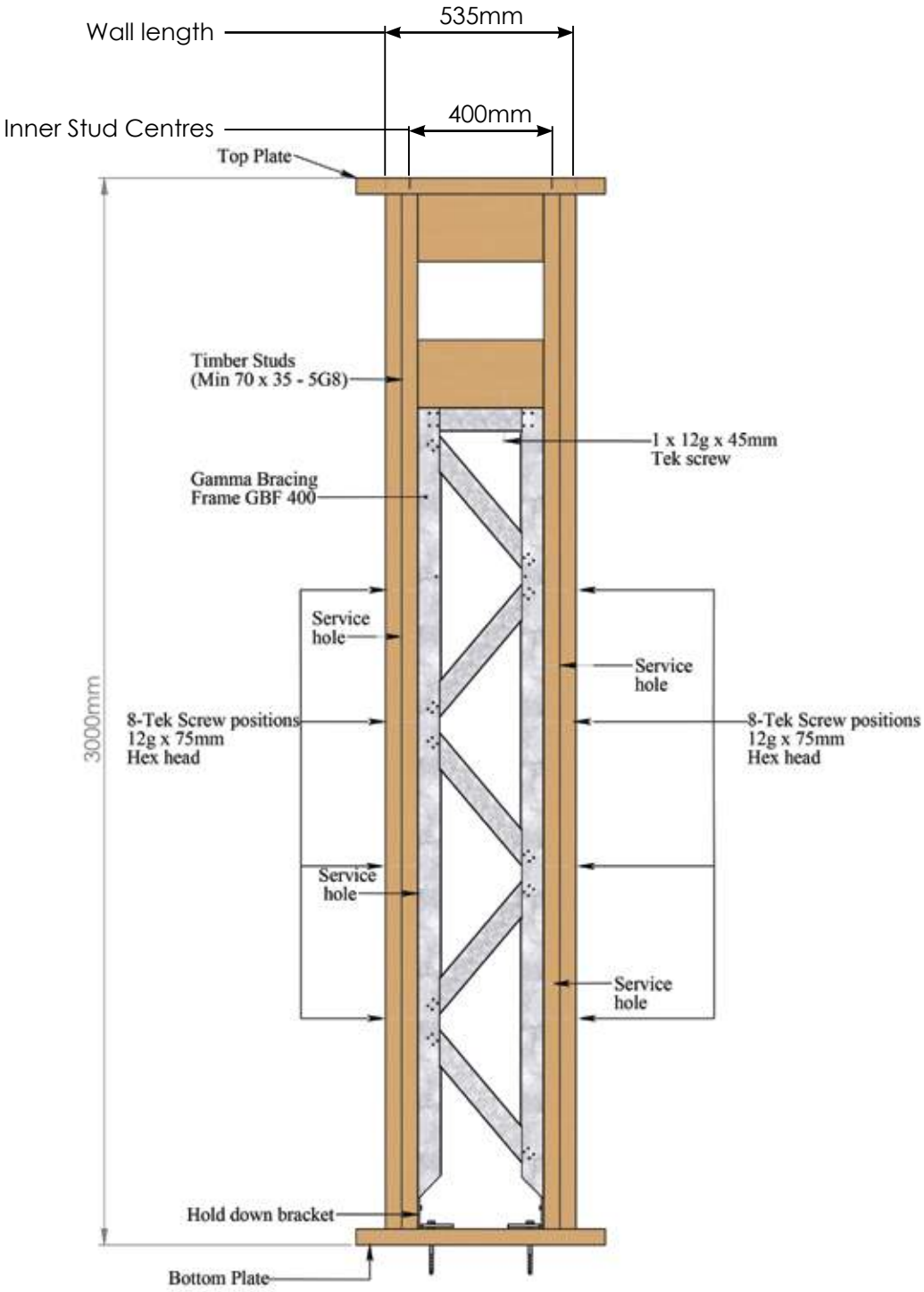
GBF535 (Wall Height 2.7m)

Document Set ID: 683756
Version: 1, Version Date: 04/11/2023

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Consent Documents
BC0777/21
Ashburton District Council

Detailed in the drawing below is the GBF535 as it must be constructed to provide the described wind and earthquake performance values.

Performance - Wind 55BU - Earthquake 60BU



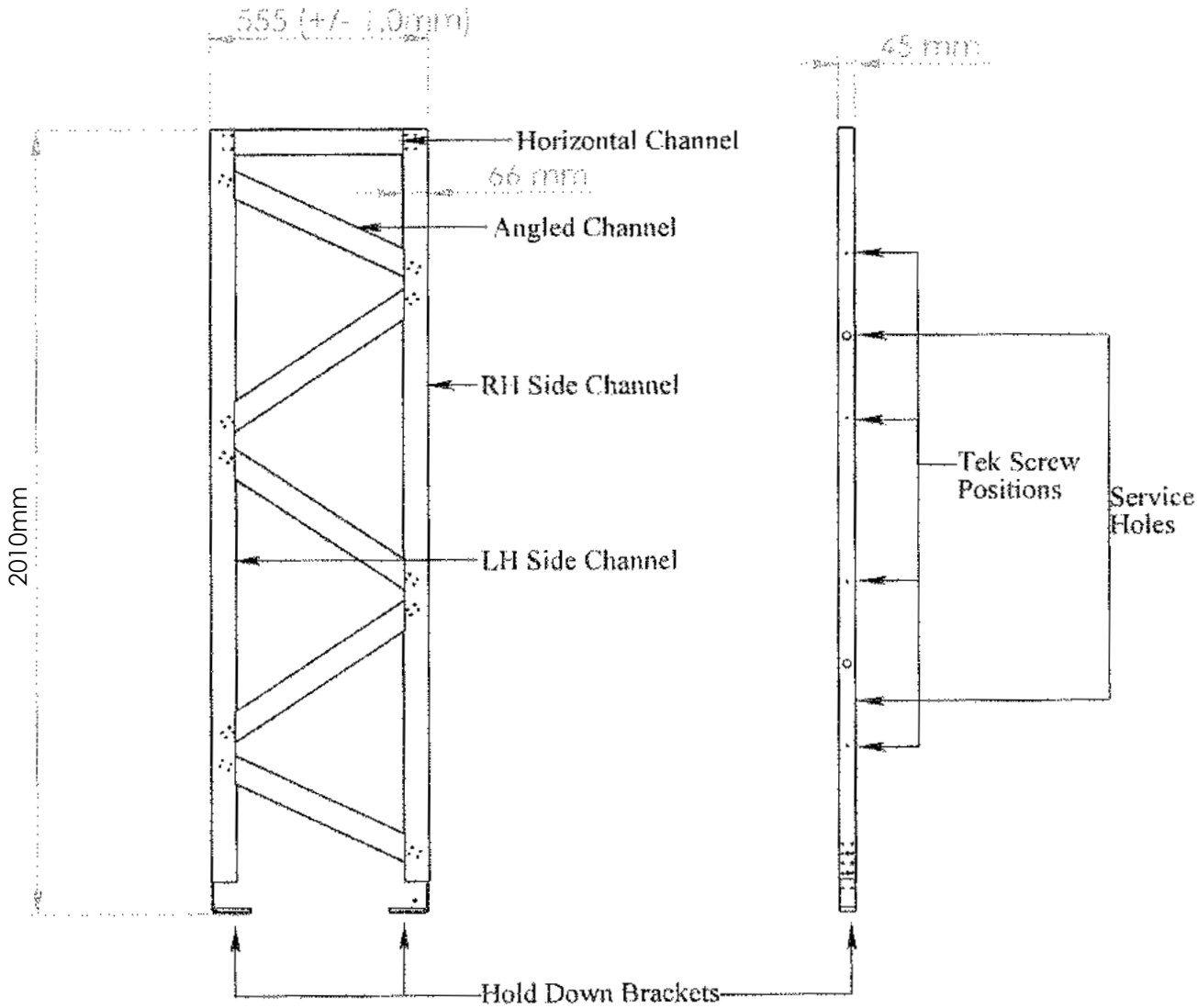
GBF535 (Wall Height 3.0m)

Document Set ID: 683756
Version: 1, Version Date: 04/11/2023

12.0 Gamma Bracing Frame GBF600S

Approved Building Consent Documents
BC0777/21
Ashburton District Council

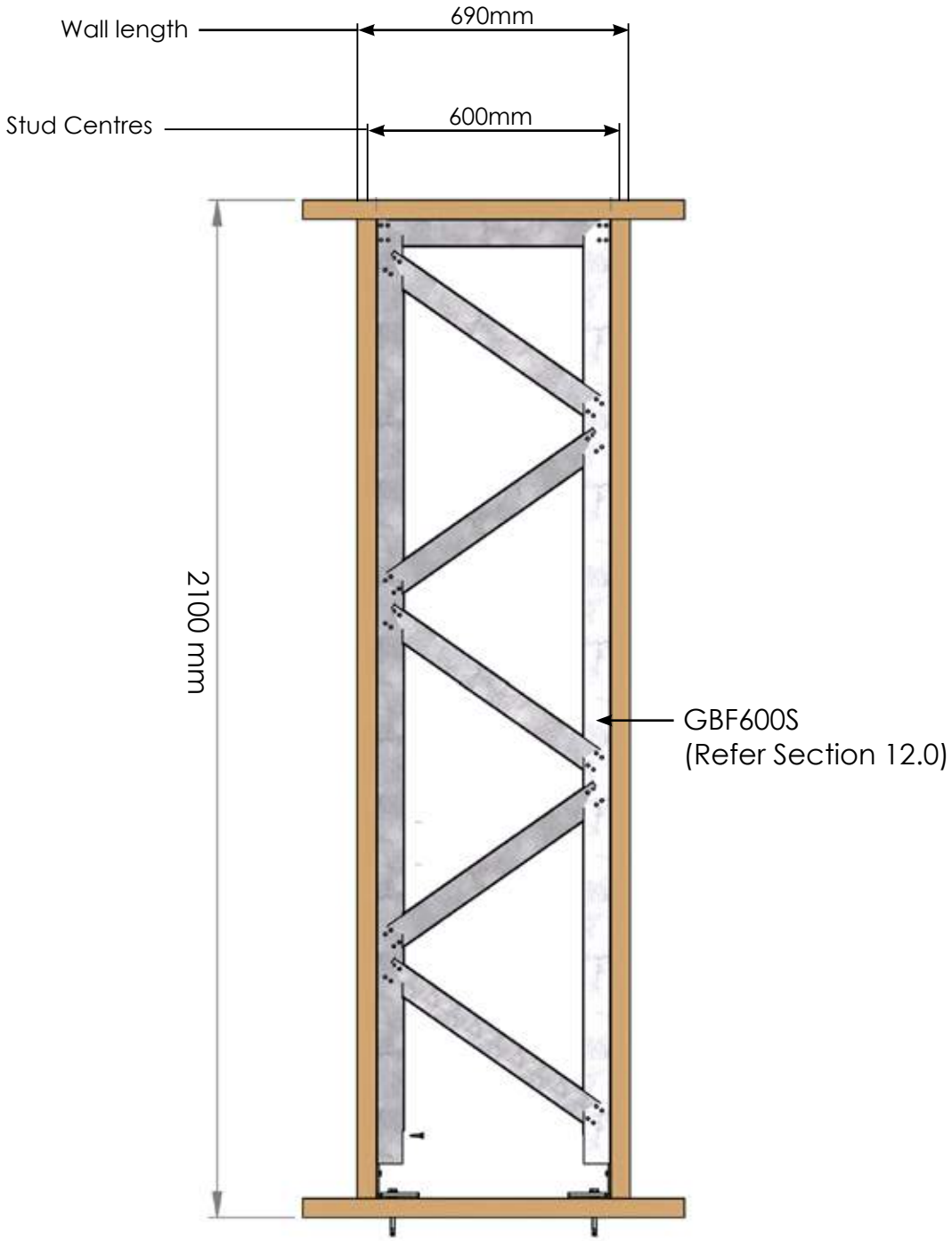
Detailed in the drawing below is the GBF600S as it is supplied.



Approved Building
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BC0777/21
Ashburton District Council

Detailed in the drawing below is the GBF600S as it must be constructed to provide the described wind and earthquake performance values.

Performance - Wind 90BU - Earthquake 90BU

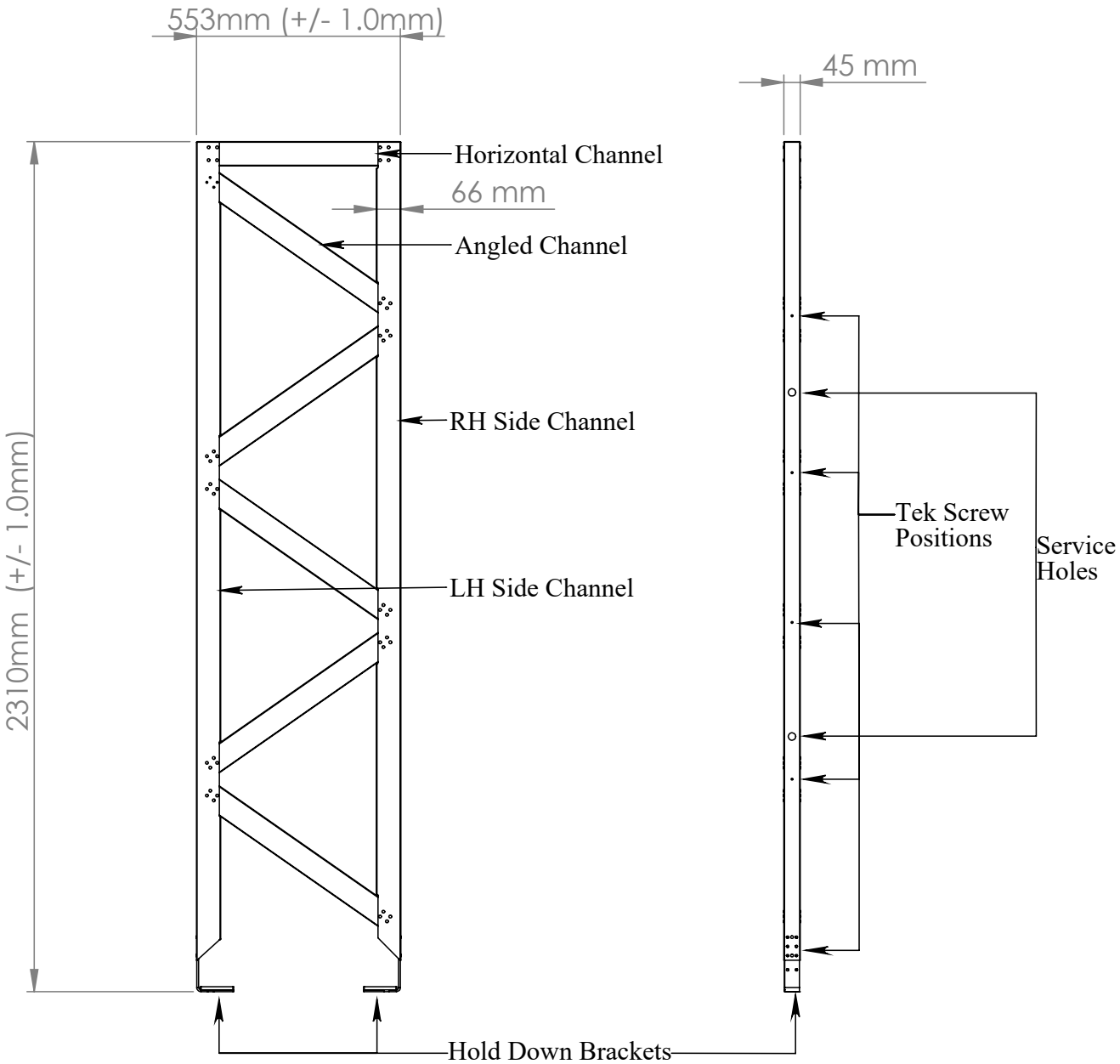


GBF600S (Wall Height 2.1m)

Document Set ID: 683756
Version: 1, Version Date: 04/11/2023

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BC0777/21
Ashburton District Council
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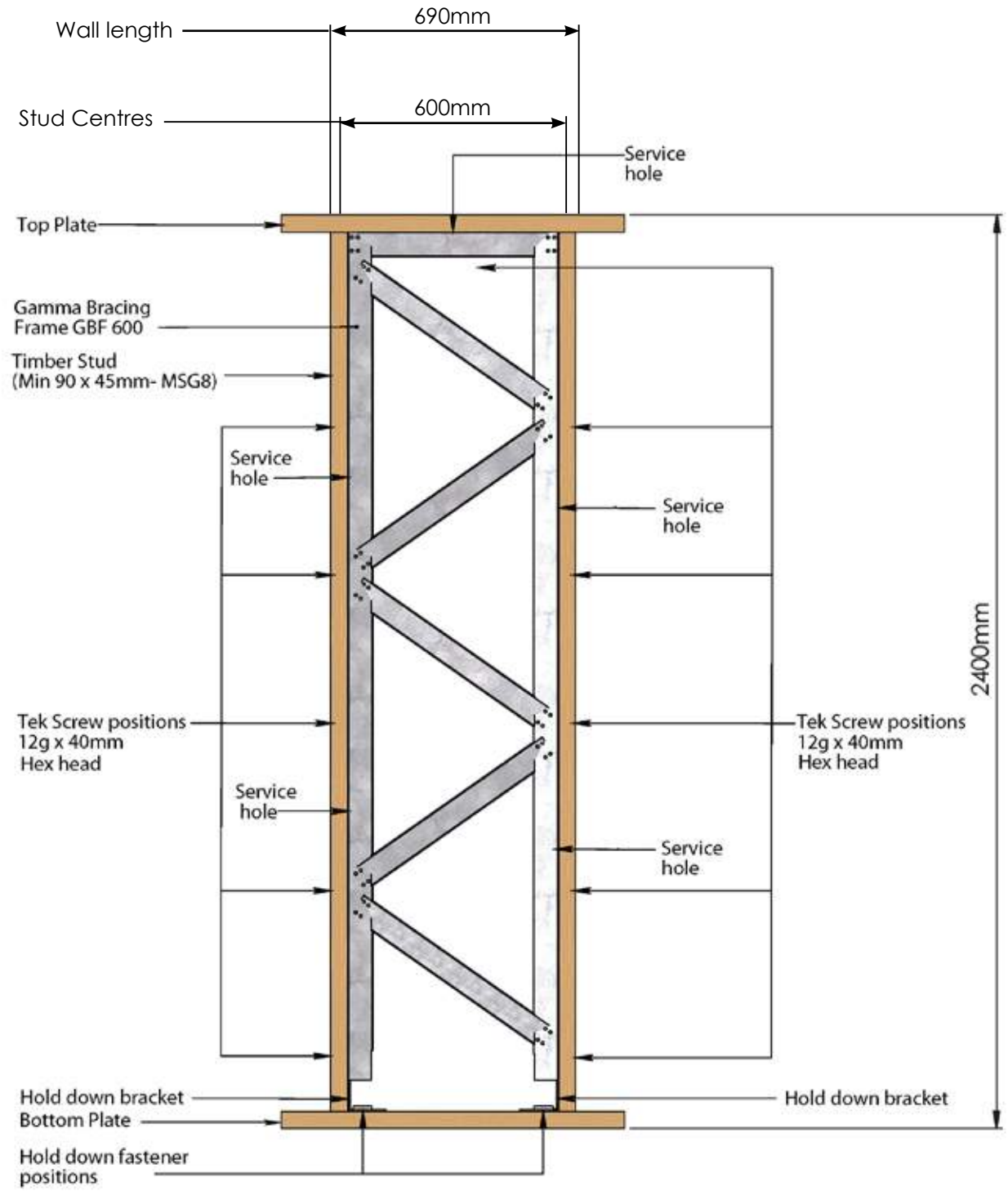
Detailed in the drawing below is the GBF600 as it is supplied.



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Detailed in the drawing below is the GBF600 as it must be constructed to provide the described wind and earthquake performance values.

Performance - Wind 84BU - Earthquake 90BU



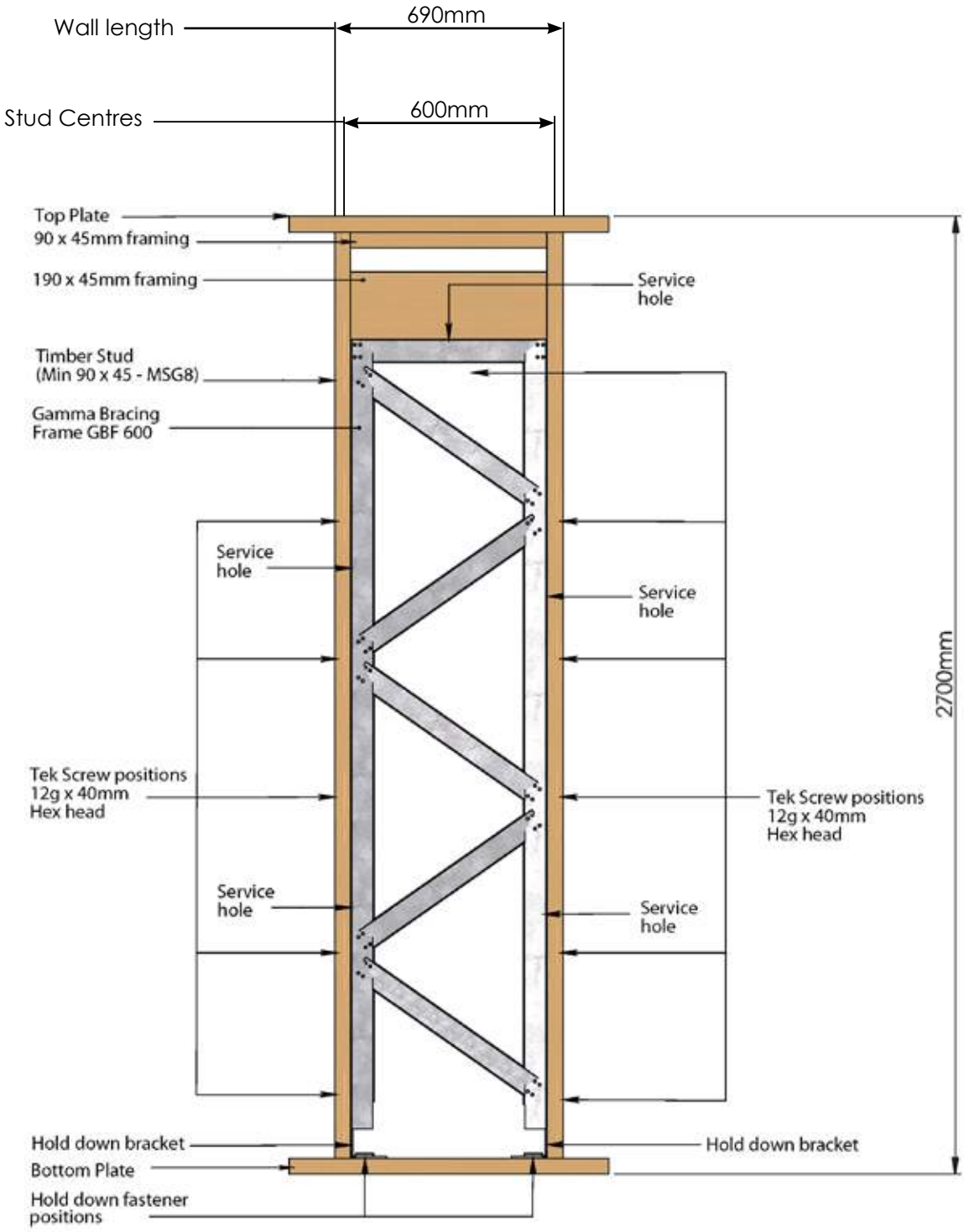
GBF600 (Wall Height 2.4m)

Document Set ID: 683756
Version: 1, Version Date: 04/11/2023

Approved Building Consent Documents
BC0777/21
Ashburton District Council

Detailed in the drawing below is the GBF600 as it must be constructed to provide the described wind and earthquake performance values.

Performance - Wind 70BU - Earthquake 70BU



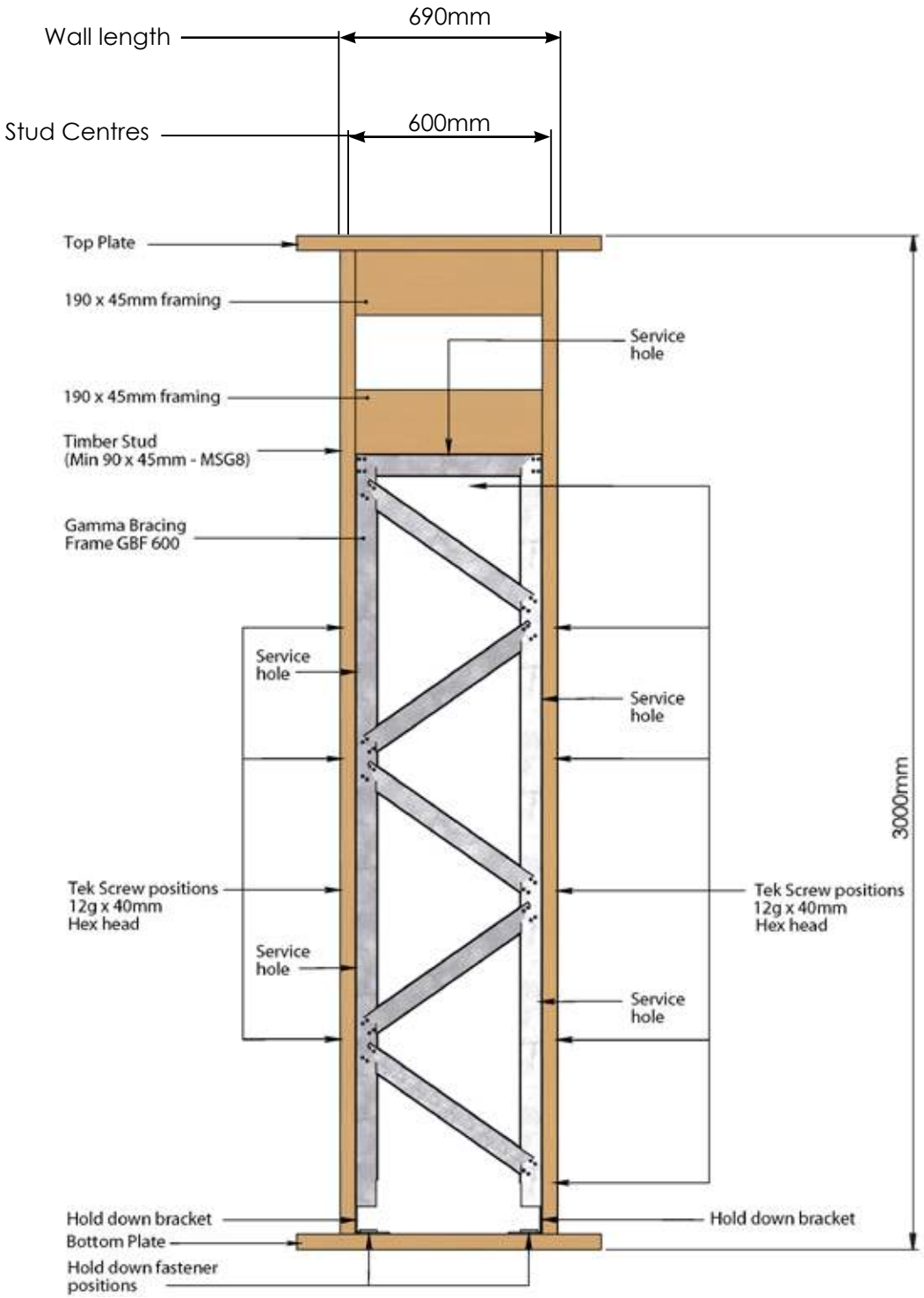
GBF600 (Wall Height 2.7m)

Document Set ID: 683756
Version: 1, Version Date: 04/11/2023

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Detailed in the drawing below is the GBF600 as it must be constructed to provide the described wind and earthquake performance values.

Performance - Wind 55BU - Earthquake 60BU

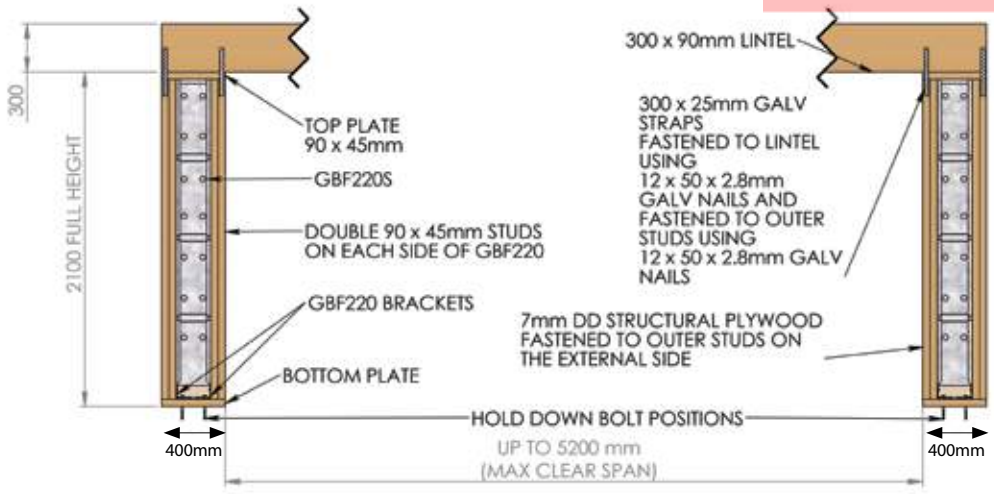


GBF600 (Wall Height 3.0m)

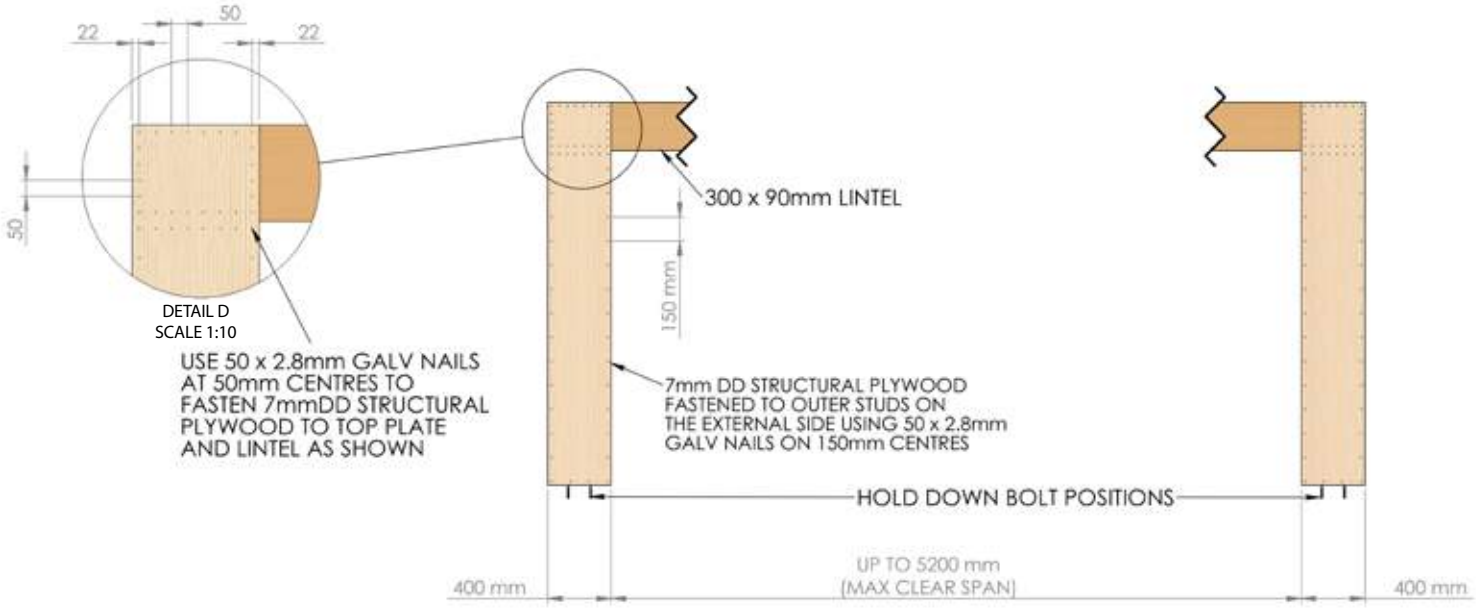
Document Set ID: 683756
Version: 1, Version Date: 04/11/2023

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GAMMA PORTAL (6.0 x 2.4m) INTERNAL SIDE SHOWN
PERFORMANCE: WIND = 124 BU / EARTH = 137 BU



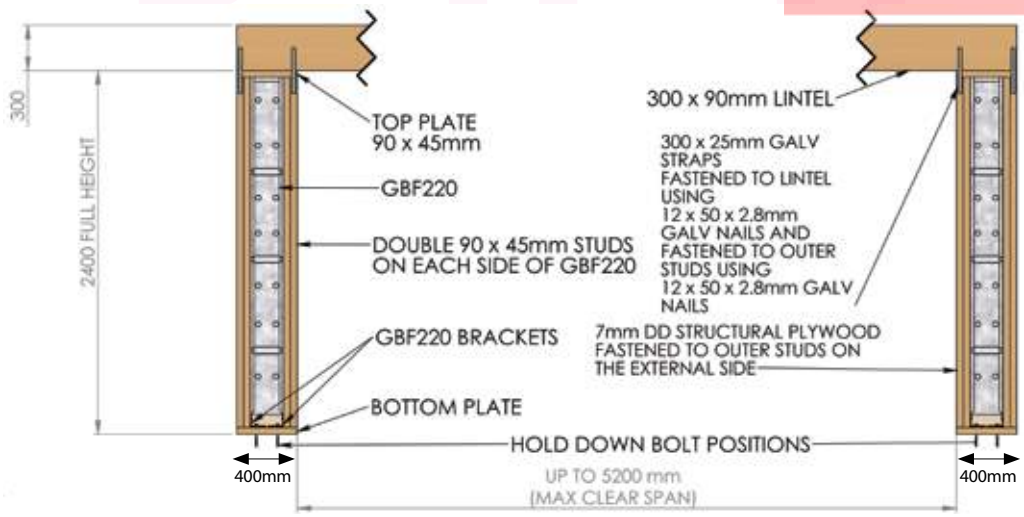
GAMMA PORTAL (6.0 x 2.4m) EXTERNAL SIDE SHOWN
PERFORMANCE: WIND = 124 BU / EARTH = 137 BU



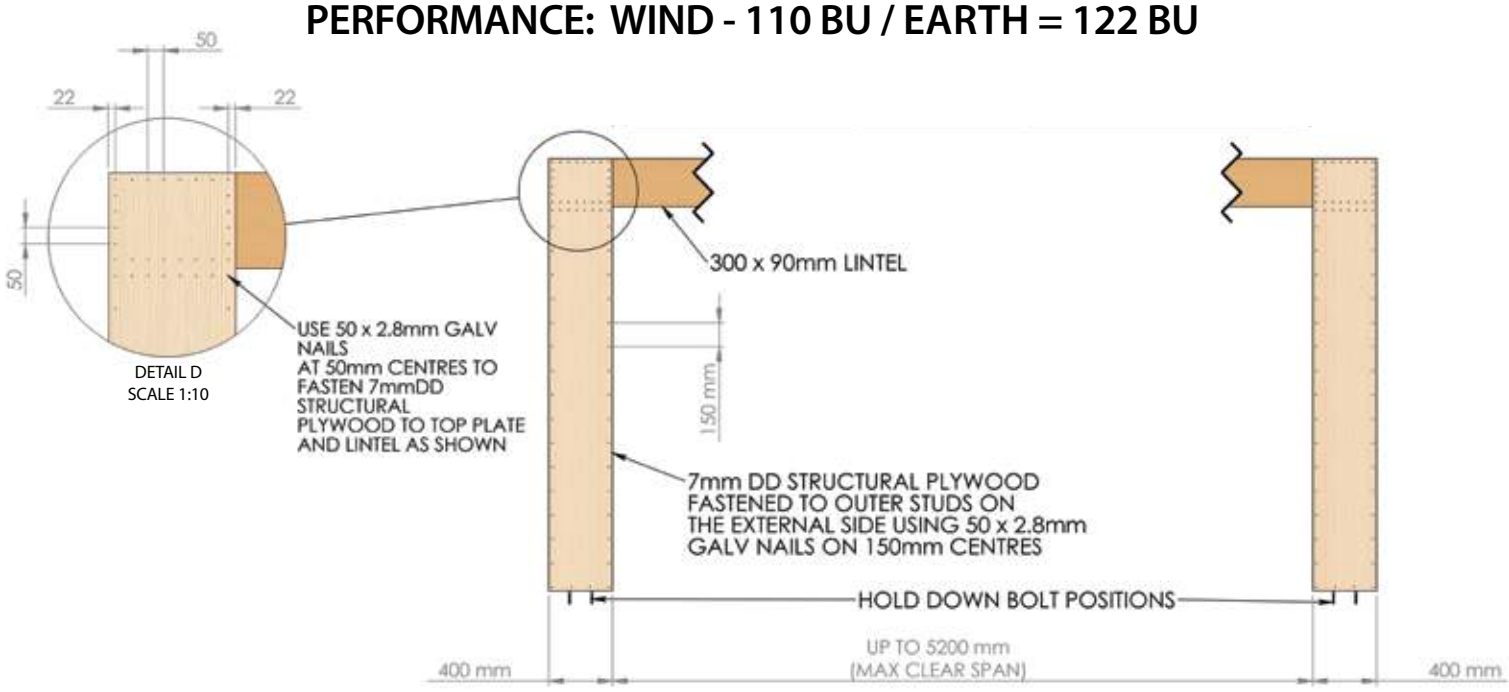
Document Set ID: 683756
Version: 1, Version Date: 04/11/2023

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BC0777/21
Ashburton District Council

GAMMA PORTAL (6.0 x 2.7m) INTERNAL SIDE SHOWN
PERFORMANCE: WIND = 110 BU / EARTH = 122 BU



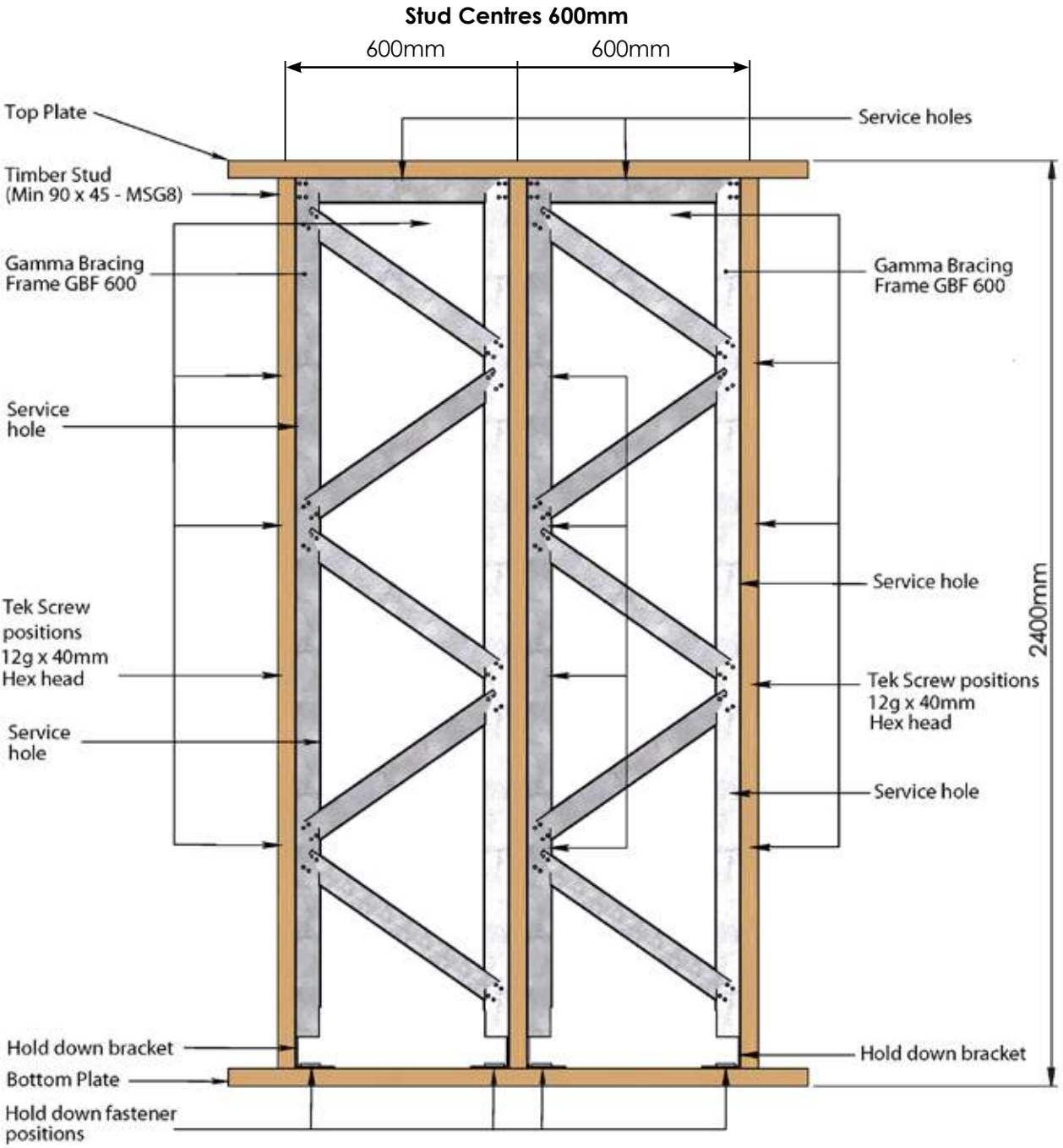
GAMMA PORTAL (6.0 x 2.7m) EXTERNAL SIDE SHOWN
PERFORMANCE: WIND - 110 BU / EARTH = 122 BU



Document Set ID: 683756
Version: 1, Version Date: 04/11/2023

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Ashburton District Council

Combined Performance - Wind 168BU - Earthquake 180BU

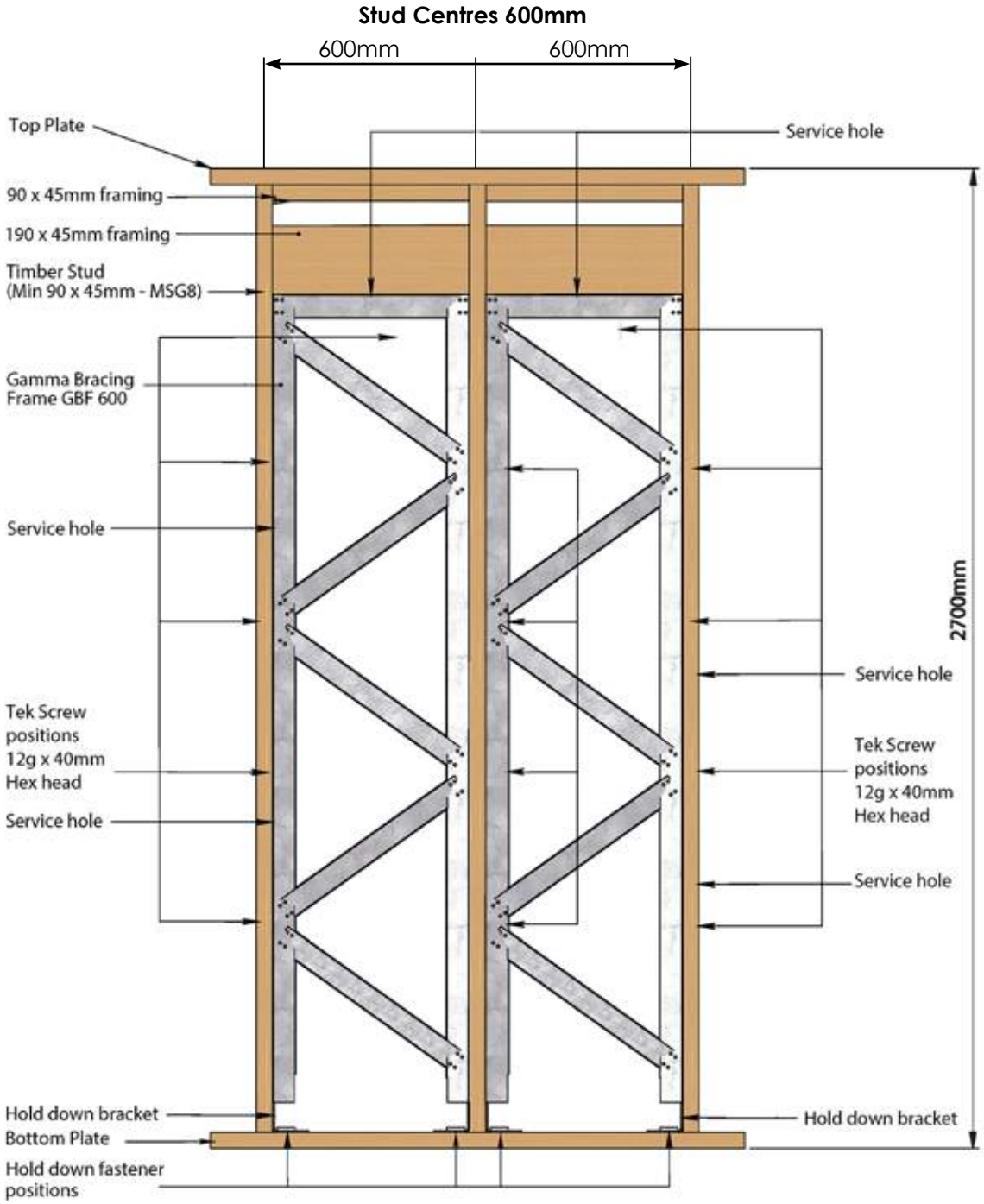


2 x GBF600 (Wall Height 2.4m)

Document Set ID: 683756
Version: 1, Version Date: 04/11/2023

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Combined Performance - Wind 140BU - Earthquake 140BU

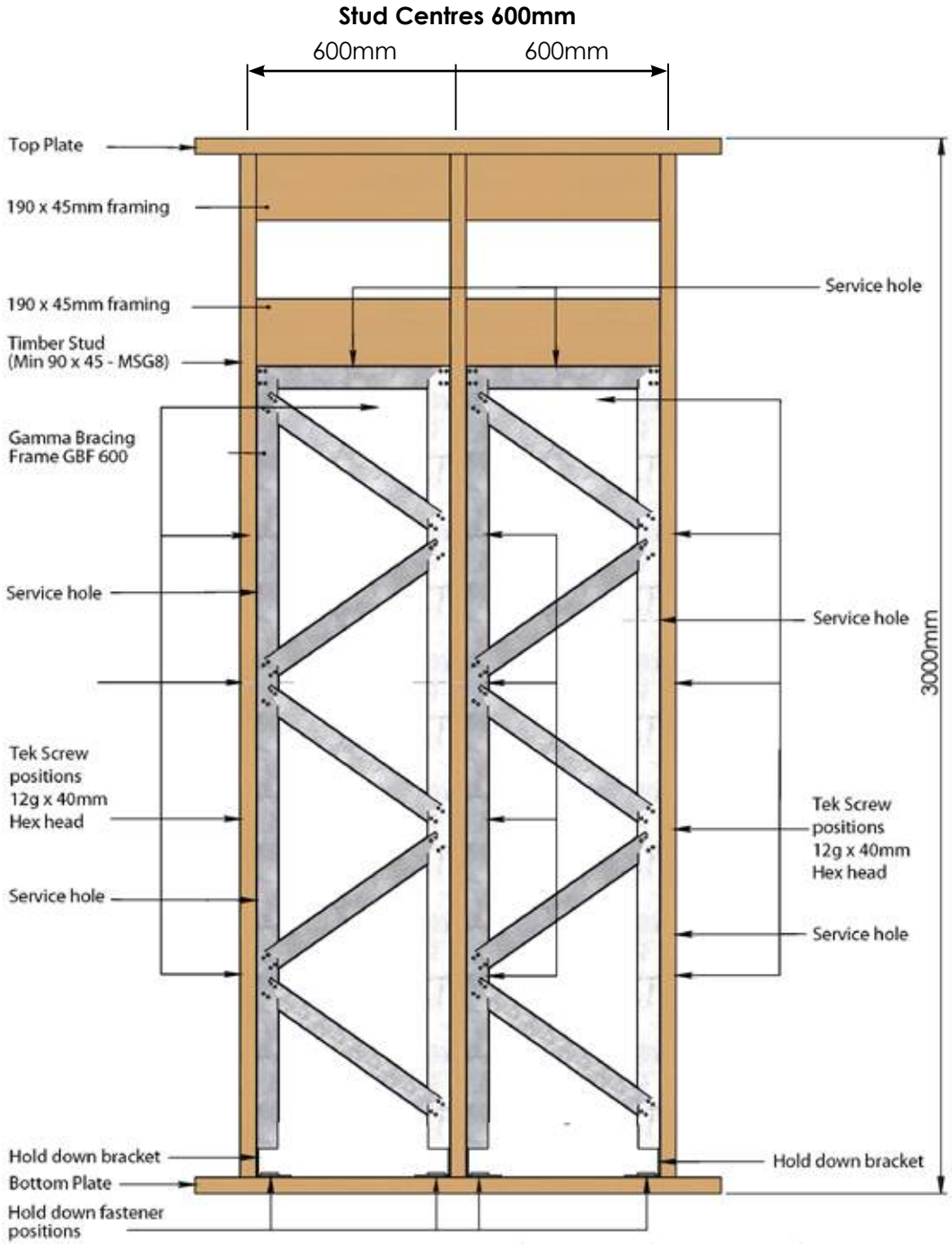


2 x GBF600 (Wall Height 2.7m)

Document Set ID: 683756
Version: 1, Version Date: 04/11/2023

Approved Building Consent Documents
BC0777/21
Auburton District Council

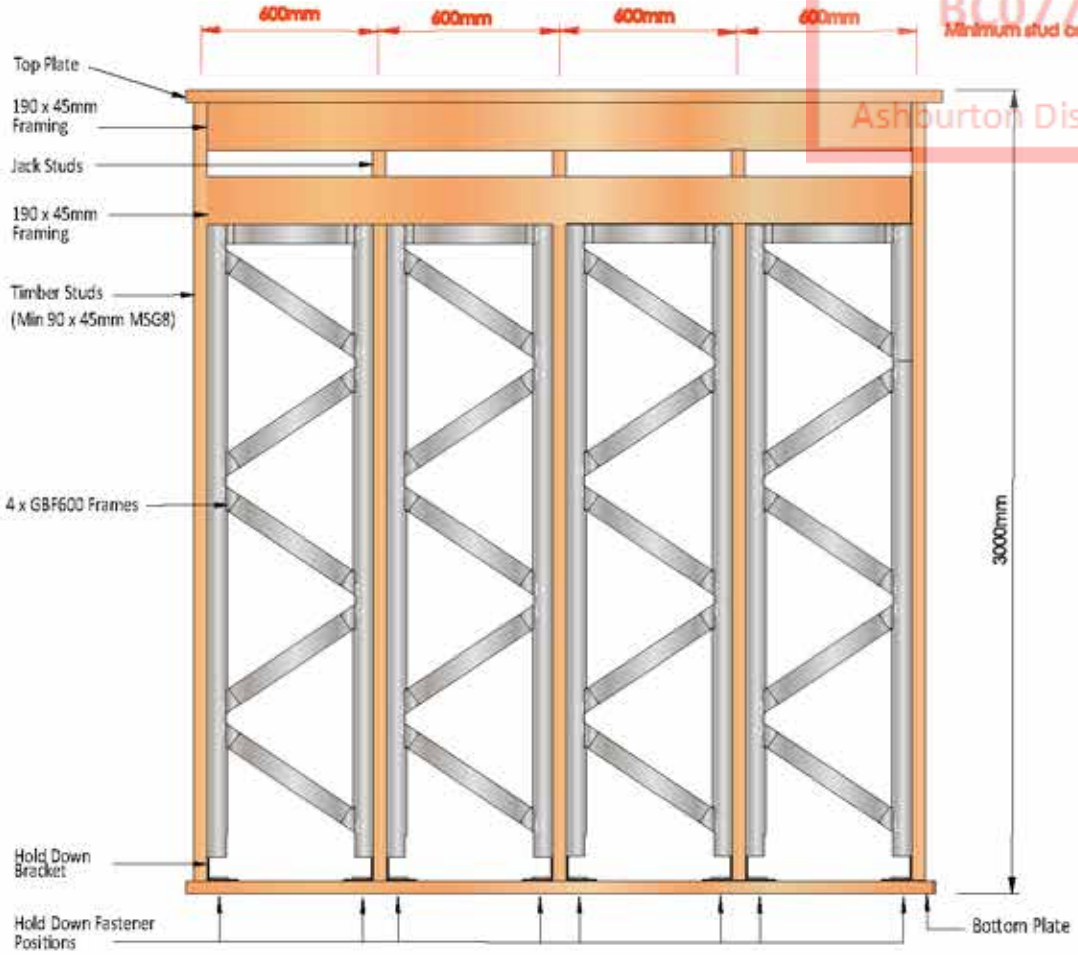
Combined Performance - Wind 110BU - Earthquake 120BU



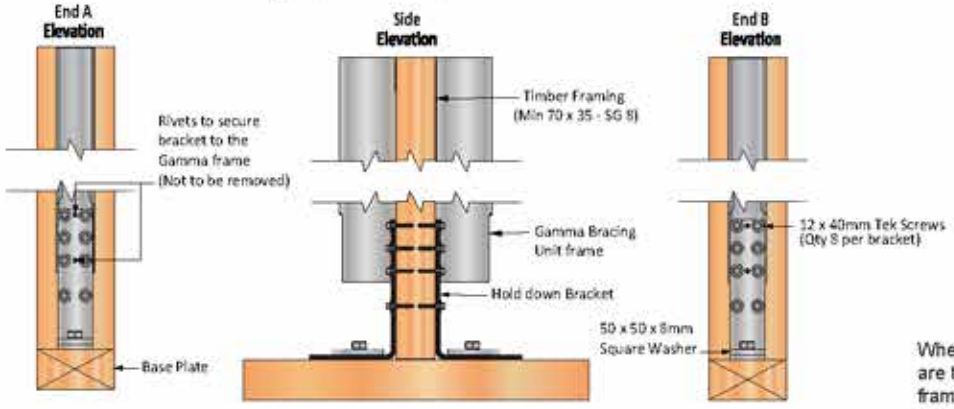
2 x GBF600 (Wall Height 3.0m)

Document Set ID: 683756
Version: 1, Version Date: 04/11/2023

Approved Building Consent Documents
BC0777/21
Minimum stud centres 600mm
Ashburton District Council

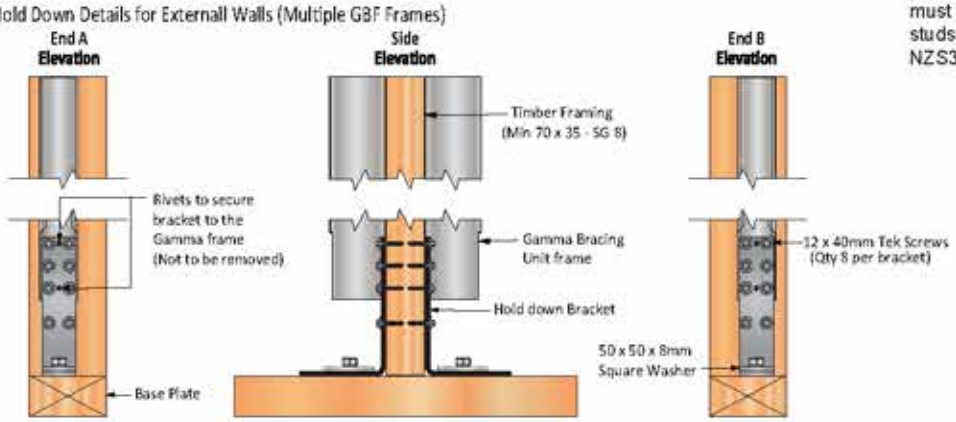


Hold Down Details for Internal Walls (Multiple GBF Fames)



Where multiple Gamma Bracing are to be installed within the wall framing it is permitted to use a continuous lintel. Vertical loading must be maintained by the timber studs as in accordance with NZS3604:2011

Hold Down Details for Externall Walls (Multiple GBF Frames)

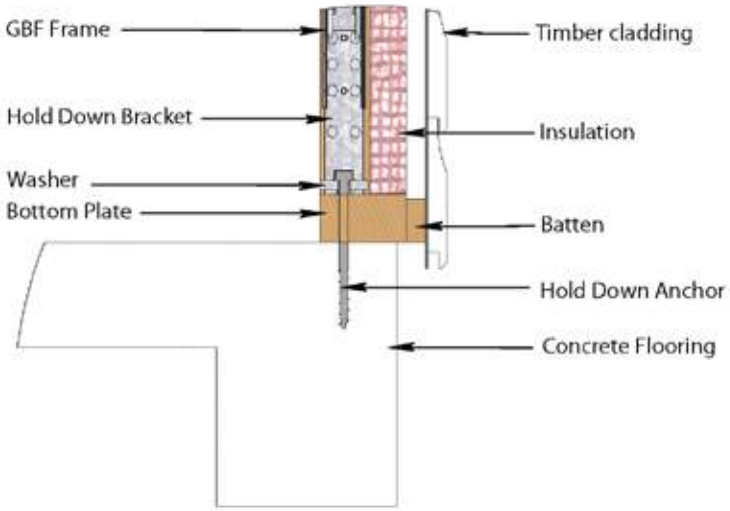


Document Set ID: 683756
Version: 1, Version Date: 04/11/2023

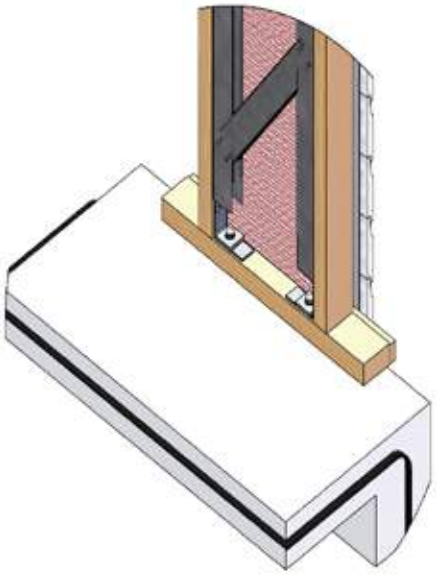
Approved Building Consent Documents
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Ashburton District Council

Hold Down - Exterior wall - Timber clad with battens on concrete floor

End Elevation

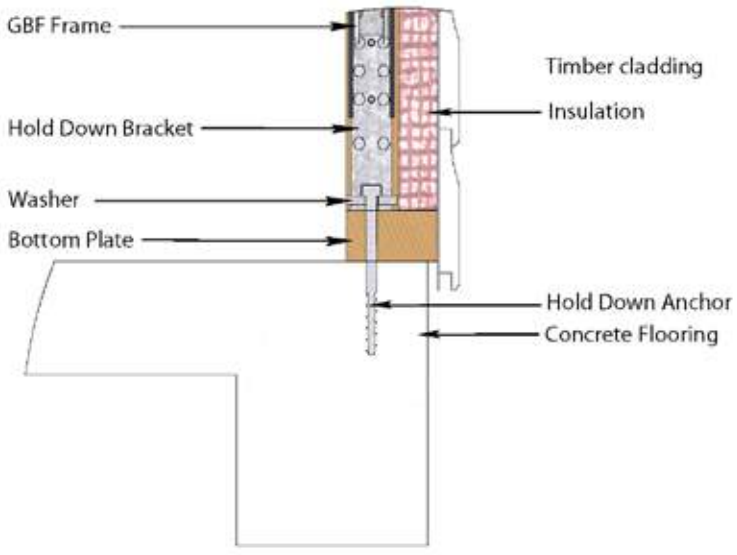


Isometric View

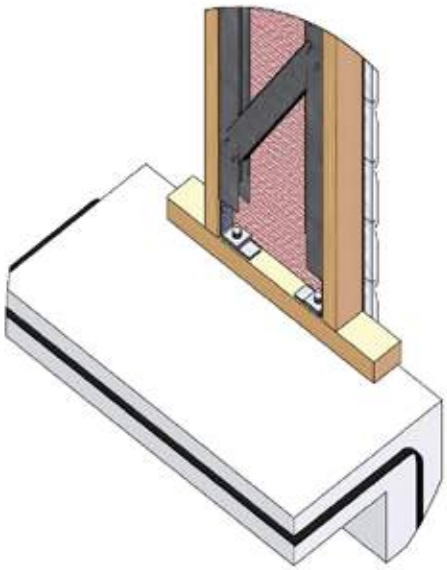


Hold Down - Exterior Timber Clad Wall on Concrete Floor

End Elevation



Isometric View

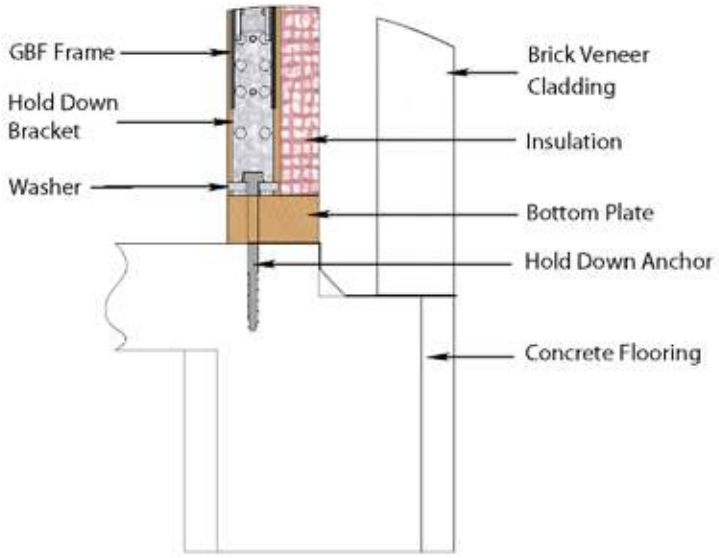


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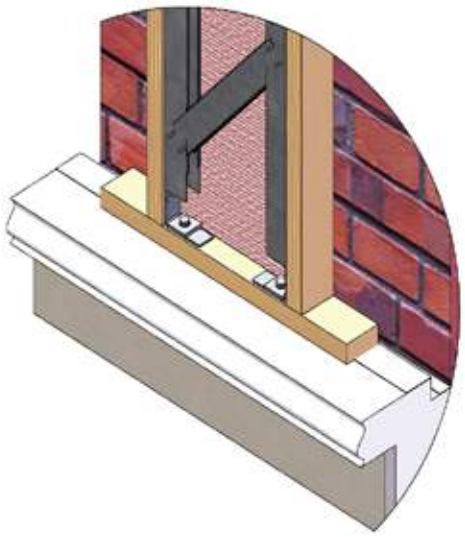
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Hold Down - Exterior wall - Brick Veneer cladding with cavity on concrete floor

End Elevation

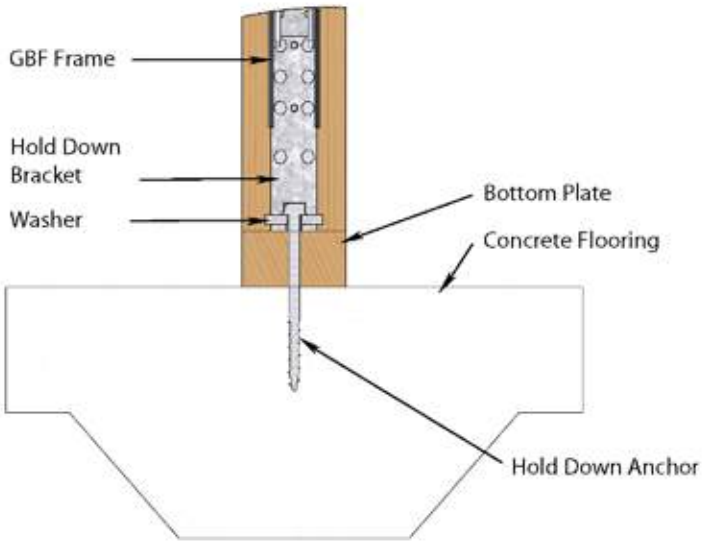


Isometric View

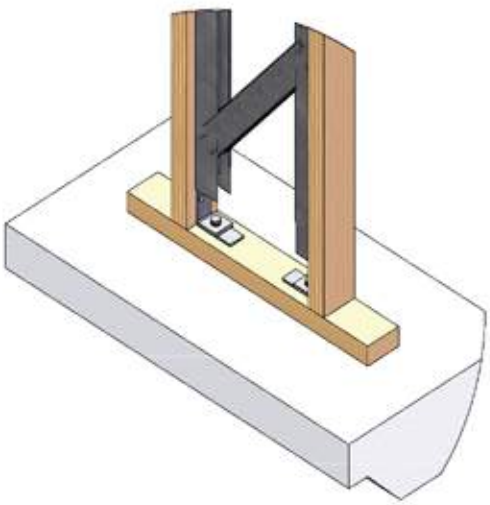


Hold Down - Interior Wall on Concrete Floor

End Elevation



Isometric View

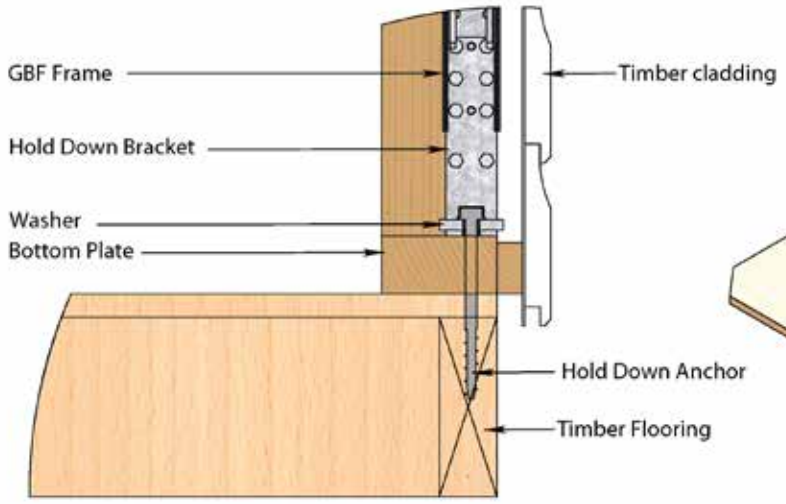


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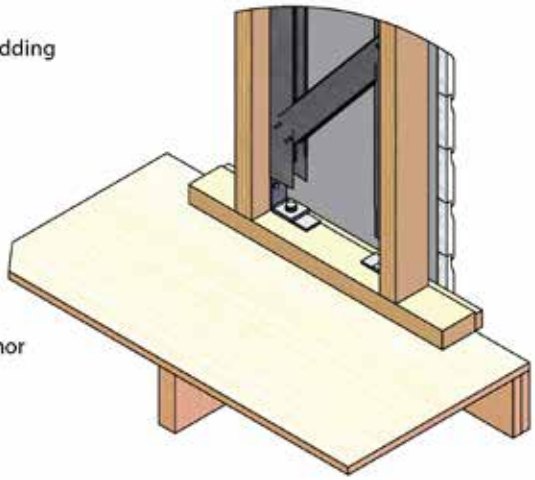
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Hold Down - Exterior wall - Timber clad with battens on timber floor

End Elevation

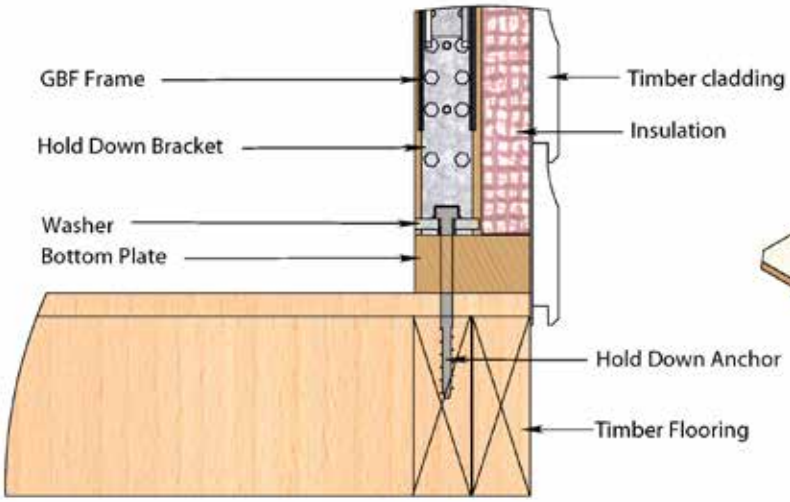


Isometric View

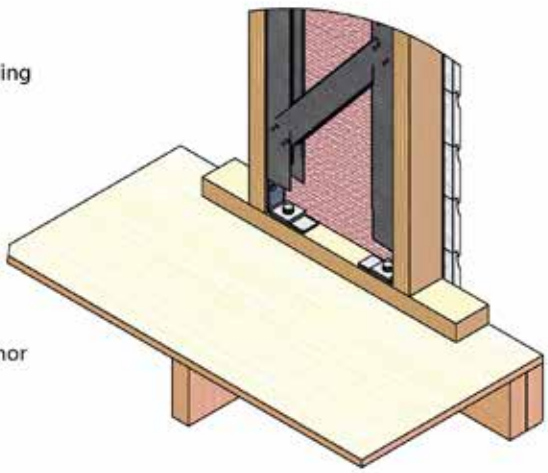


Hold Down - Exterior Timber Clad Wall on Timber Floor

End Elevation



Isometric View

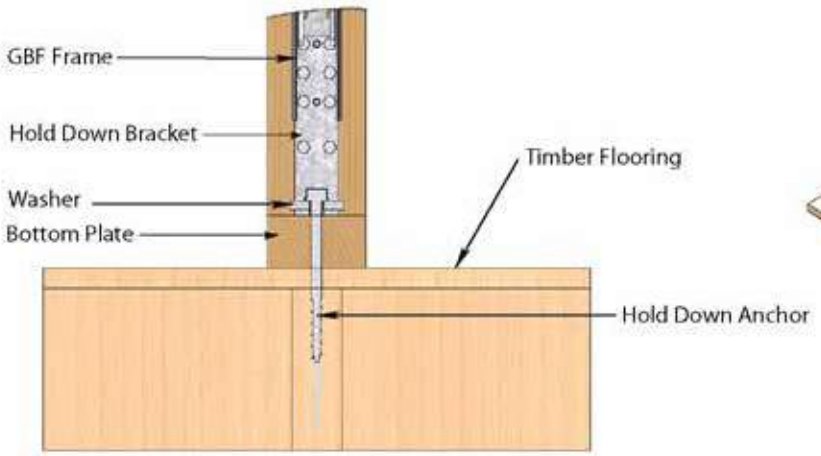


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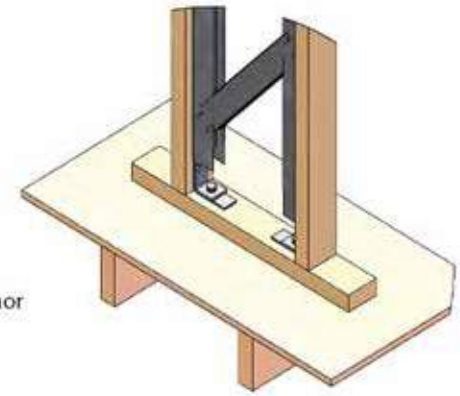
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Hold Down - Interior wall on timber floor

End Elevation



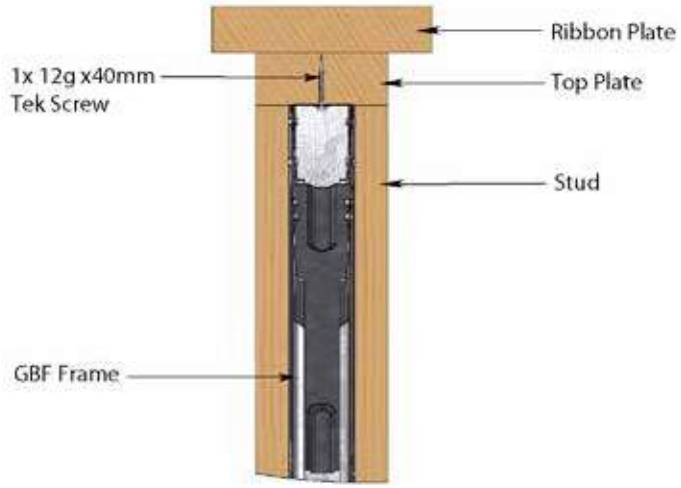
Isometric View



Construction Details - Head Detail - Interior wall

Head Detail - Interior wall

End Elevation



Isometric View



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15.8 Construction Details - GBF Height Adjustment

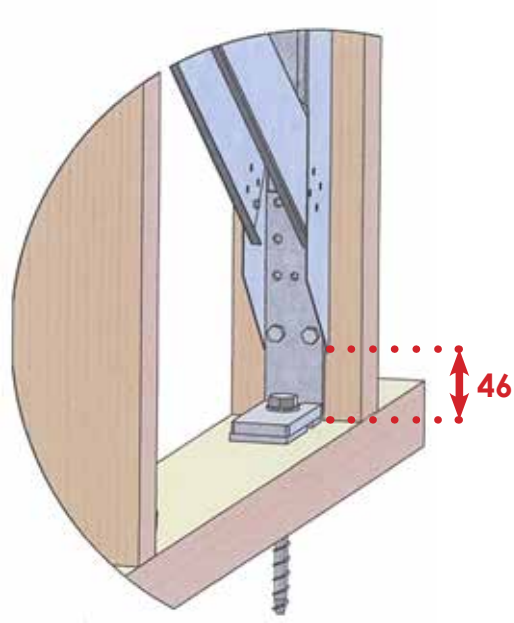
The height of the Gamma Bracing frame can be adjusted to suit variations in the wall framing height or the alignment of the wall framing.

The height of the Gamma Bracing Frame can be increased by no greater than 50.0mm and decreased by no greater than 39mm to allow for any small deviation in wall framing height.

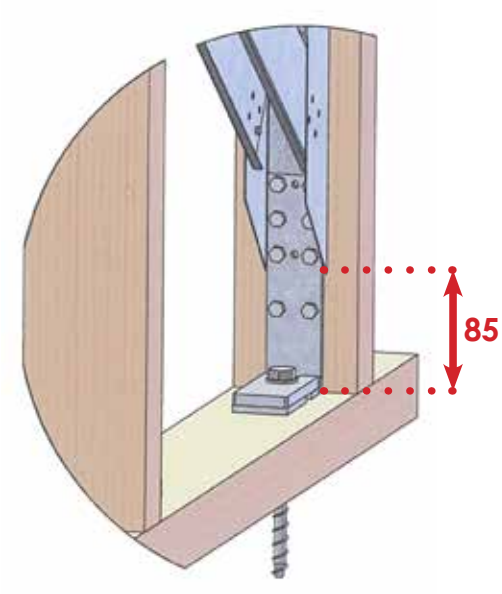
To adjust the height of the GBF it is permitted to remove the two rivets that hold each of the hold down brackets in place which allows the brackets to be adjusted up or down.

To increase the height of GBF each of the hold down brackets will require adjusting downwards from the side channels of the GBF by a maximum of 50mm

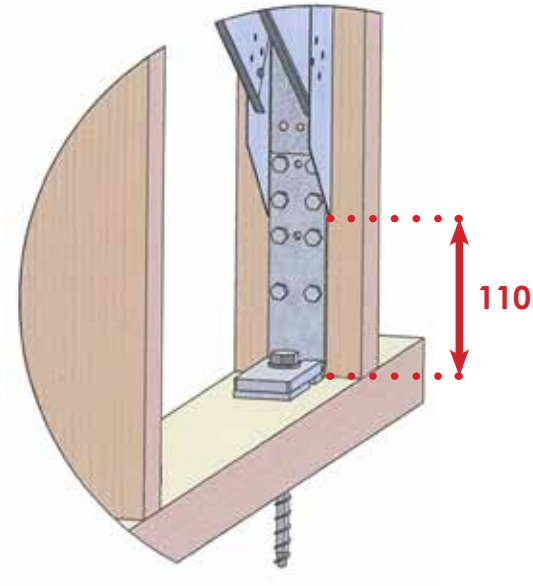
All 12g x 40mm Tek Screws MUST be installed to each of the hold down brackets and the GBF frame. (Qty of 8 Screws per Hold down bracket - supplied).



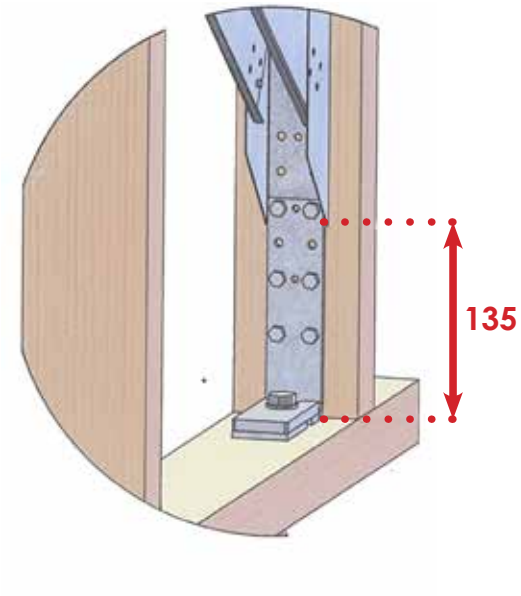
'39mm Down' Position



'As Supplied' Position



'25mm Up' Position



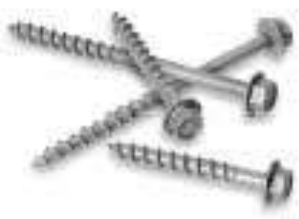
'50mm Up' Position (maximum)

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16.1 Fasteners

12g x 40mm Tek screw



Gamma Bracing Systems GBF400/2.4/2.7/3.0 & GBF600/2.4/2.7/3.0.
Frame & Stud/Top Plate:
12g x 40mm Tek Screws (Qty 25 per frame) to secure Gamma Bracing frame to timber studs and the top plate.

Gamma Bracing Systems GBF535/2.4
Frame & Stud/Top Plate:
12g x 70mm Tek Screws (Qty 24 per frame) to secure Gamma Bracing frame to timber studs.
12g x 40mm Tek Screws (Qty 1 per frame) to secure Gamma Bracing frame to the top plate.

16.2 Hold Down Anchors

TABLE 4	Hold Down Anchors		
Floor Type	**Wall Type**	**Anchor Type**	**Uplift Capacity**
Concrete	External Wall	**Masonry Screw Chemical Set Anchor "J" Bolt set into Concrete	15kN
Concrete	Internal Wall	**Masonry Screw Chemical Set Anchor Expansion Bolt	15kN
Timber	External/Internal Wall	M12 Coach Screws	12kN
** Gamma recommends the use of the Hilti HUS-H 10/140 Masonry Screw Anchor			

16.3 Insulation

Where Gamma Bracing Frames are installed in exterior walls insulation is to be installed to meet the requirements of the New Zealand building code.

Insulation is to be installed within all areas and cavities of the Gamma Bracing Frame.

For further information regarding the types of insulation, please contact Gamma Bracing Technologies Ltd,
Ph. 0800 272 733.



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Fittings to Gamma Bracing Frames

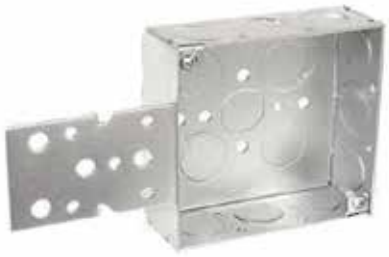
16.4 Electrical Equipment

All electrical equipment must be installed by a Registered Electrician in accordance with AS/NSZ 3000:2017. Tables 5 & 6 below detail accessory fittings that can be installed to the Gamma Bracing frame. Other larger and heavier items such as sinks, toilet cistern's and wall mounted television screens will require mounting directly to the timber studs.

Additional timber frame may be required. Follow manufacturers installation instructions.

TABLE 5	Electrical Equipment		
	Fastener Types		
Electrical Accessories Type	**Rivets**	**Tek Screws**	**Bolts/Threaded Rod**
Electrical switch mounting box	1/8" to ¼"	6g to 14g	M4 to M12
Electrical socket outlet box			
Electrical cables + mounting brackets clips			
Electrical wall mounted light fittings			
Telephone socket outlets			
Internet/Computer socket outlet			
Television Arial outlets			
Data Cables + mounting bracket & Clips			
*Note - All electrical cables to be properly insulated.			

Electrical flush mount boxes



16.5 Plumbing Equipment

TABLE 6	Plumbing Fitting Equipment		
	Fastener Types		
Plumbing Accessories Type	**Rivets**	**Tek Screws**	**Bolts/Threaded Rod**
Tap fittings + brackets	1/8" to ¼"	6g to 14g	M4 to M12
Shower Head fittings + brachets			
Pipe work + mounting brackets/clips • Galvanized Pipe • PVC Pipe • Copper Pipe (*Refer Note)			
*Note - Ensure copper pipe is well insulated when installing with Gamma Bracing Frames. Contact between Copper and Galvanized Steel causes electrolysis resulting in the corrosion of components. Use of grommets in access holes and insulated brackets and saddles when mounting directly to Gamma Bracing Frames will be required.			

Insulated pipe mounting brackets and wing backed plumbing fittings






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GAMMA BRACING FRAME

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Contact:
FreePhone 0800 272 733
website www.gammabracing.co.nz

692A Beach Road
Browns Bay
New Zealand 0630

For detailed specifications the most current Gamma Bracing System's technical manual should always be referred to.

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Substitution: in order for **Gamma Bracing Systems** to perform as tested all components must be installed exactly as prescribed.

Substituting components produces an entirely different system and may seriously compromise performance.

Where specified, correct components must be used when installing and specifying **Gamma Bracing Systems**.

Gamma Bracing Technologies™

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TECHNICAL & SALES 0800 272 733

www.gammabracing.co.nz

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Thermakraft
ONE WRAP SYSTEM
10 Products - One system
One warranty



Installation Guide

ALUBAND

Bituminous adhesive flexible window flashing tape.

Aluband is designed specifically as a premium window flashing tape and forms part of the Thermakraft One Wrap System. Made with a heavy bituminous adhesive, the product provides high strength bond and excellent abrasion resistance.

Product usage

Aluband Window Flashing Tape is installed into and around frame joinery opening over the wall underlay and exposed frame to cover both the face and edge of the opening framing as a secondary weather resistant barrier. It can also be installed at joinery heads to seal flashing upstands to the wall underlay.

Smarter products. Better buildings.
thermakraft.co.nz

BRANZ Appraised
Appraisal No.878 [2019]

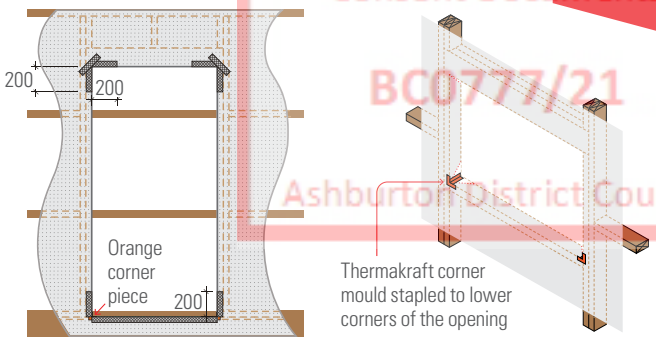
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Installation Guide

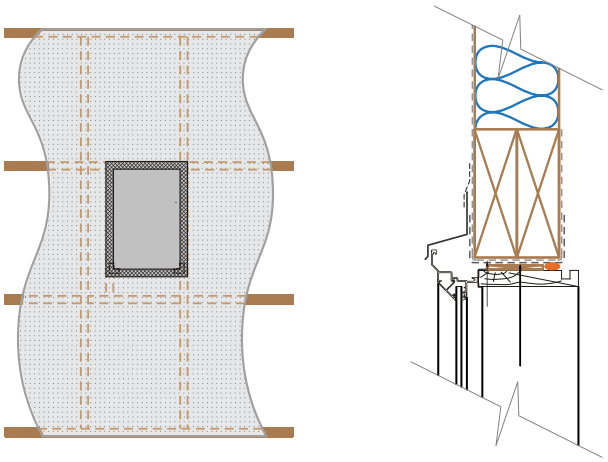
Application Method

- Cut the wall underlay/air barrier at a 45° angle away from each corner. Fold flaps tightly into the window or door opening and fix with staples on the back faces of the framing.
- Fix the Thermakraft Corner Moulded Piece to the bottom corners by way of staples or clouts to the two jambs. Always ensure that Aluband is applied to surfaces that are clean and free of dust, contaminates, solvents, oils or waxes. Note the following: 150mm wide tape is used for 100mm wide window or door framing, and the 200mm wide tape is used for 140mm to 150mm wide reveals. (With steel framed houses use Double Sided Tape to attach the Thermakraft Aluband Corner Moulded Piece to metal framing).
- Measure 200mm up both jambs, add 400mm to the length of the window sill and cut to suit that measurement.
- First remove the release film from the tape; align the back edge of the tape with the inside edge of the sill.
- Using the Thermakraft Tool, firmly press the tape onto the wall underlay to ensure good adhesion and ensure the tape is fitted tightly into the jamb to sill corners.
- At the sill/jamb corners cut the tape from the external edge of the frame outwards. Fold flaps back onto the wall underlay/air barrier and press tape firmly for good adhesion.
- Proceed to fit the Window Flashing Tape to the top corners of the frame (200mm across lintel x 200mm down jamb).
- For window or door lintel to jamb junction, apply a butterfly using the 75mm wide x 100mm long Aluband. Fix at a 45° angle to the jamb with an overlap at the corner of 3mm.
- Door frames are to be treated similarly to window openings. The sill may be either a timber or a concrete floor.
- Window Flashing Tape is used to seal the up stand of the window head flashing to the building underlay. (Refer to the cladding manufacturer's details).
- Aluband must NOT be left exposed to the weather or UV for more than 42 days.



Window and door frames

- Staple orange corner piece to the bottom corner sill. Place tape 200mm up the jambs and across the full width of the sill opening. Align tape with the back of the frame opening.
- At the top corner place tape 200mm down the jamb and 200mm across the lintel. Place a strip of 75mm tape across the top corner.



Application Tips

- Always use the Thermakraft Aluband Window Flashing Tool to apply firm pressure onto the tape during installation. This will ensure proper adhesion of the tape to the building underlay or other substrates.
- Install the Aluband Window Flashing above 5°C.
- Unaffected by LOSP or other solvent based treated timber. However, LOSP or other solvent based treated timber must have sufficient time for the solvent chemical to flash off in a well ventilated area. Recommended minimum 7 days.

Important Information

To assist the adhesion of Aluband window flashing tape, Thermakraft suggests the following two options this is particularly relevant in the following conditions:

- In temperatures below 5°C.
- When adhering to difficult to bond substrates such as rough/uneven surfaces.
- When the tape has been lifted or moved after initial application.

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Installation Guide

Application of Heat:

- Press the window sill tape into position in the usual manner.
- Apply a gentle heat, using a heat gun on low heat to the top of the window sill tape.
- Once the adhesive starts to soften use the Thermakraft tool or a roller to firmly press the tape into the wall underlay ensuring good adhesion.
- Take care not to damage the foil face lining.

Difficult to Bond Substrates Surface Preparation:

- Always ensure that Aluband is applied to surfaces that are clean and free of dust, contaminates, solvents, oils or waxes.
- Application of Scotch® Super 77™ Spray Adhesive: When installing Aluband Flashing Tapes on difficult to bond substrates, Scotch® Super 77™ Spray Adhesive may be used. Ensure that the substrate is dry and free of dirt before applying the spray adhesive. Apply a light spray/coating of the spray adhesive onto the substrate. Wait for a minute to allow the spray adhesive to become tacky. When tacky to the touch apply the flashing tape in the normal manner.

Adhesives and Sealants:

- After the installation of Aluband window flashing tape, ensure that the edges do NOT come into contact with solvent based sealants or adhesives. Solvents in these products can adversely affect the adhesion or dissolve the bituminous adhesive and cause it to run.
- If the application of solvent based adhesives or sealants are necessary, cover the edges with Thermakraft joining tape or a true aluminium foil tape to form a barrier. With a true aluminium foil tape, the installer must test the bonding strength.
- The installer must check the compatibility of the Aluband window flashing tape with the sealant or adhesive product to ensure the components are fully compatible.

Handling and Storage

Aluband window flashing tape must be handled with care to prevent damage such as tearing, excessive puncture and roll deformation.

The product must be stored under cover well away from direct moisture, rainfall contact and sunlight (UV). Care should be taken not stack other materials on top of the product.

The recommendations contained in Thermakraft's literature are based on good building practice, but are not an exhaustive statement of all relevant information and are subject to any conditions contained in the Warranty. All product dimensions and performance claims are subject to any variation caused by normal manufacturing process and tolerances. Furthermore, as the successful performance of the relevant system depends on numerous factors outside the control of Thermakraft (for example quality of workmanship and design), Thermakraft shall not be liable for the recommendations in that literature and the performance of the Product, including its suitability for any purpose or ability to satisfy the relevant provisions of the Building Code, regulations and standards. Literature subject to change without notification. Latest documentation can be found on the website. E&OE.

Issue 4, January 2020

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BRANZ Appraised
Appraisal No. 878 [2019]

THERMAKRAFT ALUBAND WINDOW FLASHING TAPE

Appraisal No. 878 (2019)

This Appraisal replaces BRANZ Appraisal No. 878 (2014)

Amended 26 March 2021



BRANZ Appraisals

Technical Assessments of products for building and construction.

Product

1.1 Thermakraft Aluband Window Flashing Tape in conjunction with the Thermakraft Corner Moulded Piece is a flexible flashing tape system for use around framed joinery openings as a secondary weather resistant barrier.

1.2 The system is installed into and around the framed joinery opening over the wall underlay and exposed frame to cover both the face and edge of the opening framing. Thermakraft Aluband Window Flashing Tape is also used at joinery heads to seal flashing upstands to the wall underlay.

Scope

Timber Framing

2.1 The Thermakraft Aluband Window Flashing Tape has been appraised for use as a flexible flashing tape with external wall cladding for timber-framed buildings within the following scope:

- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 for timber-framed buildings; and
- with a risk score of 0-20, calculated in accordance with NZBC Acceptable Solution E2/AS1, Table 2; and,
- situated in NZS 3604 Wind Zones up to, and including, Extra High.

Steel Framing

2.2 The Thermakraft Aluband Window Flashing Tape has also been appraised for use as a flexible flashing tape with external wall cladding for steel-framed buildings within the following scope:

- the scope limitations of NASH Building Envelope Solutions Paragraph 1.1 for steel-framed buildings; and,
- with a risk score of 0-20, calculated in accordance with NASH Building Envelope Solutions; and,
- situated in NASH Standard Part 2 Wind Zones up to, and including, Extra High.

Specific Design

2.3 The Thermakraft Aluband Window Flashing Tape has also been appraised for weathertightness when used on buildings subject to specific design up to an ultimate limit state (ULS) wind pressure of 2.5 kPa with wall cladding systems complying with NZBC Acceptable Solution E2/AS1 or a valid BRANZ Appraisal that specifies a flexible flashing system; and, with flexible wall underlays compatible with the flashing tape and complying with the NZBC; and, situated in NZS 3604 Wind Zones up to, and including, Extra High (refer to Paragraph 7.3).

Thermakraft

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Porirua 5240,
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Readers are advised to check the validity of this Appraisal by referring to the Valid Appraisals listing on the BRANZ website, or by contacting BRANZ.

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Building Regulations

New Zealand Building Code (NZBC)

3.1 **In the opinion of BRANZ, Thermakraft Aluband Window Flashing Tape, if designed, used, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet or contribute to meeting the following provisions of the NZBC:**

Clause B2 DURABILITY: Performance B2.3.1 (b) 15 years and B2.3.2. Thermakraft Aluband Window Flashing Tape meets these requirements. See Paragraphs 8.1 and 8.2.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.2. Thermakraft Aluband Window Flashing Tape contributes to meeting this requirement. See Paragraphs 7.1-7.4 and 11.1.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Thermakraft Aluband Window Flashing Tape meets this requirement.

Technical Specification

4.1 System components and accessories supplied by Thermakraft Limited are:

- **Thermakraft Aluband Window Flashing Tape** is a polymeric faced, bituminous modified, self-adhesive tape with a release backing paper. The tape is supplied in rolls 200, 150 and 75 mm wide x 25 m long and 150 mm wide x 10 m long. The rolls are wrapped in clear polythene film.
- **The Thermakraft Corner Moulded Piece** is made from inert polyethylene and is coloured orange. It is used in conjunction with the Thermakraft Aluband Window Flashing Tape and building underlays as part of the Thermakraft Aluband Window Flashing Tape system.
- **The Thermakraft Tool** is used to ensure proper adhesion of the Thermakraft Aluband Window Flashing Tape and to achieve a tight fit into corners.

4.2 Accessories used with the system which are supplied by the installer are:

- **Thermakraft Corner Moulded Piece Fixings** - staples, clouts or other temporary fixings to attach the corner mould to the framing prior to the installation of the Thermakraft Aluband Window Flashing Tape.
- **Scotch® Super 77™ Multipurpose Adhesive** - a clear spray primer.

Handling and Storage

5.1 Handling and storage of all materials supplied by Thermakraft Limited, whether on-site or off-site, is under the control of the installer. Thermakraft Aluband Window Flashing Tape and accessories must be protected from damage and weather. Rolls must be stored under cover, in clean, dry conditions away from direct exposure to sunlight.

Technical Literature

6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for Thermakraft Aluband Window Flashing Tape. The Technical Literature must be read in conjunction with this Appraisal. All aspects of design, use, installation and maintenance contained in the Technical Literature and within the scope of this Appraisal must be followed.

Design Information

General

7.1 Thermakraft Aluband Window Flashing Tape meets the requirements of AC 148: 2001 which is an alternative solution to the version of AC 148 referenced by NZBC Acceptable Solution E2/AS1 Paragraph 9.1.5 b) and NASH Building Envelope Solutions Paragraph 9.1.5 b). The installation method for Thermakraft Aluband Window Flashing Tape is an alternative solution to the installation method shown within NZBC Acceptable Solution E2/AS1, Figures 72A and 72B and NASH Building Envelope Solutions, Figures 72A and 72B.

Readers are advised to check the validity of this Appraisal by referring to the Valid Appraisals listing on the BRANZ website, or by contacting BRANZ.

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7.2 The use of flexible flashing systems around window and door joinery openings is critical to assist the overall weathertightness performance of window and door joinery installations.

7.3 Thermakraft Aluband Window Flashing Tape is suitable for use over flexible wall underlays compatible with the flashing tape in NZS 3604 Wind Zones up to, and including, Extra High. In the Extra High Wind Zone, the flexible underlay must be installed over a rigid underlay complying with NZBC Acceptable Solution E2/AS1, Table 23 or NASH Building Envelope Solutions, Table 23.

7.4 Thermakraft Aluband Window Flashing Tape is designed to prevent air leakage and water penetration around window and door openings at framing junctions (e.g. at the sill trimmer and opening stud junction), and to keep any water that gets past the cladding, or through the joinery, from direct contact with the framing timber.

7.5 Thermakraft Aluband Window Flashing Tape is not designed to overcome poor detailing and workmanship of the window or door joinery installation. The system must not be considered in isolation, but be considered as part of the wall cladding system. Thermakraft Aluband Window Flashing Tape is designed to be used in conjunction with air seals and joinery flashing systems, not as a substitute.

7.6 When Thermakraft Aluband Window Flashing Tape is used in conjunction with LOSP (light organic solvent preservative) treated timber, the solvent from the timber treatment must be allowed to evaporate (generally at least one week) prior to the installation of the system.

Durability

8.1 Assessment of durability to meet the NZBC is based on difficulty of access and replacement, and the ability to detect failure of Thermakraft Aluband Window Flashing Tape both during normal use and maintenance of the building.

Serviceable Life

8.2 Provided it is not exposed to the weather or ultraviolet (UV) light for a total of more than 42 days, and provided the exterior cladding is maintained in accordance with the cladding manufacturer's instructions and the cladding remains weather resistant, Thermakraft Aluband Window Flashing Tape is expected to have a serviceable life equal to that of the cladding.

Maintenance

9.1 No maintenance is required for Thermakraft Aluband Window Flashing Tape. Regular checks, at least annually, must be made of the junctions between the joinery and wall cladding to ensure that they are maintained weathertight and that the primary means of weather resistance for the junction e.g. flashing, sealant, etc. continues to perform its function, to ensure that water will not penetrate the cladding.

Prevention of Fire Occurring

10.1 Separation or protection must be provided to Thermakraft Aluband Window Flashing Tape from heat sources such as fireplaces, heating appliances and chimneys. Part 7 of NZBC Verification Method C/VM1 and Acceptable Solution C/AS1, and Acceptable Solution C/AS2 provide methods for separation and protection of combustible materials from heat sources.

External Moisture

11.1 Where a cladding manufacturer specifies the use of generic flashing tapes around window and door joinery openings at framing junctions as part of their system, or they specify the use of flexible flashing tapes that comply with NZBC E2/AS1, Paragraph 9.1.5 b) or NASH Building Envelope Solutions Paragraph 9.1.5 b), Thermakraft Aluband Window Flashing Tape may be used.

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Installation Information

Installation Skill Level Requirements

12.1 All design and building work must be carried out in accordance with the Thermakraft Aluband Window Flashing Tape Technical Literature and this Appraisal by competent and experienced tradespersons conversant with flashing tapes. Where the work involves Restricted Building Work (RBW) this must be completed by, or under the supervision of, a Licensed Building Practitioner (LBP) with the relevant License class.

General

13.1 The selected wall underlay must be installed in accordance with the manufacturer's instructions, and must completely cover the joinery opening. The underlay is then cut on a 45° angle away from each corner of the opening so the flaps can be folded into the opening and secured to the interior face of the timber framing.

13.2 Fit a Thermakraft Corner Moulded Piece into each of the bottom corners to create a seal at the corner junction. The corner piece must be fixed to the framing with staples or clouts.

13.3 Before the Thermakraft Aluband Window Flashing Tape is applied, the substrate surfaces must be clean, dry and free from any surface contaminants such as dust and grease that may cause loss of adhesion. When installing Thermakraft Aluband Window Flashing Tape on difficult to bond substrates, Scotch® Super 77™ Multipurpose Adhesive may be used. Ensure that the wall underlay/substrate is dry and free of dirt before applying the spray adhesive. Apply a light spray/coating of the spray adhesive onto the underlay/substrate. Wait for a minute to allow the spray adhesive to become tacky. When tacky to the touch, apply the flashing tape in the normal manner.

13.4 A length of Thermakraft Aluband Window Flashing Tape must be cut to the length of the sill plus 400 mm. The tape is installed flush with the interior face of the opening and is applied along the entire length of the sill and 200 mm up each jamb. The overhanging tape is cut at the corner of the opening to allow the tape to be folded onto the face of the building underlay. The Thermakraft Tool must be used to ensure that adequate adhesion of the tape is achieved and that the tape is installed tight into the sill/jamb junction.

13.5 A 400 mm length of Thermakraft Aluband Window Flashing Tape must be installed 200 mm down the jamb and 200 mm along the lintel at each of the top corners of the window or door joinery opening. A 75 mm wide x 100 mm long sealing tape 'butterfly' must be installed at 45° across the corner of the head/jamb junction overlapping the corner by 3 mm to create a seal at the corner junction.

13.6 Thermakraft Aluband Window Flashing Tape must not be stretched. To avoid wastage, the tape can be lapped 100 mm minimum onto itself without reducing the performance of the Thermakraft Aluband Window Flashing Tape system.

13.7 If the Thermakraft Aluband Window Flashing Tape is exposed to the weather or UV light for more than 42 days, then it must be replaced with new material.

Installation Temperature

13.8 Thermakraft Aluband Window Flashing Tape must not be installed at temperatures of less than 5°C.

Inspections

13.9 The Technical Literature must be referred to during the inspection of Thermakraft Aluband Window Flashing Tape installations.

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Basis of Appraisal

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

Tests

14.1 Testing of Thermakraft Aluband Window Flashing Tape has been completed by BRANZ to the requirements of ICC Evaluation Service Acceptance Criteria for Flashing Materials AC 148: 2001. The adhesion of Thermakraft Aluband Window Flashing Tape to black bituminous Kraft building paper complying with the requirements of NZBC Acceptable Solution E2/AS1, Table 23 or NASH Building Envelope Solutions Table 23 and selected other synthetic wall underlays has been tested and found to be satisfactory.

Other Investigations

15.1 An assessment was made of the durability of Thermakraft Aluband Window Flashing Tape by BRANZ technical experts.

15.2 Site inspections were carried out by BRANZ to examine the practicability of installation.

15.3 The Technical Literature has been reviewed by BRANZ and found to be satisfactory.

Quality

16.1 The manufacture of Thermakraft Aluband Window Flashing Tape has not been examined by BRANZ, but details of the quality and composition of the materials used were obtained and found to be satisfactory.

16.2 The quality of supply to the market is the responsibility of Thermakraft Limited.

16.3 Designers are responsible for the building design, and building contractors are responsible for the quality of installation of framing systems and wall underlays in accordance with the instructions of the designer.

16.4 The quality of installation, handling and storage on site is the responsibility of the installer in accordance with the instructions of Thermakraft Limited.

Sources of Information

- ICC Evaluation Service, Inc, AC148 Acceptable Criteria for Flexible Flashing Materials, July 2001.
- NZS 3604: 2011 Timber-framed buildings.
- NASH Building Envelope Solutions: 2019 Light steel framed buildings.
- NASH Standard Part Two: 2019 Light steel framed buildings.
- Ministry of Business, Innovation and Employment Record of amendments - Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992.

Amendments

Amendment No 1, dated 26 March 2021

This Appraisal has been amended to include NASH Standards and update the technical specifications.

Readers are advised to check the validity of this Appraisal by referring to the Valid Appraisals listing on the BRANZ website, or by contacting BRANZ.

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BRANZ

In the opinion of BRANZ, Thermakraft Aluband Window Flashing Tape is fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided it is used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to Thermakraft Limited, and is valid until further notice, subject to the Conditions of Appraisal.

Conditions of Appraisal

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

For BRANZ

Chelydra Percy
Chief Executive

Date of Issue:

18 December 2019

Readers are advised to check the validity of this Appraisal by referring to the Valid Appraisals listing on the BRANZ website, or by contacting BRANZ.

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THERMAKRAFT 401



SYNTHETIC SELF SUPPORTING ROOF UNDERLAY

For Timber and Steel framed roof systems

Thermakraft 401 is an absorbent and breathable synthetic roof underlay, constructed using a microporous water resistant film sandwiched between two layers of spun-bonded polyolefin. Designed and made in New Zealand, a lightweight high strength underlay suitable for use unsupported where fire retardancy is not required.

ADVANTAGES

Roof

- Suitable with masonry tile roof cladding.
- Suitable with metal tile and profiled metal roof cladding.
- Self-supporting when run horizontally at pitches ≥3° When run vertically at pitches ≥3° <10° support is required, at 10° or greater, support not required when run vertically up to spans of 1200mm max.
- Will provide temporary weather protection during construction (roofs 7 days) same day coverage recommended.
- May be installed in adverse conditions.
- May be run to any length.
- Has a 150mm lap line printed on each edge.
- Must not be used under translucent sheeting.

General

- Unaffected by LOSP treated timber.
- Recyclable with no VOC's.
- Tear resistant, light weight and strong.

ROOF
This is a Thermakraft roofing product

BRANZ Appraised
Appraisal No.943 [2016]

For additional details and latest specifications www.thermakraft.co.nz or scan QR code.

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Thermakraft 401 - Technical Specification

Breathable | Absorbent | Non Woven | Roof Underlay

Thermakraft 401 can be used as a roof underlay on timber and steel framed buildings within the following scope:

- The scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1, with regards to building height and floor area; and
- With masonry tile roof cladding; and
- With metal tile and profiled metal roof cladding; and,
- Situated in NZS3604 Wind Zones up to, and including Extra High).
- Self-supporting when run horizontally at pitches ≥3° When run vertically at pitches ≥3° <10° support is required, at 10° or greater, support not required when run vertically up to spans of 1200mm max.
- Must be supported if run vertically below 10°. Minimum roof pitch 3°.
- Refer BRANZ Appraisal No. 943 [2016] for full details.

Flammability Index

Thermakraft 401 is not rated as fire retardant. Covertek is recommended where fire retardant underlay is required.

NZBC

Contributes to meeting the Performance Requirements of NZBC Clauses B2, Durability (B2.3.1 (a) 50 years, B2.3.1 (b) 15 years and B2.3.2), E2 External Moisture E2.3.2), and F2 Hazardous Building Materials F2.3.1, providing;

- It is not damaged
- Is installed in accordance with instructions
- Is not left exposed for more than 7 days (roof), same day coverage recommended.
- Is installed by or under guidance of Licensed Building Practitioners
- Is compatible with cladding system used.

Table 1: NZBC E2/AS1 (NZS2295) roof underlay requirements

NZBC E2/AS1 TABLE 23 (NZS2295) WALL UNDERLAY PROPERTIES	PROPERTY PERFORMANCE REQUIREMENTS	PROPERTY PERFORMANCE
Absorbency	≥ 150gsm	Pass
Vapour Resistance	≤ 7 MN.s/g	Pass
pH of Extract	≥ 5.5 and ≤ 8	Pass
Shrinkage	≤ 0.5%	Pass
Water Resistance	≥ 100mm	Pass

Roll Dimensions

WIDTH (MM)	LENGTH (M)	M^2
1350	18.6	25
1350	37.0	50
1350	55	75

Made to length also available.

M^2 is the roll size for actual coverage, allow for laps and joins.

Control of Condensation

In climatic regions where condensation risks are high, such as cold or high humidity areas, care needs to be taken in specifying the correct design and installation to prevent moisture build-up in the roof cavities.

Factors which adversely affect the condensation risk in roofing systems include;

- Humid, and/or cold climatic regions.
- Warm/Skillion roof construction.
- Low roof cavity air volume and restricted air movement.
- Omitting Vapour Control Layers.
- Ceiling penetrations and entry of warm air into roof cavities.
- Occupancy activities which have high moisture loading on conditioned spaces.
- Low pitched roof.
- Bulk insulation.
- Building structures ability to naturally dry construction moisture.

Skillion and Warm Roof Construction are particularly sensitive to moisture accumulation and the design and installation of roof construction needs to take into account the higher condensation risks. Refer MRM Code of Practice for details.

BRANZ Appraised
Appraisal No.943 [2016]

For additional details and latest specifications www.thermakraft.co.nz **Customer Service 0800 806 595**

Thermakraft™

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P.O.Box 58-112, Botany, Auckland 2163 **Phone** 0800 806 595 or +64 9 273 3727
Fax +64 9 273 3726 **Email** info@thermakraft.co.nz **www.thermakraft.co.nz**

The recommendations contained in Thermakraft's literature are based on good building practice, but are not an exhaustive statement of all relevant information and are subject to any conditions contained in the Warranty. All product dimensions and performance claims are subject to any variation caused by normal manufacturing process and tolerances. Furthermore, as the successful performance of the relevant system depends on numerous factors outside the control of Thermakraft (for example quality of workmanship and design), Thermakraft shall not be liable for the recommendations in that literature and the performance of the Product, including its suitability for any purpose or ability to satisfy the relevant provisions of the Building Code, regulations and standards. Literature subject to change without notification. Latest documentation can be found on the website.

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Product Data Sheet

COVERTEK 401

Self-supporting synthetic roof underlay

Covertek 401 is an affordable lightweight roof underlay designed to keep water out and allow moisture to escape. Covertek 401 is a more affordable option if your project does not require a fire-retardant underlay. It is stable, shrink resistant, easy to handle and easy to install.

Covertek 401 comes in three roll sizes:

1350mm wide	18.6m long	25m^2 coverage*
1350mm wide	37m long	50m^2 coverage*
1350mm wide	55m long	75m^2 coverage*

* **Note:** m2 is the roll size for actual coverage, allow for laps and joins.

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Covertek 401

Self-Supporting Synthetic roof underlay

Scope of Use

- Suitable with masonry tile, metal tile or profiled metal roof cladding.
- Suitable for timber or steel framed buildings - Direct fix or cavity fix.
- Self-supporting in roof pitch application greater than or equal to 10 degrees (Refer to installation guide)
- Will provide temporary weather protection during construction (maximum 7 days), same day coverage recommended.
- Covertek 401 may be installed during adverse conditions (rain/snow) without affecting durability or performance.
- Suitable for use under dark coloured roofs.

General

- Covertek 401 is NOT fire retardant.
- Unaffected by LOSP or other solvent based treated timber. However, LOSP or other solvent based treated timber must have sufficient time for the solvent chemical to flash off in a well ventilated area. Recommended minimum 7 days.
- Tear resistant and strong.

Limitations

- Cannot be used as a wall underlay.
- Must NOT be exposed to the weather or UV for more than 7 days.

Compliance

Designed for use as a roof underlay within the following scope:

- The scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1, with regards to building height and floor plan area.
- Situated in NZS3604 Wind Zones up to, and including, 'Extra High' (ROOF ONLY).
- Refer BRANZ Appraisal No 943 (2016) for full details.

Durability

Contributes to meeting the Performance Requirements of NZBC Clauses B2, Durability (B2.3.1 (a) 50 years, B2.3.1 (b) 15 years and B2.3.2), E2 External Moisture E2.3.2), and F2 Hazardous Building Materials F2.3.1, providing:

- It is not damaged.
- Is installed in accordance with instructions.
- Is not left exposed for more than 7 days (roof), same day coverage recommended.
- Is installed by or under guidance of Licensed Building Practitioners.
- Is compatible with cladding system used. (**Note:** specifiers and product users must test for roof cladding system compatibility with the underlay before installation.)

Control of Condensation

In climatic regions where condensation risks are high, such as cold or high humidity areas, care needs to be taken in specifying the correct design and installation to prevent moisture build-up in the roof cavities.

Factors which adversely affect the condensation risk in roofing systems include:

- Humid, and/or cold climatic regions.
- Warm/Skillion roof construction.
- Low roof cavity air volume and restricted air movement.
- Omitting Vapour Control Layers.
- Ceiling penetrations and entry of warm air into roof cavities.
- Occupancy activities which have high moisture loading on conditioned spaces.
- Low pitched roof.
- Bulk insulation.
- Building structures ability to naturally dry construction moisture.

Skillion and Warm Roof Construction are particularly sensitive to moisture accumulation and the design and installation of roof construction needs to take into account the higher condensation risks. Refer MRM Code of Practice for details.

For passive ventilation of the roof space, it is recommended that all roof underlays are terminated at the ridge, and if not it should be slit or slotted to allow for passive ventilation. (For further information refer to the NZ MRM Roofing Code of Practice).

Product Warranty

Standard Thermakraft warranty applies. Refer to Thermakraft Warranty Statement for further details. This is available online at **thermakraft.co.nz** or call **0800 806 595.**

Property Performance

NZBC E2/AS1 Table 23 (NZS2295) Wall Underlay Properties	Absorbency	Vapour Resistance	pH of Extract	Shrinkage	Water Resistance
Property Performance Requirement	≥ 150gsm	≤ 0.5 MN.s/g	≥ 5.5 and ≤ 8	≤ 0.5%	≥ 100mm
Property Performance	Pass	Pass	Pass	Pass	Pass

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The recommendations contained in Thermakraft's literature are based on good building practice, but are not an exhaustive statement of all relevant information and are subject to any conditions contained in the Warranty. All product dimensions and performance claims are subject to any variation caused by normal manufacturing process and tolerances. Furthermore, as the successful performance of the relevant system depends on numerous factors outside the control of Thermakraft (for example quality of workmanship and design), Thermakraft shall not be liable for the recommendations in that literature and the performance of the Product, including its suitability for any purpose or ability to satisfy the relevant provisions of the Building Code, regulations and standards. Literature subject to change without notification. Latest documentation can be found on the website. E&OE.

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Installation Guide

COVERTEK 401

Self-supporting synthetic roof underlay

Covertek 401 is an affordable light-weight roof underlay designed to keep water out and allow moisture to escape. Covertek 401 is a more affordable option if your project does not require a fire-retardant underlay. It is stable, shrink resistant, easy to handle and easy to install.

Product Usage

Covertek 401 is a synthetic self-supporting roof underlay designed as a means of managing condensation, water vapour transfer and water ingress in roof applications. Constructed using a microporous water-resistant film sandwiched between two layers of spun-bonded polyolefin. Covertek 401 is absorbent and breathable.

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Installation Guide

Application Method

Long-run metal roofing/vertical or horizontal installation method

- Fix using stainless steel 8-12mm staples or 20mm flat head clouts, or appropriate proprietary fastenings on timber framed structure. Fixing at 300mm centres. Fixing types and requirements for steel framed structure can be found in the MRM Code of Practice.
- Refer to table below to determine underlay support requirements.

Roof Pitch	Span	Underlay Support Required	
		Horizontally Installed	Vertically Installed
≥ 10°	> 1200mm	Yes	Yes
	≤ 1200mm	No	No
< 10° (Min 3°)	> 1200mm	Yes	Yes
	≤ 1200mm	No	Yes

- Covertek 401 upper sheet lapped over lower sheets (shiplap) to ensure water is shed to the outer face.

Note: Covertek 401 can move downwards. To prevent this, it must be "Captured" by the fastenings at each purlin. Horizontal fix must not be used on purlin distance greater than 1200mm to allow for 150mm laps.

- Must be laid firmly (tight/taut) without creases. All laps either vertical or horizontal must be a minimum of 150mm lap.
- When underlay support is required, Thermakraft recommend using AUSMESH Safety Mesh, AUSNET hexagonal netting or Thermastrap 201.
- Covertek 401 can be installed above the battens or purlins for profiled metal roof claddings and otherwise in accordance with NZBC E2/AS1.
- If required to achieve a lap seal (refer to NZ Metal Roofing Code of Practice), use Thermakraft Aluband window sealing tape or Thermakraft White General Purpose Tape.
- Covertek 401 will provide temporary weather protection during construction (maximum 7 days), same day coverage recommended. DO NOT over expose the product for more than 7 days.
- Covertek 401 may be unwound to the full length from the gutter to the ridge. However, when ridge ventilation is required Covertek 401 may be terminated or slit at the ridge purlin to allow a free passage of air.
- Covertek 401 must NOT overhang the gutter line by more than 20 mm, or if eaves flashings are used, terminate on the upper side of the flashing. More details can be found in the MRM Code of Practice.
- Flue penetrations must have a minimum distance of 50mm from Covertek 401 (refer to NZ Metal Roof and Wall Cladding Code of Practice 10.11.5).
- Covertek 401 must be free of tears and punctures, fit tightly and be lap taped around all penetrations (except flue penetrations), to provide drainage for any condensation, or surface water from leaks.

Note: Do not use Aluband on penetrations where Polybutene water pipes have been installed. Refer Pipe Manufacturers for instructions on sealing penetrations.

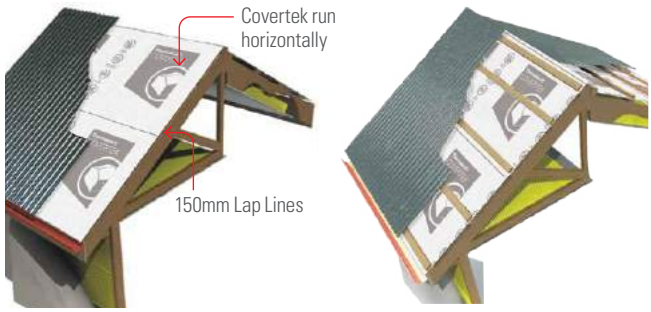
Concrete/metal tile roofing

- Covertek 401 must be laid over rafters prior to fixing the tile battens. The maximum span between rafters for Covertek 401 is 1200mm. Masonry tile roofs must have antiponding boards in accordance with NZBC E2/AS1.
- Installed Covertek 401 may be laid over the top of the antiponding boards and draped into the gutter by no more than 20mm. Antiponding boards must be treated in accordance with NZS 3604.
- Covertek 401 must be installed by a licensed building practitioner.

Application Tips

Unaffected by LOSP or other solvent based treated timber. However, LOSP or other solvent based treated timber must have sufficient time for the solvent chemical to flash off in well ventilated area. Recommended minimum 7 days.

Corrugated roofing:



Covertek 401 can be direct fix or cavity fix and must be installed in a manner that prevents ponding of water and span no more than 1200mm.

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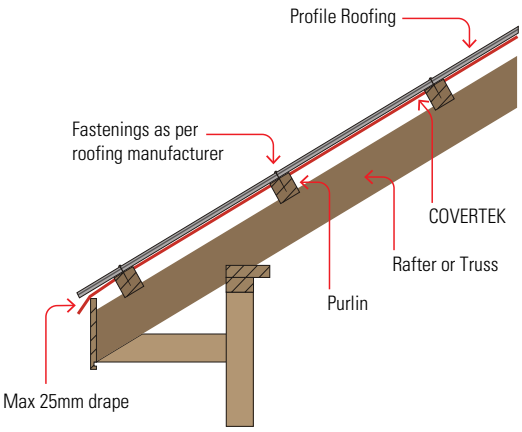
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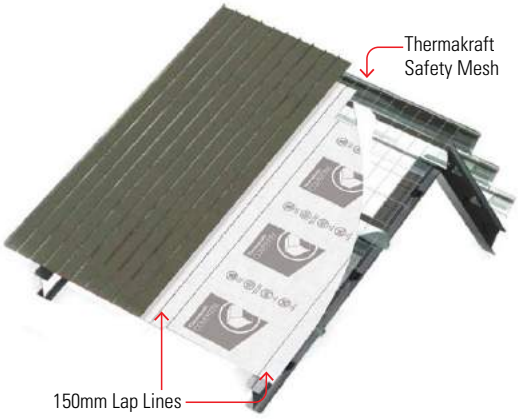
Installation Guide

Long run metal roofing:

Wooden construction

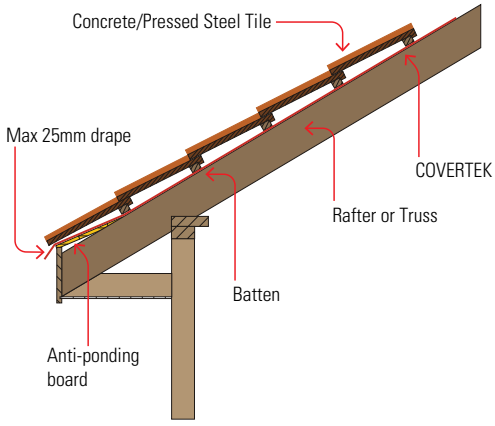


Steel construction

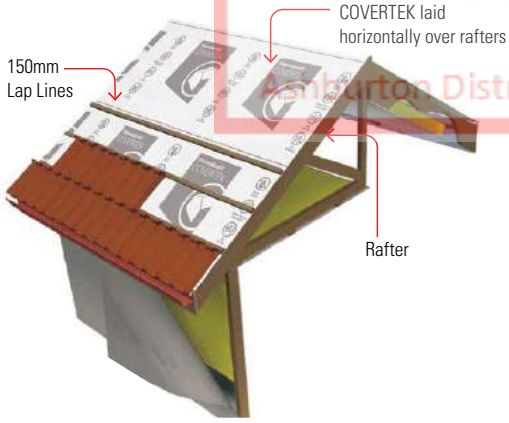


Concrete/metal tile roofing:

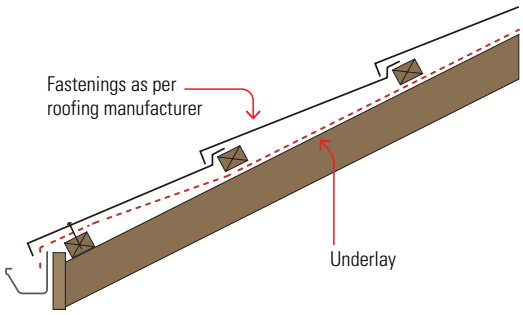
Tile roofing



Tile roofing



Metal tile installation



Handling and Storage

Covertek 401 must be handled with care to prevent damage such as tearing and roll deformation.

The product must be stored under cover well away from direct moisture, rainfall contact and sunlight (UV). Care should be taken not stack other materials on top of the product.

The recommendations contained in Thermakraft's literature are based on good building practice, but are not an exhaustive statement of all relevant information and are subject to any conditions contained in the Warranty. All product dimensions and performance claims are subject to any variation caused by normal manufacturing process and tolerances. Furthermore, as the successful performance of the relevant system depends on numerous factors outside the control of Thermakraft (for example quality of workmanship and design), Thermakraft shall not be liable for the recommendations in that literature and the performance of the Product, including its suitability for any purpose or ability to satisfy the relevant provisions of the Building Code, regulations and standards. Literature subject to change without notification. Latest documentation can be found on the website. E&OE.

Issue 1, November 2019

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Approved Building
Consent Documents
Thermakraft
BC0777/21
Ashburton District Council

BRANZ Appraised
Appraisal No. 943 [2016]

COVERTEK 401 ROOF UNDERLAY



Appraisal No. 943 (2016)
Amended 13 February 2020

BRANZ Appraisals
Technical Assessments of products for building and construction.

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Product

1.1 Covertek 401 Roof Underlay is a non fire retardant, synthetic self-supporting building underlay for use under roof claddings. The product consists of a micro-porous water resistant film ultrasonically bonded to two layers of non-woven spun-bonded polyolefin and is coloured white.

Scope

2.1 Covertek 401 Roof Underlay has been appraised for use as a roof underlay on buildings within the following scope:

- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 with regards to building height and floor plan area; or,
- the scope limitations of NASH Building Envelope Solutions, Paragraph 1.1 for steel framed buildings; and,
- with masonry tile roof cladding; and,
- with metal tile roof cladding; and,
- with profiled metal roof cladding; and,
- situated in NZS 3604 Wind Zones up to, and including Extra High.

Building Regulations

New Zealand Building Code (NZBC)

3.1 **In the opinion of BRANZ, Covertek 401 Roof Underlay, if used, designed, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet, or contribute to meeting the following provisions of the NZBC:**

Clause B2 DURABILITY: Performance B2.3.1 (a), not less than 50 years, B2.3.1 (b), 15 years and B2.3.2. Covertek 401 Roof Underlay meets these requirements. See Paragraphs 9.1 and 9.2.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.2. When used as part of the roof cladding system, Covertek 401 Roof Underlay will contribute to meeting this requirement. See Paragraphs 12.1 and 12.2.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Covertek 401 Roof Underlay meets this requirement and will not present a health hazard to people.

Readers are advised to check the validity of this Appraisal by referring to the Valid Appraisals listing on the BRANZ website, or by contacting BRANZ.

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Technical Specification

4.1 Covertek 401 Roof Underlay is a synthetic building underlay for use under roof claddings. The product consists of a micro-porous water resistant film ultrasonically bonded to two layers of non-woven spun-bonded polyolefin. Covertek 401 Roof Underlay is colour white or light grey.

4.2 The product is supplied in rolls 1.350 m wide x 55.6 m long. The product is printed with the Thermakraft 401 logo repeated along the length of the roll. The rolls are wrapped in clear polythene film.

Accessories

4.3 Accessories used with Covertek 401 Roof Underlay which are supplied by the installer are:

- **Fixings** - stainless steel staples, clouts, screws or proprietary underlay fixings, or other temporary fixings to attach the roof underlay to the framing.

Handling and Storage

5.1 Handling and storage of the product, whether on or off site, is under the control of the installer. The rolls must be protected from damage and weather. They must be stored on end, under cover, in clean, dry conditions and must not be crushed.

Technical Literature

6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for Covertek 401 Roof Underlay. The Technical Literature must be read in conjunction with this Appraisal. All aspects of design, use, installation and maintenance contained in the Technical Literature and within the scope of this Appraisal must be followed.

Design Information

General

Timber and Steel Framing

7.1 Timber and steel roof framing must be provided in accordance with the requirements of the NZBC and the roof cladding manufacturer.

General

7.2 Covertek 401 Roof Underlay is intended for use as an alternative to conventional kraft paper roof underlays, which are fixed over timber or steel framed roofs in order to limit the entry of wind into the roof cavity, and to assist in the moisture management of the roof cladding system.

7.3 The material also provides a degree of temporary weather protection during early construction. However, the product will not make the roof weathertight and some wetting of the underlying structure is always possible before the roof cladding is installed. Hence, the entire building must be closed-in and made weatherproof before moisture sensitive materials such as ceiling linings and insulation materials are installed.

7.4 Covertek 401 Roof Underlay must not be exposed to the weather or ultra violet light for a total of more than 7 days before being covered by the roof cladding.

7.5 Covertek 401 Roof Underlay is suitable for use under roof claddings on buildings as a roof underlay as called up in NZBC Acceptable Solution E2/AS1, Table 23 or NASH Building Envelope Solutions Table 23 for steel framed buildings. Refer to Table 1.

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Table 1: Material Requirements

NZS 2295 Property	Property Performance Requirement	Results
Absorbency	≥ 150 g/m^2	Pass
Vapour Resistance	≤ 7 MN s/g	Pass
Water Resistance	≥ 100 mm	Pass
pH of Extract	≥ 5.5 and ≤ 8	Pass
Shrinkage	≤ 0.5%	Pass

7.6 Covertek 401 Roof Underlay is suitable for use at roof pitches 3° and above. When used at pitches less than 10°, Covertek 401 Roof Underlay can be installed horizontally when spanning no greater than 1200 mm in one direction, or it can be installed vertically when fully supported by a corrosion resistant material.

7.7 At pitches 10° and greater, Covertek 401 Roof Underlay can be installed vertically or horizontally and must span no greater that 1200 mm in one direction.

7.8 At roof pitches less than 10° (minimum 3°), Covertek 401 Roof Underlay may be run horizontally, or vertically if installed over a roof underlay support.

7.9 Refer to Table 2 for a summary of the roof underlay support requirements.

Table 2: Roof Underlay Support Requirements

Roof Pitch	Span	Roof Underlay Support Required?	
		Horizontally Installed	Vertically Installed
10° or more	Greater than 1200 mm	Yes	Yes
	1200 mm or less	No	No
Less than 10° (minimum 3°)	Greater than 1200 mm	Yes	Yes
	1200 mm or less	No	Yes

Structure

8.1 Covertek 401 Roof Underlay is suitable for use in all Wind Zones of NZS 3604 up to, and including, Extra High or NASH Standard Part 2 Wind Zones up to and including Extra High.

Durability

9.1 Covertek 401 Roof Underlay meets code compliance with NZBC Clause B2.3.1 (a), not less than 50 years for roof underlays used where the roof cladding durability requirement or expected serviceable life is not less than 50 years, e.g. behind masonry roof tile cladding, and code compliance with NZBC Clause B2.3.1 (b), 15 years for roof underlays used where the roof cladding durability requirement is 15 years.

Serviceable Life

9.2 Provided it is not exposed to the weather or ultra-violet light for a total of more than 7 days, and provided the roof cladding is maintained in accordance with the cladding manufacturer's instructions and the roof cladding remains weather resistant, Covertek 401 Roof Underlay is expected to have a serviceable life equal to that of the roof cladding.

Control of Internal Fire and Smoke Spread

10.1 Covertek 401 Roof Underlay has an AS 1530 Part 2 Flammability Index of greater than 5. For Risk Groups other than SH, Covertek 401 Roof Underlay must be enclosed by a suitable internal lining in occupied spaces (not exposed to view).

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Prevention of Fire Occurring

11.1 Separation or protection must be provided to Covertek 401 Roof Underlay from heat sources such as fire places, heating appliances, flues and chimneys. Part 7 of NZBC Acceptable Solutions C/AS1, C/AS2 and NZBC Verification Method C/VM1 provide methods for separation and protection of combustible materials from heat sources.

External Moisture

12.1 Covertek 401 Roof Underlay must only be used under roof claddings that meet the requirements of the NZBC, such as those covered by NZBC Acceptable Solution E2/AS1 or NASH Building Envelope Solutions, or roof claddings covered by a valid BRANZ Appraisal.

12.2 Covertek 401 Roof Underlay, when installed in accordance with the Technical Literature and this Appraisal, will assist in the total cladding system's compliance with NZBC Clause E2.

Installation Information

Installation Skill Level Requirements

13.1 Installation must always be carried out in accordance with the Covertek 401 Roof Underlay Technical Literature and this Appraisal by, or under the supervision of a Licensed Building Practitioner with the relevant Licence Class.

Underlay Installation

14.1 Covertek 401 Roof Underlay must be fixed at maximum 300 mm centres to all framing members with large-head clouts 20 mm long, 6-8 mm stainless steel staples, self-drilling screws or proprietary underlay fixings. The membrane must be pulled taut over the framing before fixing.

14.2 Covertek 401 Roof Underlay may be installed horizontally or vertically at roof pitches 3° and above (refer to Paragraph 7.1 for further guidance). It must extend from the ridge and overhang the fascia board by 20-25 mm. Vertical laps must be no less than 150 mm wide. Horizontal laps must also be no less than 150 mm, with the direction of the lap ensuring that water is shed to the outer face of the underlay. End laps must be made over framing and be no less than 150 mm wide. To assist with achieving the correct lap dimension, Covertek 401 Roof Underlay has a 150 mm lap line printed continuously along the top face.

14.3 When fixing the product in windy conditions, care must be taken due to the large sail area created.

14.4 Any damaged areas of Covertek 401 Roof Underlay, such as tears, holes or gaps around service penetrations, must be repaired. Damaged areas can be repaired by covering with new material lapping the damaged area by at least 150 mm and taping, or by taping small tears.

Inspections

14.5 The Technical Literature must be referred to during the inspection of Covertek 401 Roof Underlay installations.

Basis of Appraisal

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

Tests

15.1 The following tests have been carried out on Covertek 401 Roof Underlay in accordance with NZBC Acceptable Solution E2/AS1, Table 23 and NASH Building Envelope Solutions: tensile strength, edge-tear resistance and resistance to water vapour transmission in accordance with AS/NZS 4200.1, shrinkage in accordance with AS/NZS 4201.3, resistance to water penetration in accordance with AS/NZS 4201.4, surface water absorbency in accordance with AS/NZS 4201.6 and pH of extract in accordance with AS/NZS 1301.421s. A range of these tests were completed before and after the underlays were exposed to ultra-violet light.

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Other Investigations

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

16.2 An evaluation of the expected performance of Covertek 401 Roof Underlay in direct contact with metal roof cladding has been completed by BRANZ.

16.3 The practicability of installation of Covertek 401 Roof Underlay has been assessed by BRANZ and found to be satisfactory.

16.4 The Technical Literature, including installation instructions, has been examined by BRANZ and found to be satisfactory.

Quality

17.1 The manufacture of Covertek 401 Roof Underlay has been examined by BRANZ, including methods adopted for quality control. Details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory.

17.2 The quality of supply to the market is the responsibility of Thermakraft Limited.

17.3 Building designers are responsible for the design of the building, and for the incorporation of the roof underlay into their design in accordance with the instructions of Thermakraft Limited.

17.4 Quality of installation is the responsibility of the installer in accordance with the instructions of Thermakraft Limited.

Sources of Information

- AS/NZS 1301.421s: 1998 Determination of the pH value of aqueous extracts of paper, board and pulp - cold extraction method.
- AS/NZS 4200.1: 1994 Pliable building membranes and underlays - materials.
- AS/NZS 4201.3: 1994 Pliable building membranes and underlays - Methods of test – Shrinkage.
- AS/NZS 4201.4: 1994 Pliable building membranes and underlays - Methods of test – Resistance to water penetration.
- AS/NZS 4201.6: 1994 Pliable building membranes and underlays - Methods of test – Surface water absorbency.
- NASH Building Envelope Solutions: 2019 Light steel framed buildings
- NASH Standard Part Two: 2019 Light Steel Framed Buildings
- NZS 3604: 2011 Timber-framed buildings.
- Ministry of Business, Innovation and Employment Record of amendments - Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992.

Amendments

Amendment No. 1, dated 23 February 2017.

This Appraisal has been amended to update the Appraisal Holder.

Amendment No. 2, dated 13 February 2020.

This Appraisal has been amended to update the 'Design Information' Section, update fire clause references, update product name, update company logo and the inclusion of NASH Building Envelope Solutions.

Readers are advised to check the validity of this Appraisal by referring to the Valid Appraisals listing on the BRANZ website, or by contacting BRANZ.

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BRANZ

In the opinion of BRANZ, Covertek 401 Roof Underlay is fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided it is used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to Thermakraft Limited, and is valid until further notice, subject to the Conditions of Appraisal.

Conditions of Appraisal

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

For BRANZ

Chelydra Percy
Chief Executive

Date of Issue:
30 November 2016

Readers are advised to check the validity of this Appraisal by referring to the Valid Appraisals listing on the BRANZ website, or by contacting BRANZ.

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ALTERNATIVE SOLUTION to E2/AS1: Brick piers less than 230mm wide (Fig. 50)

Extract from John Oliver's Brick Book, Third Edition 2014

FIG. 48 LARGE WIDTH LINTEL - UB

SD

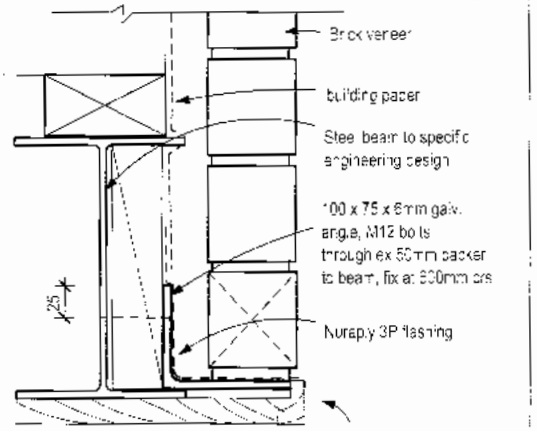


FIG. 49 LARGE WIDTH LINTEL - Channel

SD

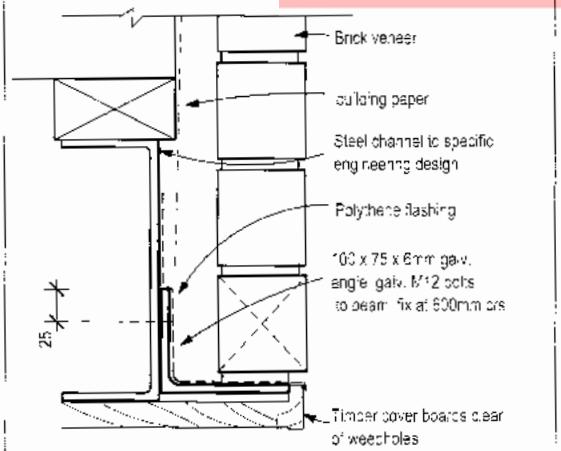
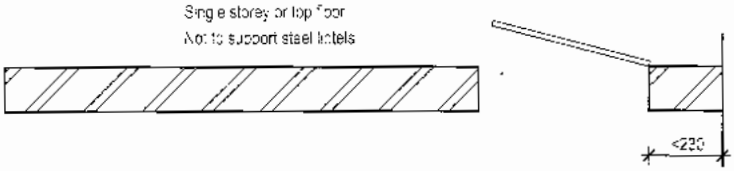


FIG. 50 PIERS & RETURNS - Brick Veneer Openings & Arches

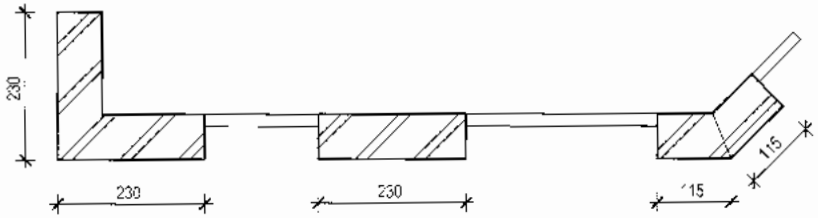
PLAN VIEW

A) Alternative solution for BCA when piers are less than 230mm wide

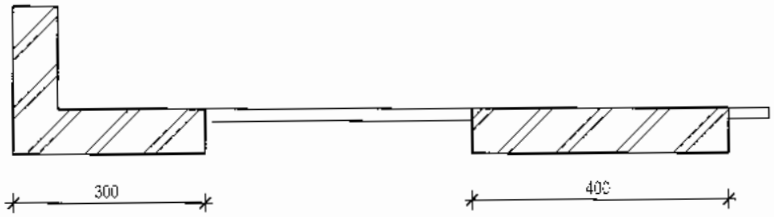
LIMITATIONS: Tie every second brick
Single storey or top floor
Not to support steel lintels



B) Bricks to be tied every second course.
230mm piers are too small to support lintels which require 230mm of bending each side. Ignore pier and treat as one large opening



C) Galvanised steel lintels may be supported on 300mm returns and 400mm piers



Note: In most cases where brick veneer is tied to a timber or steel frame it is in a non-structural situation and the width of the pier is not critical unless it is carrying a lintel load.
Where the dimension of the end support is in question, the load may be transferred to the structural frame using Shelf Angles provided the specification is followed. Alternatively, consult a structural engineer for specific design

General Comment on Concrete Reinforced Arches

Avoid placing reinforced concrete (unless in concrete block form) between two skins of brick veneer to form arches. This may result in long term salt problems on the surface of the bricks due to salts in the concrete. Consult a structural engineer as specific design is required.

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GERARD
Roofing Designed to Endure
BC0777/21
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Product Technical Statement

Gerard Roofs Pressed Steel Tiles

Statement of Building Code Compliance

This system if designed, used, installed and maintained in accordance with the supporting technical information and additional conditions and limitations will meet the following provisions of the New Zealand Building Code:

- B1 Structure
- B2 Durability
- E1 Surface Water
- E2 External Moisture

Evidence Base to Support Compliance

This system has the following evidence to support the above solution type declaration:

- Independent technical opinion
- In-house technical opinion
- Independent testing
- In-house testing
- Industry-based scheme
- Historical proof of performance

B1, B2, E1 & E2 reference NZ Metal Roofing & Wall Cladding Manufacturers Code of Practice. Section 10 relates to Pressed Metal Roofing Tiles.

Compliance with NZS4217 Pressed Metal Tile Roofs

Aluminium-zinc coated steel complies with AS1397, not NZS3441 as prescribed in NZS4217. We are also comfortable that we meet the requirements of B2 based on the In-service History Evaluation allowed under B2/VM1. At two severe marine testing sites we have roofs which are in good condition after 23 and 25 years respectively. Evaluations continue on other roofs which are in excess of 30 years.

Scope of Use

Buildings that comply with NZS3604 with a minimum roof pitch which is profile dependent of between 12 and 20 degrees.

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Environmental Conditions

This system is code-compliant for the following environmental conditions:

- Wind Zone - Specific Design
- Corrosion Zone - Sea Spray Extreme
- Seismic Zone - High

Specific design can allow higher wind speeds - batten rafter connections are the limitation.

Installation Conditions

This system is code-compliant on the condition that it has been installed by:

- Licensed Applicator / Installer

Additional Conditions & Limitations

A warranty for the system is supplied with 50 year pro-rated duration.

Material Compatibility with Modern Roofing Materials

If alterations are made to the home after the installation of the roof, such as fitting of chimneys, extensions, installation of skylights, etc., it is important to ensure that the materials that are used are compatible with the roofing material. Gerard Roofs' steel tiles are manufactured from 55% aluminium- zinc coated steel and then post coated with a protective and decorative coating system.

Dissimilar Metal Corrosion

When two different metals are in contact and moisture is present, one metal is relatively protected while the other suffers accelerated corrosion. A similar effect commonly occurs with water flowing over dissimilar metals. This form of corrosion is commonly found where:

- Water is discharged from copper or brass systems over a galvanised or 55% aluminium-zinc coated steel roof
- Unpainted lead flashings are applied directly to 55% aluminium-zinc coated steel products, or
- Where fasteners are incompatible with the roofing material

Any electrical contact between dissimilar metals should be avoided.

Consenting Instructions

Where Gerard Metal Roofing Tiles are specified on plans these must be installed by a trained installer. Substitution is not allowed.

Critical Maintenance

As detailed in our warranty: "It is best to chemically clean the roof before growths are seen as a preventative maintenance measure. Spores may be present on the roof for up to two years before any visible organic growths are noticed. Treating the roof will not only kill the organic growths, but also the spores that lead to them. We suggest treating the roof every three to five years, however if you see growth occurring treat the roof more frequently."

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Product Technical Statement

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Ashburton District Council

Gerard Roofs Pressed Steel Tiles

Statement of Building Code Compliance

This system if designed, used, installed and maintained in accordance with the supporting technical information and additional conditions and limitations will meet the following provisions of the New Zealand Building Code:

- B1 Structure
- B2 Durability
- E1 Surface Water
- E2 External Moisture

Evidence Base to Support Compliance

This system has the following evidence to support the above solution type declaration:

- Independent technical opinion
- In-house technical opinion
- Independent testing
- In-house testing
- Industry-based scheme
- Historical proof of performance

B1, B2, E1 & E2 reference NZ Metal Roofing & Wall Cladding Manufacturers Code of Practice. Section 10 relates to Pressed Metal Roofing Tiles.

Compliance with NZS4217 Pressed Metal Tile Roofs

Aluminium-zinc coated steel complies with AS1397, not NZS3441 as prescribed in NZS4217. We are also comfortable that we meet the requirements of B2 based on the In-service History Evaluation allowed under B2/VM1. At two severe marine testing sites we have roofs which are in good condition after 23 and 36 years respectively. Evaluations continue on other roofs which are in excess of 30 years.

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Scope of Use

Buildings that comply with NZS3604 with a minimum roof pitch which is profile dependent of between 12 and 20 degrees.

Environmental Conditions

This system is code-compliant for the following environmental conditions:

- Wind Zone - Specific Design
- Corrosion Zone - Sea Spray Extreme
- Seismic Zone - High

Specific design can allow higher wind speeds - batten rafter connections are the limitation.

Installation Conditions

This system is code-compliant on the condition that it has been installed by:

- Licensed Applicator / Installer

Additional Conditions & Limitations

A warranty for the system is supplied with 50 year pro-rated duration.

Material Compatibility with Modern Roofing Materials

If alterations are made to the home after the installation of the roof, such as fitting of chimneys, extensions, installation of skylights, etc., it is important to ensure that the materials that are used are compatible with the roofing material. Gerard Roofs' steel tiles are manufactured from 55% aluminium-zinc coated steel and then post coated with a protective and decorative coating system.

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Dissimilar Metal Corrosion

When two different metals are in contact and moisture is present, one metal is relatively protected while the other suffers accelerated corrosion. A similar effect commonly occurs with water flowing over dissimilar metals. This form of corrosion is commonly found where:

- Water is discharged from copper or brass systems over a galvanised or 55% aluminium-zinc coated steel roof
- Unpainted lead flashings are applied directly to 55% aluminium-zinc coated steel products, or
- Where fasteners are incompatible with the roofing material

Any electrical contact between dissimilar metals should be avoided.

Consenting Instructions

Where Gerard Roof Tiles are specified on plans these must be installed by a trained installer. Substitution is not allowed.

Critical Maintenance

As detailed in our warranty: "It is best to chemically clean the roof before growths are seen as a preventative maintenance measure. Spores may be present on the roof for up to two years before any visible organic growths are noticed. Treating the roof will not only kill the organic growths, but also the spores that lead to them. We suggest treating the roof every three to five years, however if you see growth occurring treat the roof more frequently."

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External Moisture

To Whom It May Concern

Re: Gerard Roof Tiles External Moisture. NZBC and Specific Engineering Design.

NZBC E2 requires that a roof provide adequate resistance to penetration by, and the accumulation of, moisture from the outside.

Gerard Roofs have been in service for more than 50 years and we offer a 50 year warranty on our metal roofing tiles even in extreme environments.

E2/AS1 Section 8.3 Pressed Metal Tile, The Metal Roofing and Wall Cladding Code of Practice and Gerard Roofs Installation manual provide details which outline the installation of the roofing system so that the roofing system meets the NZBC E2 requirements.

Wall Flashing Details

E2/AS1 requires the use of wall flashings specific to the wind zone in which the roofs will be fastened – these relate to the minimum cover that the wall must cover the flashing up-stand. In situations where the wind zone is higher than Extra High the flashings specified in the Extra High Wind Zone should be used. This requires coverage of 90 mm.

Gerard roofs install roofs in cyclonic regions of Australia where wind speeds of 240 km/hr have occurred without issues with standard flashings.

Roofing Underlays

Pressed metal tiles have to have an underlay that meets the requirements of NZS 2295:2006. The Bitumen based underlays are not suitable for Extra High or above Wind Zones however there are some Synthetic roofing underlays that have been approved by BRANZ which are suitable for the Extreme Wind Zones.

A Synthetic roofing underlay should be used under roofs that are located in Extra High or Specific Engineering Designed situation.

In summary, we have confidence that roofs installed as per Gerard Roofs installation manual and maintained in accordance with our warranty will last in excess of 50 years, we have installed roofs in New Zealand for more than 50 years and have significant numbers of installations in cyclonic regions where the wind and rainfall levels exceed those of the New Zealand Environment.

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Should this not address your concerns, please feel free to contact me in person so I can better understand your reservations.

Regards

Dean Vincent

Sales and Marketing Manager

New Zealand and Pacific Regions

Peter Richards

Product Innovation Manager

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Dektite

Design features

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Flexible Cone Sleeve

Dektite cone shape eliminates seal breakdown due to vibration or expansion and contraction, while isolation of pipe from sheeting dampens noise levels.

Stress Isolation Points

Unique to Dektite, two flexible shoulders absorb distortion and stop transfer of stresses from base to cone, as unit is formed over roofing profile.

Bonded Aluminium Flange

Corrosion-resistant, malleable flange, evenly distributes fastening pressure and allows ease of hand-shaping on most sheet profiles.

Integrity of Flashing Shape

Minimal distortion after installation, maintains natural flashing shape and seal around pipe, while water run-off is improved.

UV Protection

Dektite products are resistant to ultraviolet light damage and will remain fully flexible under all conditions.

Easily Identified Sizing

Pipe diameter rings are clearly marked on the cone sleeve (metric and imperial) for cutting to match the appropriate pipe diameter.

Low Profile Design

Sleek, unobtrusive shape is designed to minimise silhouette on roofline, while managing to provide generous internal clearance for steep, angular installations.

Improved Waterproofing

Designed to strengthen sealant bond and improve waterproofing, the ribbed base also has a tapered edge to improve runoff and contribute to a superior waterproof seal.

Perfect for approved flues!

Dektite EPDM polymer flashings have been officially tested and conform to all Australian and New Zealand Standards on approved flue systems. EPDM withstands temperatures from -50°C - 115°C and up to 150°C intermittently. withstands temperatures from -60°C - 200°C and up to 250°C intermittently.

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Dektite Aluminium

The best solution for stone chip and pressed metal tiles

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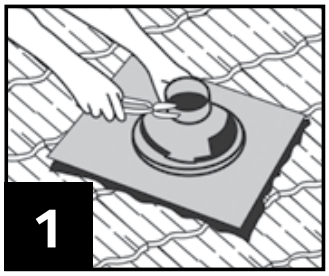
- ✔ The base is 99.9% pure grade aluminium making it strong, malleable and easy to install.
- ✔ Environmentally friendly, ideal where potable water is collected.
- ✔ The best solution for stone chip and pressed metal tiles.
- ✔ EPDM withstands temperatures from -50°C to 115°C and up to 150°C intermittently.

Code	Base (mm)	Pipe (mm)	Pitch	Colour
TFA 12-70	500 x 600	12-70	0-45°	BLACK (EPDM)
TFA 50-170	600 x 600	50-170	0-45°	
TFA 110-220	764 x 764	110-200	0-45°	
TFA 160-300	600 X 900	160-300	0-45°	
TFA 300-450	965 x 965	300-450	0-45°	

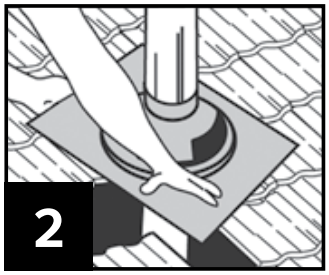




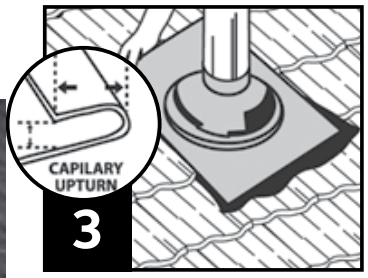
Installation Instructions:



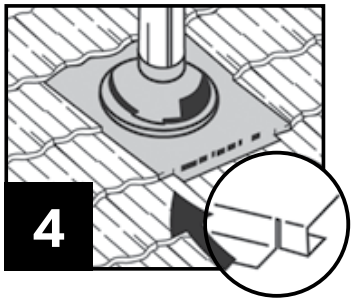
Trim Dektite cone to suit pipe size using sharp tin snips.



After lubricating the flue with water, slide Dektite down to the tile level.



Form an anti-capillary fold then place upper edge of base under up-stream tiles.



Dress base to profile, cut tabs on the bottom corners and fold under to stop wind lift .

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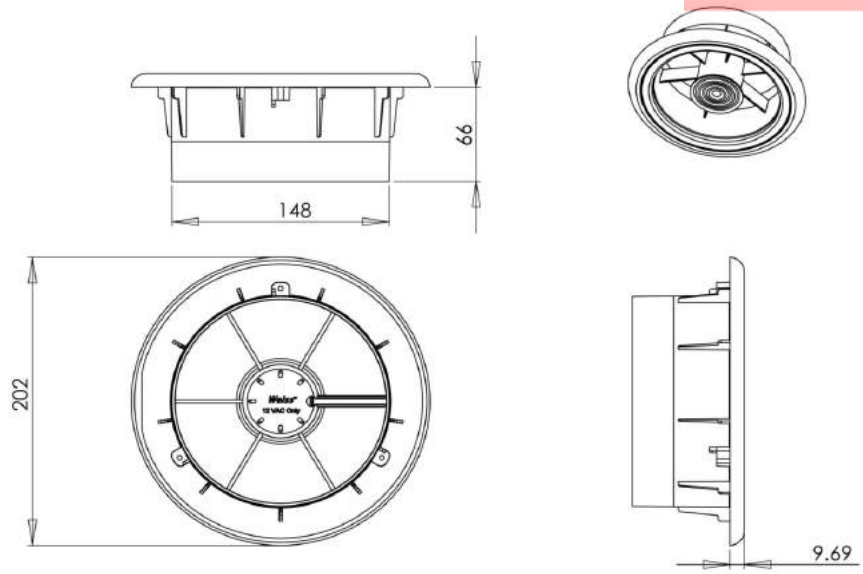
Technical Data Sheet

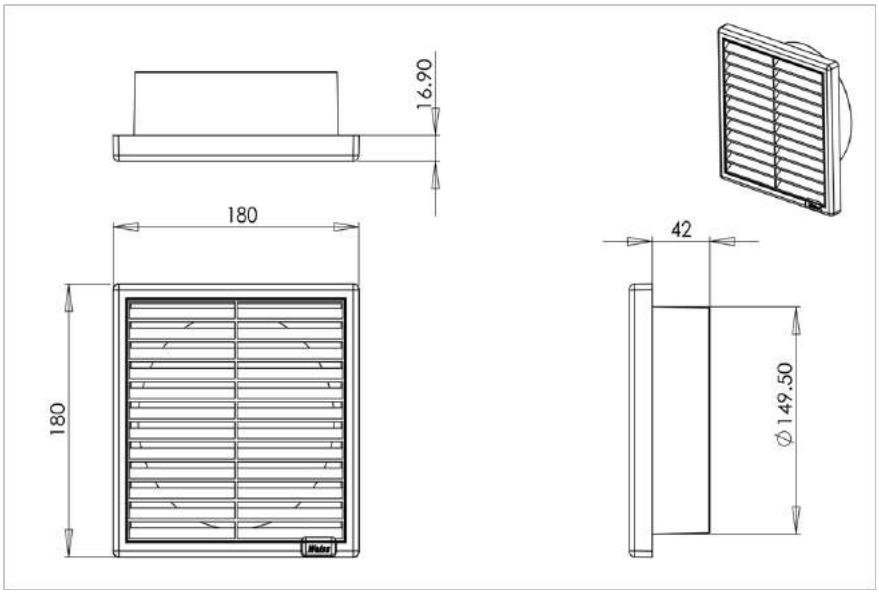
FV130

Shower Fan Unit

150mm ducting

Dimensions	
Cut-out size for inlet fascia	170mm
Cut out size for outlet vent	155mm





Specifications

Weight	2kg
Colour of front fascia	White
Housing material	ABS

Approval

AS/NZS 3350.2.80:1998 Amdts 1-3 "Electrical Fan"

Features

- Easy to install
- 6 metres of 150mm ducting supplied
- Unique 'no fuss' all in one unit
- Allows moisture to be removed to the out-side of your home
- All parts are included
- 3 year extended warranty

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Technical Data Sheet

Product Use

The FV130 is used for the extraction of mist and steam

Typical applications:

- Bathrooms
- Toilets
- Laundries

Environmental Conditions

Operation	to IEC 721-3-3
Climatic conditions	class 3K5
Temperature	0...+50°C
Humidity	<95% r.h.

Standards

Test standards	AS/NZS 3350.2.80: 1998 Amdts 1-3 "Electrical Fan"
Test Report no	SD3190
EMC Compliance	This is a Level One product with an C frame motor that has a very low risk of causing EMC Interference

General

Free Air Fan Performance	362m³/ hr 100.6L/sec
Installed decibel rating	45DB

Ordering

When ordering please give name and type,

Reference	FV130
Barcode	942000490093-8

Technical Data

Power Supply	230 VAC
Power consumption	max. 0.4 Amps
Supply Line fusing	max. 10A
For solid wires	2 x 1.5mm²
Motor	230-240VAC 50Hz 0.4 Amp
Motor insulation class	B1
Total motor wattage	40 Watts
Motor protection	Thermally protected
Total product wattage	40 watts

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ARDEX WPM 001

One-Part Undertile Waterproofing Membrane

Fast-drying acrylic undertile liquid waterproofing membrane

Class III Membrane - Conforms to AS4858:2004

BRANZ Appraised (No. 472 and No. 473)

Suitable for internal use

Low VOC content – meets Green Building Council of Australia Green Star IEQ-13 requirements

BRANZ Appraised
Appraisal No.472 [2017]

BRANZ Appraised
Appraisal No.473 [2017]

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ARDEX WPM 001

One-Part Undertile Waterproofing Membrane

PRODUCT DESCRIPTION

ARDEX WPM 001 is a tough, ready to use waterproofing membrane specifically designed for use under tiles. ARDEX WPM 001 has been uniquely formulated with synthetic microfibres to increase its strength and eliminate the need for a separate reinforcement mat. ARDEX WPM 001 is based on the most advanced acrylic polymer technology, and is totally resistant to re-emulsification once cured.

ARDEX WPM 001 is flexible, safe to use, low in odour, and is fully compatible with polymer modified tile adhesives. ARDEX WPM 001 is one of the fastest drying one part acrylic membranes on the market – normally ready to tile in 48 hours @ 23°C.

ARDEX WPM 001 meets the Green Building Council of Australia Green Star IEQ-13 requirements for Architectural Sealant when tested in accordance with SCAQMD Method 304-91 Determination of Volatile Organic Compounds (VOC) in Various Materials as referenced by South Coast Air Quality Management Division (SCAQMD) Rule 1168.

FEATURES/BENEFITS

- Fast drying ARDEX WPM 001 can be tiled over in 48 hours in non critical areas*
- Liquid reinforced: Excellent strength, eliminates need for reinforcing mat
- Flexible: Accommodates normal building movement class 3 membrane as per AS/NZ 4858: 2004 Wet Area Membranes
- Advanced acrylic: Will not re-emulsify once cured
- Designed for tiling - Fully compatible with ARDEX tile adhesive systems
- Water based, safe to use, low odour & easy cleaning
- CSIRO Appraisal #91 for undertile waterproofing in shower recesses
- Conforms to the requirements of AS/NZ 4858: 2004 Wet Area Membranes.
  (Ref: CSIRO Report 3779)

*Critical areas include areas where the membrane is applied at greater than 0.5mm or over impermeable substances such as over bond breakers or incorporating other reinforcement. Longer drying times are necessary in these areas.

APPLICATION RANGE

Performance Levels
Commercial and residential

Location
Internal wet areas, balconies, decks, and other areas that will be tiled or otherwise protected from regular foot traffic. Only recommended on concrete, screed and render substrates externally.

Surfaces
Walls & floors

Substrates

Concrete	Cured for min. 28 days or sealed when set with one coat of ARDEX WPM 300 (HydrEpoxy 300) at a coverage rate of 3.0 square metres per litre and allowed to cure overnight. External wet concrete should be allowed to dry thoroughly or sealed with one coat of ARDEX WPM 300 as above.
Renders and screeds	Cured for min. 7 days or sealed when set with one coat of ARDEX WPM 300 at a coverage rate of 3.0 square metres per litre and allowed to cure overnight. Wet render should be allowed to dry thoroughly or sealed with one coat of ARDEX WPM 300 as above.
Fibre cement	Suitable for wet area grade fibre cement.
Plasterboard	Wet area grade only.
Plywood	Structural plywood (PAA branded), marine grade or other wet area grade only. Not recommended for external use (Refer ARDEX). Plywood panels shall be laid with staggered joints (brick bond), the edge of sheets shall be supported with dwangs or framing. The maximum recommended span in E2/AS1 is 400mm. However specific design may allow 17.5mm plywood or greater to be laid on 400mm purlins with nogs or dwangs at 600mm or even 1200mm centres. Plywood shall be laid with the face grain at right angles to the supports. External edges shall be chamfered with a minimum radius of 5mm. Plywood shall be fixed with 10 gauge x 50mm stainless steel countersunk head screws with 3mm gaps between all sheets, at 150mm centres on edges, and 200mm in the body of the sheets. All joints in the plywood and junctions of plywood with other materials shall have 25mm ARDEX Release tape applied before application of the membrane.
Particleboard	Wet area grade, internal use only (special preparation is required – contact ARDEX).
Permanent Immersion	In conditions of permanent immersion, it is recommended that ARDEX WPM 002 (Superflex Two Part) is used. Must be covered with tiles for full immersion.

Contact ARDEX for use over existing membranes, covering materials, and any other substrates not listed.

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TABLE 1

	Thickness per Coat		Total Dry Film Thickness (2 coats)	Theoretical Coverage		Per Unit
	Dry Film	Wet Film		Per coat	For 2 coats	
FLOORS	0.5mm	1.0mm	1.0mm	15m²	7.5m²	20kg(15L) unit
WALLS	0.25mm	0.5mm	0.5mm	30m²	15m²	20kg(15L) unit

PACKAGING

Single component: 20kg (approx. 15 litres)

SHELF LIFE

12 months when stored in the original unopened packaging, in a dry place at 23°C. Do not store in direct sunlight. Replace lid tightly after use. Use remaining contents from part used containers within 3 months.

COVERAGE

Two coats are recommended for an effective waterproof membrane.

Coverage will vary depending on the porosity of the surface.

One 20kg (15 litre) unit will cover approximately 7.5-15m² (based on two coats) depending on area requirements between wall and floor surfaces to be treated. Refer Table I.

DRYING TIMES

Recoat time

1-2 hours at (23°C/50% RH) between first and second coats. Alternatively, if a polyester mat is used between coats then the second coat can be applied whilst the first coat is still wet.

Dry through

The slowest drying areas are those where the membrane has been applied over a silicone bond breaker, eg. wall and floor junctions. The membrane cannot be tiled over until these critical areas are completely dry. ARDEX WPM 001 is totally dry in 48 hours at 23°C/50% RH, but can take up to 72 hours at 10°C/50% RH in corners or for thick films.

Fully cured

The shower should not be used until the membrane has reached its full strength. ARDEX WPM 001 membrane is fully cured after 3 days at 23°C, or after 5 days at 10°C.

Drying times will vary depending on humidity, surface temperature and surface porosity.

Do not apply on substrates where the surface temperature is below 10°C or above 35°C.

CLEANING

Wash hands, brushes, rollers, etc, with water while the membrane is still fresh. Remove cured material with mineral turpentine.

SAFETY PRECAUTIONS

Do not use the product in the following situations:

- Areas subject to negative hydrostatic pressure or rising damp, unless treated with ARDEX WPM 300.
- Where the substrate is wet – wet surfaces can be sealed with one coat of ARDEX WPM 300 at a coverage rate of 3.0 square metres per litre and allowed to cure overnight.
- Where rain is imminent.
- Where the membrane will be left exposed and subjected to regular foot traffic.
- On glazed, glass or other totally impervious surfaces (eg. areas pre-treated with water repellants).
- Where the surface temperature is below 10°C or greater than 35°C.
- All floor areas must have adequate falls either built into the substrate or achieved with a sand/cement screed prior to application of the ARDEX WPM 001.

For substrates or situations other than those listed contact ARDEX.

SAFETY DATA

ARDEX WPM 001 is non-hazardous and non dangerous. It may produce discomfort of the eyes, respiratory tract and skin. Do not breathe gas/fumes/vapour/spray. Avoid contact with skin. Wear eye/face protection. In case of contact with eyes, rinse with plenty of water and seek medical advice.

ADDITIONAL INFORMATION IS LISTED IN THE SAFETY DATA SHEET.

QUALITY PRODUCT

ARDEX WPM 001 is manufactured and tested to ARDEX procedures which are maintained in accordance with Quality System Standard ISO 9001.

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ARDEX WPM 001

One-Part Undertile Waterproofing Membrane

USER NOTES

The technical details and recommendations contained in this data sheet are given in good faith and represent the best of our knowledge and experience at the time of printing. It is the responsibility of the user to ensure that the product is used in accordance with ARDEX instructions and in applications for which they are intended.

APPLICATION

Apply ARDEX WPM 001 by brush or roller. A medium nap (12-15mm pile) paint roller is recommended. New rollers should be dampened with water before being used for the first time.

For best results with a paint brush use a good quality, 50mm long bristle variety.

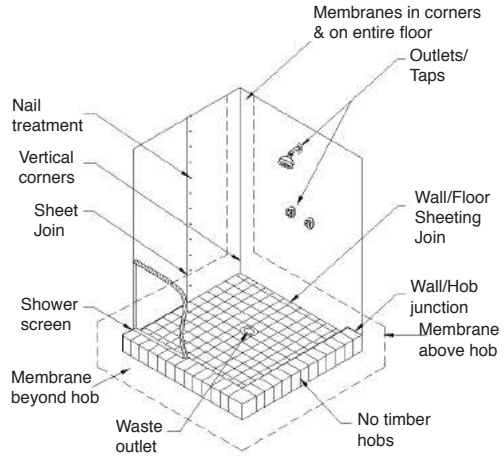
To achieve the required dry film thickness per coat, application must consist of laying the product onto the surface and light finish the surface. Do not try to apply in the same manner as a building paint. A conventional building paint is normally applied at 25-40 micrometers wet film thickness while ARDEX WPM 001 needs to be applied at between 0.5 and 1.0 mm per coat depending on product and application (Refer Table 1).

CRITICAL AREAS:

INTERNAL WET AREAS

1. Construction should be in accordance with Australian 3740 - 2004 Waterproofing of wet areas within residential buildings.
2. All render and tile bed requirements should be completed before application of the membrane and tiles or other floor coverings should be direct bonded to the membrane.
3. Ensure wall & floor sheets are installed as per sheet manufacturer's recommendations.
4. Ensure suitable brick/concrete hobs are used (do not use timber).

Fig.1 – Shower Recess – Critical Areas

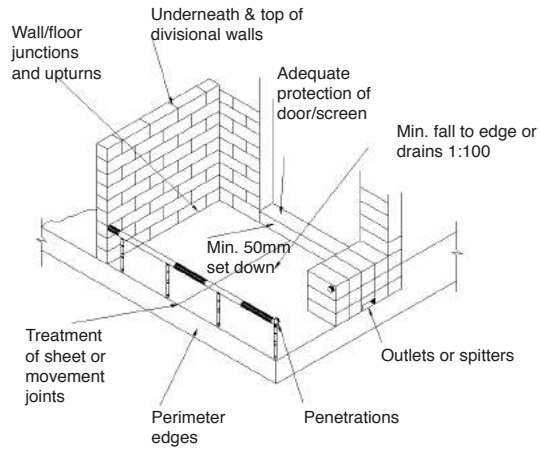


5. Ensure that falls to the waste are min 1:60 (ie. approx. 30mm in 2mtr)) before waterproofing. Ensure outlet pipes are fixed securely and that the waste or drainage flanges are recessed into the floor.
6. Avoid sheet joints in shower recess floor. Ensure that sheets are securely fixed to the wall at the bottom edge, and sheet joints are sealed with a neutral cure silicone sealant spread approximately 6mm on either side of the joint.
7. Treat nail and screw holes with neutral cure silicone sealant.
8. Seal the perimeters of taps, shower outlets and waste outlets with neutral cure silicone sealant.
9. Apply a bead of neutral cure silicone sealant to all horizontal and vertical corners.
10. Apply a bead of neutral cure silicone sealant to the junction of the hob or angle and walls. Spreading the sealant to 6mm on either side of the joint.
11. Waste outlets shall incorporate a puddle flange or similar in accordance with AS3740 & the top surface shall be set flush with the surface to which the membrane is to be applied. A bead of neutral cure silicone shall be applied across the intersection of the puddle flange and the screed/floor.
12. Apply the membrane to the entire shower recess floor and down into waste or drainage flange. Apply the membrane over the hob and at least 150mm beyond the outside edge of the hob (ideally to entire wet area floor).
13. Apply the membrane 1800mm up the walls or to the height of the shower rose within the shower recess.
14. Install the shower screen to inside edge of the hob.

BALCONIES AND DECKS

1. Ensure that the deck is constructed with falls to edge/drains of min 1:100 (ie. 20mm in 2m) or else

Fig.2 – Balcony – Critical Areas



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achieve the fall with a sand/cement screed.

2. Ensure a min set down (step down) of 50mm to the finished floor level (ie. top of tiles).
3. Ensure suitable flashing is installed, ideally prior to the installation of the balcony screen/ sliding door.
4. Treat any sheet joints with a neutral cure silicone prior to waterproofing.
5. Prepare and seal all wall/floor junctions with a bead of neutral cure silicone.
6. Apply the membrane up the step down and as far up underneath the screen door flashing as possible (ideally waterproof prior to installing door).
7. Where possible, apply the membrane prior to building divisional walls, or other items such as planter boxes.
8. Apply the membrane to the entire balcony floor and at least 50mm up the wall above the top surface of the finished tiles and finished below the wall drainage vents.
9. Apply the membrane to the top of the parapets and divisional walls, or else install suitable metal capping.
10. Apply the membrane down over the front edge of the balcony onto the drip rail.
11. Carefully seal any gaps around balcony penetrations prior to applying the membrane.
12. Apply the membrane down into outlets and drains, ensuring excess material is removed.
13. Ensure all weep holes are above the membrane application area.

APPLICATION NOTES

Surface preparation

- Ensure all surfaces are structurally sound and totally dry. The pores of concrete surfaces should be open (absorbent surface). All sheet substrates must be securely fixed in accordance with the manufacturers instructions.
- Falls to outlets of at least 1:60 or approx. 30mm in 2mtr (wet areas) or 1:100 externally, must be achieved prior to tiling.
- The surface to be coated should be free from dust, oil, paint, curing compounds and any other contaminating materials.
- Damaged concrete should be repaired (leveled) and surface defects including all cracks and sharp protrusions should be treated prior to the application of the membrane.
- Remove laitance on concrete or screeds by mechanical means.
- Highly dense (>40MPa) or steel trowelled concrete should be roughened by suitable mechanical means (shot blasting, grinding, etc).

Priming

The primer is a critical part of the waterproofing system. Apply one coat of ARDEX WPM 265 (Sheltercoat/ Superflex Water Based Primer) by brush or roller to all areas to be waterproofed including the floor waste. Allow the primer to completely dry prior to the application of the ARDEX WPM 001 membrane. This will take around 20-30 minutes depending upon weather conditions and porosity of the substrate. Coverage is approximately 6m^2 per litre. Plastic (eg. PVC) pipes should be primed with a solvent based plumbers pink primer. Prime metal surfaces with a suitable metal primer such as epoxy polyamide primer.

GENERAL APPLICATION

Crack preparation

Cracks <2mm:

Clean and remove any loose particles in the crack. Prime the crack and adjacent area carefully with ARDEX WPM 265 and allow to dry before applying two coats of ARDEX WPM 001 membrane in a band at least 200mm wide equidistantly across the crack, along the length of the crack.

Cracks 2-6mm:

(Refer Fig. 3) Prepare and prime the crack as above. Apply a bead of neutral cure silicone into the crack and extend it 6mm either side. Apply a 300mm wide band of ARDEX WPM 001 equidistantly across the crack along the entire length of the crack. Place a 190mm wide band of ARDEX "Deckweb" polyester woven cloth reinforcement over the applied membrane. Thoroughly wet out the cloth preferably using a fluted roller, and remove all creases in, or air pockets under the mat. Immediately apply a second coat to completely fill the mat.

Cracks >6mm:

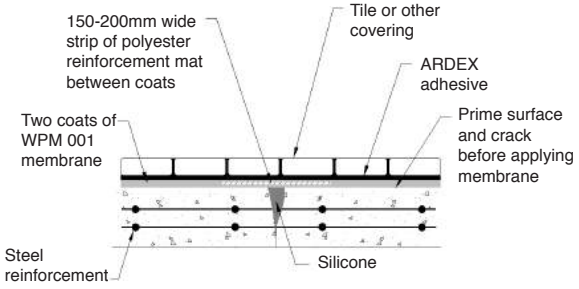
Contact your local ARDEX representative.

Movement/construction joints

Movement joints (<6mm)

Use same procedure as in crack preparation.

Fig.3 Crack Treatments



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ARDEX WPM 001

One-Part Undertile Waterproofing Membrane

Clean and prime the joint before filling it with a bead of neutral cure silicone and extending it 6mm each side of joint. Apply a 300mm wide band of ARDEX WPM 001 equidistantly across the crack along the entire length of the crack. Place a 190mm wide band of ARDEX "Deckweb" polyester woven cloth reinforcement over the applied membrane. Thoroughly wet out the mat and remove all creases in, or air pockets under the mat. Immediately apply a second coat to completely fill the mat.

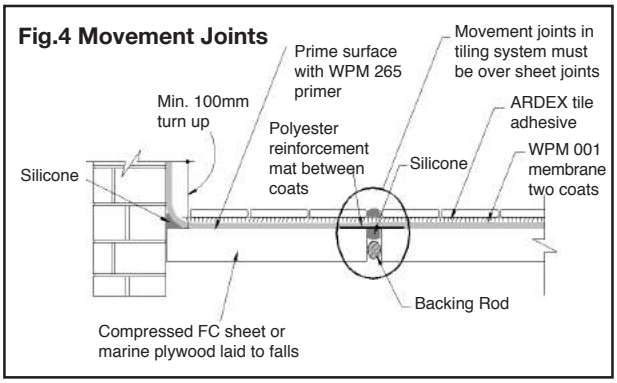
Construction joints (>6mm)

Use the same procedure as above, but replace the reinforcing mat with 120mm of ARDEX Coving Bandage. Note: if tiling, movement joints should be taken to the surface of the tiles. Fill the joints between the tiles immediately above the movement joints with an appropriate joint sealant. (Refer Fig.4)

Corners & coving areas

After priming with ARDEX WPM 265 and allowing to dry,

Fig.4 Movement Joints



apply a generous bead (12mm) of neutral cure silicone sealant to seal all junctions between two substrates in coving areas and corners.Smooth over the silicone so that it extends 6mm up the wall and 6mm over the floor and allow to touch dry.

Apply a first coat of ARDEX WPM 001 to the area and allow the membrane to dry.

Apply a second coat ensuring that excess product is removed from the junction (the final dry film thickness should be minimum of 1.0mm). Alternatively, if a polyester reinforcement mat is used between coats then the second coat can be applied as soon as the mat is fully bedded into the first coat.

WALL/FLOOR JUNCTION

After priming with ARDEX WPM 265 and allowing to dry, apply a generous bead (12mm) of neutral cure silicone sealant to seal all junctions between two substrates. Smooth over the silicone so that it extends 6mm up the wall and 6mm over the floor and allow to touch dry. Place a 190mm wide band of ARDEX "Deckweb" polyester woven mat reinforcement over the applied membrane. Thoroughly wet out the cloth and remove all creases in, or air pockets under the mat. Immediately apply a second coat to completely fill the mat. The ARDEX WPM 001 should be applied to at least 100 mm up the wall surfaces as per the recommendations for the application of ARDEX WPM 001 to floors.

Walls

Two coats of ARDEX WPM 001 are required to achieve a minimum total dry film thickness of 0.5mm.

After priming with ARDEX WPM 265 and allowing to dry, apply two coats of ARDEX WPM 001 (to achieve a minimum dry film thickness of 0.5mm) in two opposite directions. Wall sheet joints should be treated with a neutral cure silicone, PVC duct tape or base jointing compound. In balcony situations take the membrane up underneath any existing cover flashing or install appropriate flashing. Allow the first coat to dry before applying the second coat.

Floors

Two coats of ARDEX WPM 001 are required to achieve a minimum total dry film thickness of 1.0mm. The flooring recommendations should be extended at least 150 mm up all perimeter walls.

Prime the surface with ARDEX WPM 265 and allow to dry.

Apply the first coat over the primed surface and allow it to dry (1-2 hours at 23°C, 50%RH) before applying a second coat in an opposite direction. In shower recesses a drainage flange must be installed on all timber/ sheeted floors, and are strongly recommended on all other substrates. Where possible rebate the flange into the floor. Seal the perimeter of the flange with neutral cure silicone treatment. If a flange is not installed the membrane must be applied down into the pipe. (Refer Fig.5) Allow the membrane to dry completely before tiling. Refer drying times above.

Waste Outlet

Prime the surface with ARDEX WPM 265 and allow to dry. Surfaces of the outlet flange must be primed with an appropriate primer.

Apply ARDEX WPM 001 over the adjacent floor surface extending down into the waste outlet flange overlapping the edge of flange by at least 30mm. Place ARDEX "Deckweb" polyester woven mat reinforcement over the applied membrane. Thoroughly wet out the cloth and remove all creases in, or air pockets under the mat. Immediately apply a second coat to completely fill the mat. (Refer Fig. 5)

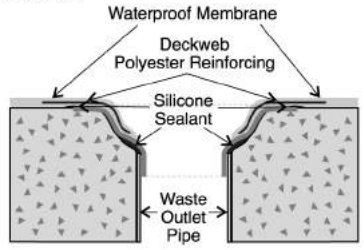
Balcony penetrations (Refer Fig.6)

All upstands are to be mechanically fixed through the membrane, which must be fabricated with a base plate flange.

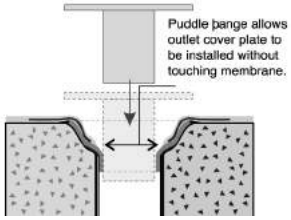
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Fig.5 – Waste outlet



Outlet Detail Using Puddle Flange



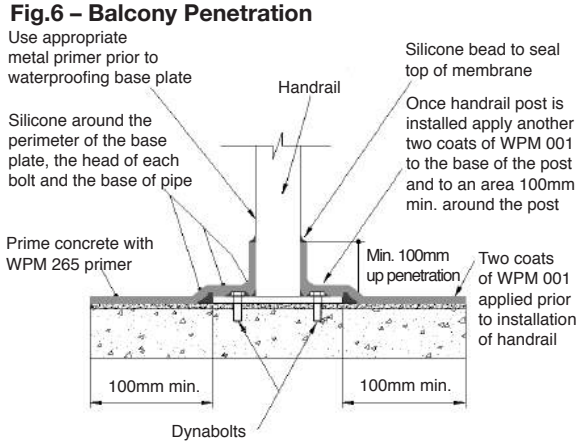
Prime the metal with an appropriate metal primer such as an epoxy polyamide primer and allow to dry. Apply a 10mm bead of neutral cure silicone around the perimeter of the penetration. Apply the first coat of ARDEX WPM 001 on the substrate and the flanged metal.

Allow first coat to dry before applying a second coat ensuring a finished dry film thickness of no less than 1.0mm is achieved. Place a suitable flashing collar around the penetration sealing it with a suitable sealant.

Tiling systems

It is advisable to conduct a flood test of the shower once the membrane has cured (normally after 72 hours), and before the tiling commences. A broad range of ARDEX tile adhesives can be used over ARDEX membranes. Contact ARDEX or your nearest ARDEX stockist for advice on the most suitable system.

Fig.6 – Balcony Penetration



TECHNICAL DATA

ARDEX WPM 001
Characteristics of liquid

Form & Colour	Blue viscous paste
Type	Single part
Specific Gravity	Approx. 1.34kg/litre
pH of Liquid	8.5
Viscosity of Liquid (RVT Brookfield, spindle 7 speed 10)	52,000cps
Non Volatile Matter (volume) AS1321.10	50.3%±1
Tensile Strength 7 days dry AS1145	1.04 MPa
Full Cure	1.92 MPa
Elongation at Break 7 days dry AS1145	780%

Conforms to requirements of class 3 membrane of AS/NZ 4858: 2004 Wet Area Membranes.

NOTE: Most of the tests have been carried out in the ARDEX laboratory under standard conditions (23±2°C, 50±5% R.H)

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ARDEX WPM 001

One-Part Undertile Waterproofing Membrane

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DISCLAIMER

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ARDEX WPM 002

Two-Part Undertile Waterproofing Membrane

Two-Part Undertile Waterproofing Membrane

BRANZ Appraised (No. 472 & No. 473)

Suitable for internal and external use

Advanced acrylic – will not re-emulsify

Fibre-reinforced – eliminates the need for reinforcing mat

Water based – safe to use, low odour and easy cleaning

Flexible – meets class III category for AS/NZ 4858 Wet Area Membranes

Low VOC content – meets Green Building Council of Australia Green Star IEQ-13 requirements

BRANZ Appraised
Appraisal No.472 [2017]

BRANZ Appraised
Appraisal No.473 [2017]

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ARDEX WPM 002

Two-Part Undertile Waterproofing Membrane

PRODUCT DESCRIPTION

ARDEX WPM 002 is a tough, fast drying two component waterproofing membrane specifically designed for use under tiles. The product has been uniquely formulated with synthetic microfibres to increase its strength and eliminate the need for a separate reinforcement mat. ARDEX WPM 002 is based on the most advanced acrylic polymer technology, and is totally resistant to re-emulsification.

ARDEX WPM 002 is flexible, safe to use, low in odour, and is fully compatible with polymer modified tile adhesives. ARDEX WPM 002 is one of the fastest drying acrylic membranes on the market – normally ready to tile in 16-24 hours @ 23°C.

ARDEX WPM 002 meets the Green Building Council of Australia Green Star IEQ-13 requirements for Architectural Sealant when tested in accordance with SCAQMD Method 304-91 Determination of Volatile Organic Compounds (VOC) in Various Materials as referenced by South Coast Air Quality Management Division (SCAQMD) Rule 1168.

FEATURES/BENEFITS

Fast drying ARDEX WPM 002 can be tiled over in 16-24 hours, or 4 hours @ 23°C/50% RH in non critical areas*.

Features benefits

- Liquid reinforced: Excellent strength, eliminates need for reinforcing mat.
- Flexible: Accommodates normal building movement.
- Advanced acrylic: Will not re-emulsify.
- Designed for tiling: Fully compatible with ARDEX tile adhesives.
- Water based, safe to use, low odour and easy cleaning for undertile waterproofing in shower recesses by independent testing authority.
- Excellent exterior.
- Conforms to the requirements of AS/NZS 4858:2004 Wet Area Membranes (Ref: CSIRO Report 3879)

*Critical areas include areas where the membrane is applied at greater than 0.5mm or over impermeable substances such as over bond breakers or incorporating other reinforcement. Longer drying times are necessary in these areas.

APPLICATION RANGE

Performance levels
Commercial and residential.

Location
Internal and external wet areas, balconies, decks, and other areas that will be tiled or otherwise protected from regular foot traffic. Only recommended on concrete, screed and render substrates externally.

Surfaces
Walls and floors.

Substrates

Concrete	Cured for min. 28 days or sealed when set with one coat ARDEX WPM 300 at a coverage rate of 3.0 square metres per litre and allowed to cure overnight. Wet concrete should be allowed to dry thoroughly or sealed with one coat of ARDEX WPM 300 as above.
Renders and screeds	Cured for min. 7 days or sealed when set with one coat ARDEX WPM 300 at a coverage rate of 3.0 square metres per litre and allowed to cure overnight. Wet render should be allowed to dry thoroughly or sealed with one coat of ARDEX WPM 300 as above.
Fibre cement	Wet area grade only.
Plasterboard	Wet area grade only.
Plywood	Structural plywood (PAA branded) or marine grade or other wet area grade only. Not recommended for external use (refer ARDEX). Plywood panels shall be laid with staggered joints (brick bond), the edge of sheets shall be supported with dwangs or framing. The maximum recommended span in E2/AS1 is 400mm. However specific design may allow 17.5mm plywood or greater to be laid on 400mm purlins with nogs or dwangs at 600mm or even 1200mm centres. Plywood shall be laid with the face grain at right angles to the supports. External edges shall be chamfered with a minimum radius of 5mm. Plywood shall be fixed with 10 gauge x 50mm stainless steel countersunk head screws with 3mm gaps between all sheets, at 150mm centres on edges, and 200mm in the body of the sheets. All joints in the plywood and junctions of plywood with other materials shall have 25mm ARDEX Release tape applied before application of the membrane.
Particleboard	Wet area grade, internal use only (special preparation is required – contact ARDEX). Not recommended for external use (refer ARDEX).
Permanent Immersion	In conditions of permanent immersion, it is recommended that WPM 002 must be covered with tiles for full immersion applications.

Contact ARDEX for use over existing membranes, covering materials, and any other substrates not listed.

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TABLE 1

	Thickness per coat		Total dry film thickness (2 coats)	Theoretical coverage		Per unit
	Dry film	Wet film		Per coat	For 2 coats	
FLOORS	0.6mm	0.9mm	1.2mm	32m²	16m²	40kg kit
WALLS	0.4mm	0.6mm	0.8mm	48m²	24m²	40kg kit

PACKAGING

Two component: 20kg (approx. 20 litres) liquid pail/ 20kg bags powder.

SHELF LIFE

12 months when stored in the original unopened packaging, in a dry place at 23°C. Do not store in direct sunlight. Replace lid tightly after use. Use remaining contents from part used containers within 3 months.

COVERAGE

Two coats are recommended for an effective waterproof membrane. Coverage will vary depending on the porosity of the surface.

One 40kg kit will cover approximately 16-24m (based on two coats) depending on area requirements between wall and floor surfaces to be treated.

DRYING TIMES

Curing time will vary depending on temperature and humidity.

Recoat time

1-2 hours (23°C/50% RH) between first and second coats. Alternatively, if a polyester mat is used between coats then the second coat can be applied whilst the first coat is still wet.

Dry through

The slowest drying areas are those where the membrane has been applied over a silicone bond breaker, eg. wall and floor junctions. The membrane cannot be tiled over until these critical areas are completely dry.

ARDEX WPM 002 membrane is totally dry in 16 hours at 23°C/50% RH but can take up to 24 hours at 10°C / 50% RH in corners or for thick films.

In areas where bond breakers or additional reinforcement are not used, ARDEX WPM 002 can be tiled over after 4 hours at 23°C / 50% RH.

Fully cured

The shower should not be used until the membrane has reached its full strength. Normally ARDEX WPM 002 membranes are fully cured after 3 days at 23°C, or after 5 days at 10°C.

Drying times will vary depending on humidity, surface temperature and surface porosity.

Do not apply on substrates where the surface temperature is below 10°C or above 35°C.

CLEANING

Wash hands, brushes, rollers, etc, with water while the membrane is still fresh. Remove cured material with mineral turpentine.

SAFETY PRECAUTIONS

Do not use the product in the following situations:

- Areas subject to negative hydrostatic pressure or rising damp, unless treated with ARDEX WPM 300.
- Where the substrate is wet – wet surfaces can be sealed with one coat of ARDEX WPM 300 at a coverage rate of 3.0 square metres per litre and allowed to cure overnight.
- Where rain is imminent.
- Where the membrane will be left exposed and subjected to regular foot traffic.
- On glazed, glass or other totally impervious surfaces (eg. areas pre-treated with water repellants).
- Where the surface temperature is below 10°C or greater than 35°C.
- All floor areas must have adequate falls either built into the substrate or achieved with a sand/cement screed prior to application of the ARDEX WPM 002.

For substrates or situations other than those listed contact ARDEX.

SAFETY DATA

ARDEX WPM 002 Part A is non-hazardous. It may produce discomfort of the eyes, respiratory tract and skin. It should not be swallowed or inhaled. Avoid contact with skin and wear eye/face protection. In case of contact with eyes, rinse with plenty of water and contact a doctor or Poisons Information Centre.

ARDEX WPM 002 Part B contains cement and is therefore hazardous. It may cause burns and serious damage to eyes. Do not breathe dust and avoid contact with eyes. Wear dust masks, goggles and gloves

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ARDEX WPM 002

Two-Part Undertile Waterproofing Membrane

when handling. Keep container locked up and in a well ventilated place.

ADDITIONAL INFORMATION IS LISTED IN THE MATERIAL SAFETY DATA SHEET.

APPLICATION

Apply ARDEX WPM 002 by brush or roller. A medium nap (12–15mm pile) paint roller is recommended. New rollers should be dampened with water before being used for the first time.

For best results with a paint brush use a good quality, 50mm long bristle variety.

To achieve the required dry film thickness per coat application must consist of laying the product onto the surface and light finish the surface. Do not try to apply in the same manner as a building paint. A conventional building paint is normally applied at 25–40 micrometers wet film thickness while ARDEX WPM 002 needs to be applied at between 0.6 and 0.9 mm per coat depending on product and application (Refer Table 1).

CRITICAL AREAS:
INTERNAL WET AREAS

1. Construction should be in accordance with Australian 3740 - 2004 Waterproofing of wet areas within residential buildings.
2. All render and tile bed requirements should be completed before application of the membrane and tiles or other floor coverings should be direct bonded to the membrane.
3. Ensure wall and floor sheets are installed as per sheet manufacturer's recommendations.
4. Ensure suitable brick/concrete hobs are used (do not use timber), and that the top of the hob does not slope outwards.
5. Ensure that falls to the waste are min 1:60 (ie. approx. 30mm in 2m) before waterproofing. Ensure outlet pipes are fixed securely and that the waste or drainage flanges are recessed into the floor.
6. Avoid sheet joints in shower recess floor. Ensure that sheets are securely fixed to the wall at the bottom edge, and sheet joints are sealed with a neutral cured silicone sealant spread approximately 6mm on either side of the joint.
7. Treat nail and screw holes with neutral cure silicone sealant.
8. Seal the perimeters of taps, shower outlets and waste outlets with neutral cure silicone sealant.
9. Apply a bead of neutral cure silicone sealant to all horizontal and vertical corners, and spread to 6mm on either side of joint.
10. Apply a bead of neutral cure silicone sealant to the junction of the hob or angle and walls, and spread to 6mm on either side of joint.
11. Waste outlets shall incorporate a puddle flange or similar in accordance with AS3740 and the top surface shall be set flush with the surface to which the membrane is to be applied. A bead of neutral cure silicone shall be applied across the intersection of the puddle flange and the screed/floor.
12. Apply the membrane to the entire shower recess floor and down into waste or drainage flange. Apply the membrane over the hob and at least 150mm beyond the outside edge of the hob (ideally to entire wet area floor).
13. Apply the membrane 1800mm up the walls or to the height of the shower rose within the shower recess.
14. Install the shower screen to inside edge of the hob.

BALCONIES AND DECKS

1. Ensure that the deck is constructed with falls to edge/drains of min 1:100 (ie. 20mm in 2m) or else achieve the fall with a sand/cement screed.
2. Ensure a min set down (step down) of 50mm to the finished floor level (ie. top of tiles).

Fig.1 – Shower recess – critical areas

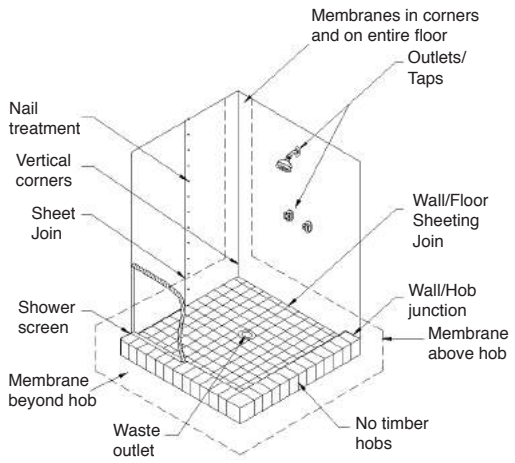
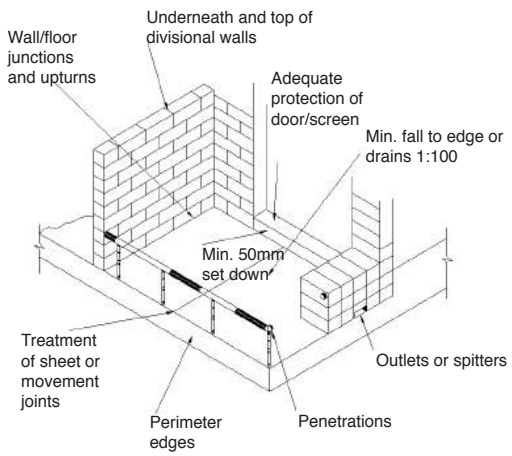


Fig.2 – Balcony – critical areas



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3. Ensure suitable flashing is installed, ideally prior to the installation of the balcony screen/sliding door.
4. Treat any sheet joints with a neutral cure silicone prior to waterproofing.
5. Prepare and seal all wall/floor junctions with a bead of neutral cure silicone.
6. Apply the membrane up the step down and as far up underneath the screen door flashing as possible (ideally waterproof prior to installing door).
7. Where possible, apply the membrane prior to building divisional walls.
8. Apply the membrane to the entire balcony floor and at least 50mm up the wall above the top surface of the finished tiles and finished below the wall drainage vents.
9. Apply the membrane to the top of the parapets and divisional walls, or else install suitable metal capping.
10. Apply the membrane down over the front edge of the balcony onto the drip rail.
11. Carefully seal any gaps around balcony penetrations prior to applying the membrane.
12. Apply the membrane down into outlets and drains, ensuring excess material is removed.
13. Ensure all weep holes are above the membrane application area.

APPLICATION NOTES

Surface preparation

- Ensure all surfaces are structurally sound and totally dry. The pores of concrete surfaces should be open (absorbent surface). All sheet substrates must be securely fixed in accordance with the manufacturers instructions.
- Falls to outlets of at least 1:60 or approx. 30mm in 2m (wet areas) or 1:100 externally, must be achieved prior to tiling.
- The surface to be coated should be free from dust, oil, paint, curing compounds and any other contaminating materials.
- Damaged concrete should be repaired (leveled) and surface defects including all cracks and sharp protrusions should be treated prior to the application of the membrane.
- Remove laitance on concrete or screeds by mechanical means.
- Highly dense (>40MPa) or steel trowelled concrete should be roughened by suitable mechanical means (shot blasting, grinding, etc).

Priming

The primer is a critical part of the waterproofing system. Apply one coat of ARDEX WPM 265 (Sheltercoat/ Superflex Water Based Primer) by brush or roller to all areas to be waterproofed including the floor waste. Allow the primer to be completely dry prior to the application of the ARDEX WPM 002 membrane. This will take around 20-30 minutes depending upon weather conditions and porosity of the substrate. Coverage is approximately 6m^2 per litre. Plastic (eg. PVC) pipes should be primed with a solvent based plumbers pink primer. Prime metal surfaces with a suitable metal primer such as epoxy polyamide primer.

GENERAL APPLICATION

Crack preparation

Cracks <2mm:

Clean and remove any loose particles in the crack. Prime the crack and adjacent area carefully with ARDEX WPM 265 and allow to dry before applying two coats of ARDEX WPM 002 membrane, in a band at least 200mm wide equidistantly across the crack, along the length of the crack.

Cracks 2-6mm:

(Refer Fig. 3) prepare and prime the crack as above. Apply a bead of neutral cure silicone into the crack and extend it 6mm either side. Apply a 300mm wide band of ARDEX WPM 002 equidistantly across the crack along the entire length of the crack. Place a 190mm wide band of ARDEX “Deckweb” polyester woven cloth reinforcement over the applied membrane. Thoroughly wet out the cloth and remove all creases in, or air pockets under the mat. Immediately apply a second coat to completely fill the mat.

Cracks >6mm:

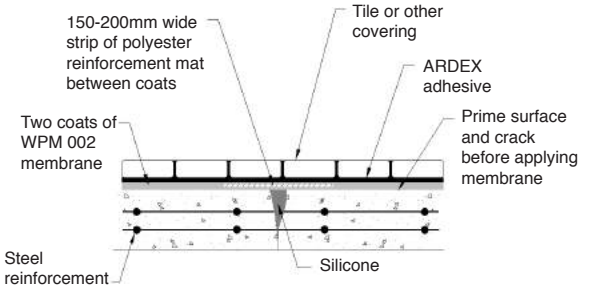
Contact your local ARDEX representative.

Movement/construction joints

Movement joints (<6mm)

Clean and prime the joint before filling it with a bead of neutral cure silicone and extending it 6mm each side of joint. Apply a 300mm wide band of ARDEX WPM 002 equidistantly across the crack along the entire length of the crack. Place a 190mm wide band of ARDEX

Fig.3 Crack Treatments



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"Deckweb" polyester woven cloth reinforcement over the applied membrane. Thoroughly wet out the cloth and remove all creases in, or air pockets under the mat. Immediately apply a second coat to completely fill the mat.

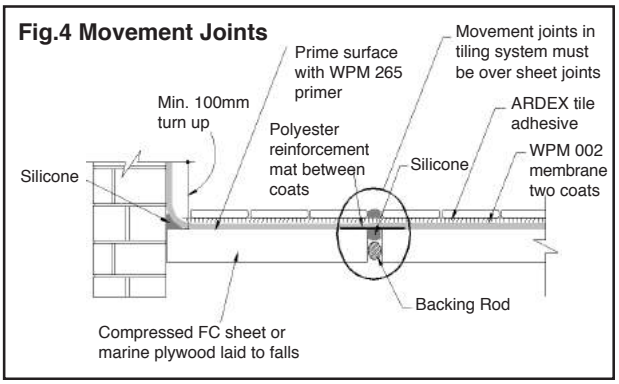
Construction joints (>6mm)

Use the same procedure as above, but replace the reinforcing mat with 120mm of ARDEX Coving Bandage. Note: if tiling, movement joints should be taken to the surface of the tiles. Fill the joints between the tiles immediately above the movement joints with an appropriate joint sealant. (Refer Fig.4)

Corners and coving areas

After priming with ARDEX WPM 265 and allowing to dry, apply a generous bead (16mm) of neutral cure silicone sealant in coving areas and corners. (Refer Fig.5) Smooth over the silicone so that it extends 8mm up the wall and 8mm over the floor and allow to touch dry.

Fig.4 Movement Joints



Apply a first coat of ARDEX WPM 002 to the area and allow the membrane to dry.

Apply a second coat ensuring that excess product is removed from the junction (the final dry film thickness should be around 1.2mm) Alternatively, if a polyester reinforcement mat is used between coats then the second coat can be applied as soon as the mat is fully bedded into the first coat.

WALL/FLOOR JUNCTION

After priming with ARDEX Superflex WPM 265 and allowing to dry, apply a generous bead (16mm) of neutral cure silicone sealant to seal all junctions between two substrates. Smooth over the silicone so that it extends 8mm up the wall and 8mm over the floor and allow to touch dry. Place a 190mm wide band of ARDEX "Deckweb" polyester woven cloth reinforcement over the applied membrane. Thoroughly wet out the cloth and remove all creases in, or air pockets under the mat. Immediately apply a second coat to completely fill the mat. The ARDEX WPM 002 should be applied to at least 150mm up the wall surfaces as per the recommendations for the application of ARDEX WPM 002 to floors.

Walls

Two coats of ARDEX WPM 002 are required to achieve a minimum total dry film thickness of 0.8mm.

After priming with ARDEX Superflex WPM 265 and allowing to dry, apply two coats of ARDEX WPM 002 (to achieve a minimum dry film thickness of 0.8mm) in two opposite directions. Wall sheets joints should be treated with a neutral cure silicone, PVC duct tape or base jointing compound. In balcony situations take the membrane up underneath any existing cover flashing or install appropriate flashing. Allow the first coat to dry before applying the second coat.

Floors

Two coats of ARDEX WPM 002 are required to achieve a minimum total dry film thickness of 1.2mm. The flooring recommendations should be extended at least 150mm up all perimeter walls.

Prime the surface with ARDEX WPM 265 water based primer and allow to dry.

Apply the first coat over the primed surface and allow it to dry (1-2 hours at 23°C, 50% RH) before applying a second coat in an opposite direction. In shower recesses a drainage flange must be installed on all timber/sheeted floors, and are strongly recommended on all other substrates. Where possible rebate the flange into the floor. Seal the perimeter of the flange with neutral cure silicone treatment. If a flange is not installed the membrane must be applied down into the pipe. (Refer Fig.5) Allow the membrane to dry completely before tiling. Refer drying times above.

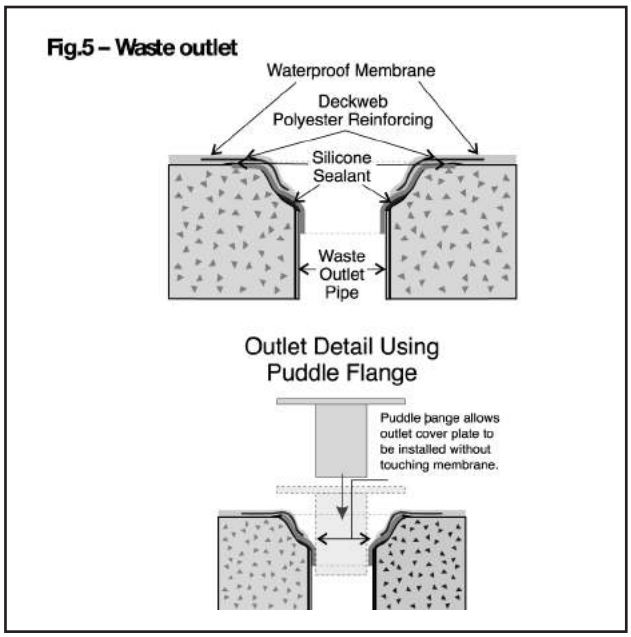
Waste outlet

Prime the surface with ARDEX WPM 265 and allow to dry. Surfaces of outlet flange must be primed with an appropriate primer.

Apply ARDEX WPM 002 over the adjacent floor surface extending down into the waste outlet pipe overlapping the pipe surfaces by at least 30mm. Place ARDEX "Deckweb" polyester woven cloth reinforcement over the applied membrane. Thoroughly wet out the cloth and remove all creases in, or air pockets under the mat. Immediately apply a second coat to completely fill the mat. (Refer Fig. 5).

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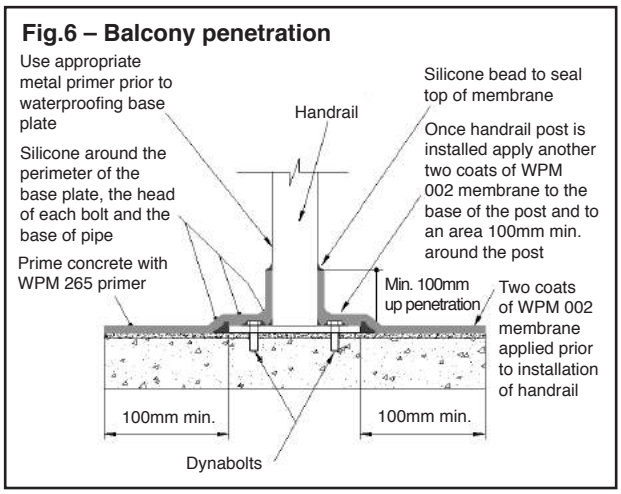


Balcony penetrations (Refer Fig. 6)

All upstands are to be mechanically fixed through the membrane, which must be fabricated with a base plate flange.

Prime the metal with an appropriate metal primer such as an epoxy polyamide primer and allow to dry. Apply a 10mm bead of neutral cure silicone around the perimeter of the penetration. Apply the first coat of ARDEX WPM 002 on the substrate and the flanged metal.

Allow first coat to dry before applying a second coat ensuring a finished dry film thickness of no less than 1.2mm is achieved. Place a suitable flashing collar around the penetration sealing it with a suitable sealant.



Tiling systems

It is advisable to conduct a flood test of the shower once the membrane has cured (normally after 48 hours), and before the tiling commences. A broad range of ARDEX tile adhesives can be used over ARDEX Superflex membranes. Contact ARDEX or your nearest ARDEX stockist for advice on the most suitable system.

QUALITY PRODUCT

ARDEX WPM 002 is manufactured and tested to ARDEX procedures which are maintained in accordance with Quality System Standard ISO 9001.

USER NOTES

The technical details and recommendations contained in this data sheet are given in good faith and represent the best of our knowledge and experience at the time of printing. It is the responsibility of the user to ensure that the product is used in accordance with ARDEX instructions and in applications for which they are intended.

TECHNICAL DATA

ARDEX WPM 002
Characteristics of components

Form & Colour	Liquid: white, medium viscosity Powder: off white
Characteristics of mixed product	
Mixing Ratio	1:1 by weight
SG of mixed product	1.44kg/litre
Non Volatile Matter	77±1%
Colour	light grey/green
Characteristics of cured membrane	
Shore A hardness ASTM D2240 – dry film – wet film	 85 – 90 75 – 80
Tensile Strength 7 days dry AS1145	 1.7 MPa
Full Cure 28 days:	2.9 MPa
Elongation at Break 7 days dry AS1145	 332%

NOTE: Most of the tests have been carried out in the ARDEX laboratory under standard conditions (23±2°C, 50±5% RH)

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DISCLAIMER

The technical details, recommendations and other information contained in this data sheet are given in good faith and represent the best of our knowledge and experience at the time of printing. It is your responsibility to ensure that our products are used and handled correctly and in accordance with any applicable New Zealand Standard, our instructions and recommendations and only for the uses they are intended. We also reserve the right to update information without prior notice to you to reflect our ongoing research and development program. Country specific recommendations, depending on local standards, codes of practice, building regulations or industry guidelines, may effect specific installation recommendations. The supply of our products and services is also subject to certain terms, warranties and exclusions, which may have already been disclosed to you in prior dealings or are otherwise available to you on request. You should make yourself familiar with them.

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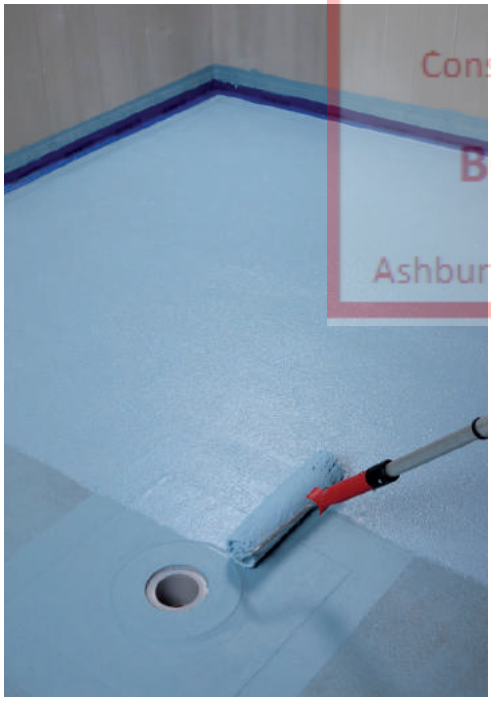
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BRANZ Appraised
Appraisal No. 484 [2018]

MAPEGUM WPS, MAPELASTIC, MAPELASTIC SMART, MAPELASTIC TURBO AND MAPELASTIC AQUADEFENSE WET AREA MEMBRANES

Appraisal No. 484 (2018)

This Appraisal replaces BRANZ Appraisal No. 484 (2012)



BRANZ Appraisals

Technical Assessments of products for building and construction.

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Product

1.1 Mapegum WPS and Mapelastic AquaDefense are one component, liquid-applied waterproofing membranes for internal applications under ceramic or stone tile finishes.

1.2 Mapelastic, Mapelastic Smart and Mapelastic Turbo are two-component liquid applied waterproofing membranes suitable for internal applications on substrates under ceramic or stone tile finishes.

Scope

2.1 Mapegum WPS, Mapelastic, Mapelastic Smart, Mapelastic Turbo and Mapelastic AquaDefense Wet Area Membranes have been appraised for use as waterproofing membranes for the internal wet areas of buildings, within the following scope:

- on floor substrates of concrete, flooring grade particle board, plywood, compressed fibre cement sheet and fibre cement sheet tile underlay, and on wall substrates of concrete, concrete masonry, wet area fibre cement sheet lining systems and wet area plasterboard lining systems; and,
- when protected from physical damage by ceramic or stone tile finishes; and,
- where floors are designed and constructed such that deflections do not exceed 1/360th of the span.

2.2 The use of Mapegum WPS, Mapelastic, Mapelastic Smart, Mapelastic Turbo and Mapelastic AquaDefense Wet Area Membranes on concrete slabs where hydrostatic or vapour pressure is present is outside the scope of this Appraisal.

2.3 Movement and control joints in the substrate must be carried through the membrane and tile finish. The design and construction of the substrate and movement and control joints is specific to each building, and is therefore the responsibility of the building designer and building contractor and is outside the scope of this Appraisal.

2.4 The ceramic or stone tile finishes are outside the scope of this Appraisal.

2.5 The membranes must be installed by trained applicators, approved by Mapei New Zealand Ltd, to the conditions of the Technical Data Sheet (TDS) of the products.

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Building Regulations

New Zealand Building Code (NZBC)

3.1 **In the opinion of BRANZ, Mapegum WPS, Mapelastic, Mapelastic Smart, Mapelastic Turbo and Mapelastic AquaDefense Wet Area Membranes if designed, used, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet the following provisions of the NZBC:**

Clause B2 DURABILITY: Performance B2.3.1 (b) 15 years and B2.3.2. Mapegum WPS, Mapelastic, Mapelastic Smart, Mapelastic Turbo and Mapelastic AquaDefense Wet Area Membranes meet these requirements. See Paragraph 9.1.

Clause E3 INTERNAL MOISTURE: Performance E3.3.6. Interior wet area floors and walls incorporating Mapegum WPS, Mapelastic, Mapelastic Smart, Mapelastic Turbo and Mapelastic AquaDefense Wet Area Membranes will meet this requirement. See Paragraphs 11.1 - 11.7.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Mapegum WPS, Mapelastic, Mapelastic Smart, Mapelastic Turbo and Mapelastic AquaDefense Wet Area Membranes meet this requirement and will not present a health hazard to people.

Technical Specification

4.1 Materials supplied by Mapei New Zealand Ltd are as follows:

- **Mapegum WPS** - A one-part, fast drying, polymer-based, ready-to-use, liquid-applied membrane. It is supplied as a light grey-coloured paste in 5, 10 and 25 kg buckets.
- **Mapelastic** - A two-part, flexible, cementitious, liquid-applied membrane. It is supplied as a Part A powder in 24 kg multi-wall bags and a Part B liquid in 8 kg plastic containers. When dry, the membrane is grey in colour.
- **Mapelastic Smart** - A two-part, flexible, cementitious, liquid-applied membrane. It is supplied as a Part A powder in 20 kg multi-wall bags and a Part B liquid in 10 kg plastic containers. When dry, the membrane is light grey in colour.
- **Mapelastic Turbo** - A two-part, cementitious, liquid-applied membrane. It is supplied as a Part A powder in 20 kg multi-wall bags and a Part B liquid in 16 kg containers. When dry, the membrane is light grey in colour.
- **Mapelastic AquaDefense** - A one-part solvent free, ultra-quick drying synthetic resin based paste in water dispersion liquid applied membrane. It is supplied as a light blue coloured paste in 15 kg drums.
- **Mapeband and Mapeband Gaskets** - A rubber-coated polyester tape for waterproofing expansion joints and sealing around drains and pipes. Available as a tape 120 mm wide in rolls 50 m long, and also in ready-made internal and external corners (90 and 270 degrees) and pipe gaskets 118 x 118 mm and 300 x 300 mm, "T" profiles 515 mm x 315 mm and cross profiles 515 x 515 mm.
- **Mapeband PE120** - A PVC fabric tape used to reinforce wall/wall and floor/wall joints. It is only used with Mapegum WPS and Mapelastic AquaDefense. Available as a tape 120 mm wide in rolls 10 m and 50 m long, and also as preformed angles 90° and 270°.
- **Mapetex Sel** - A macro-holed non-woven fabric, used to reinforce the first and second layer of the waterproofing membranes. It is supplied as a polypropylene, white fabric in rolls 100 mm, 200 mm and 1.0 m wide x 25 m long.
- **Mapenet 150** - A glass fibre mesh used to reinforce the membranes. It is supplied as a blue mesh in rolls 1.0 m wide and 50 m long.
- **Mapeband SA** - A self-adhesive Butyl Rubber tape used to reinforce all joints. It is supplied as a 2.0 mm thick, 100 mm wide tape in rolls 25 m long.
- **Mapei Primer 3296** - A acrylic primer for absorbent surfaces. It is an opaque colour and supplied in 5 and 10 kg drums.

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Handling and Storage

5.1 All materials must be stored inside, up off concrete floors, in dry conditions, out of direct sunlight and out of freezing conditions. The membrane products have a shelf life of 24 months from date of manufacture in the original unopened packaging. Once opened, the products must be used within 3 months.

Technical Literature

6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for the Mapegum WPS, Mapelastic, Mapelastic Smart, Mapelastic Turbo and Mapelastic AquaDefense Wet Area Membranes. The Technical Literature must be read in conjunction with this Appraisal. All aspects of design, use, installation and maintenance contained in the Technical Literature and within the scope of this Appraisal must be followed.

Design Information

General

7.1 Mapegum WPS, Mapelastic, Mapelastic Smart, Mapelastic Turbo and Mapelastic AquaDefense Wet Area Membranes are for use in buildings where an impervious waterproof membrane is required to floors and walls to prevent damage to building elements and adjoining areas.

7.2 Mapegum WPS and Mapelastic AquaDefense are designed to be used where a one-component product is preferred.

7.3 The membranes must be protected from physical damage by the application of ceramic or stone tile finishes.

7.4 Movement and control joints may be required depending on the shape and size of the building or room, and the tile finish specified. Design guidelines can be found in the BRANZ Good Practice Guide - Tiling.

7.5 Timber framing must comply with NZS 3604, or where specific engineering design is used, the framing shall be of at least equivalent stiffness to the framing provisions of NZS 3604, or comply with the serviceability criteria of AS/NZS 1170. In all cases framing must be provided so that the maximum span of the substrate as specified by the substrate manufacturer is met and all sheet edges are fully supported. Timber framing systems supporting the substrates must be constructed such that deflections do not exceed 1/360th of the span. Where NZS 3604 is used, the allowable joist spans given in Table 7.1 shall be reduced by 20%.

Substrates

Plywood

8.1 Plywood must be a minimum of 17 mm thick complying with AS/NZS 2269, CD Grade Structural with sanded C face upwards and treated to H3 (CCA treated). LOSP treated plywood must not be used.

8.2 The plywood must be laid with the face grain at right angles to the floor joists. The plywood must be supported with dwangs or framing with a maximum span of 400 mm in each direction, fixed with 10g x 50 mm stainless steel countersunk head screws at 150 mm centres along the sheet edges and 200 mm through the body of the sheets.

Fibre Cement Compressed Sheet/Fibre Cement Sheet Tile Underlay

8.2 Fibre cement compressed sheet and tile underlay must be manufactured to comply with the requirements of AS/NZS 2908.2 and must be specified by the manufacturer as being suitable for use as a wet area substrate. Installation must be in accordance with the instructions of the manufacturer.

Particleboard

8.3 Particleboard must be specified for the end use in accordance with NZS 3602.

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Concrete and Concrete Masonry

8.4 Concrete and concrete masonry substrates must be to a specific engineering design meeting the requirements of the NZBC, such as concrete construction to NZS 3101, concrete slab-on-ground to NZS 3604 or NZS 4229 and concrete masonry to NZS 4229 and NZS 4230.

Wet Area Wall Linings

8.5 Plasterboard wall linings must be manufactured to comply with AS/NZS 2588, and be suitable for use in internal wet areas.

8.6 Fibre cement sheet must be suitable for use in wet areas and comply with AS/NZS 2908.2.

8.7 Installation of plasterboard or fibre cement wall linings must be carried out in accordance with the instructions of the manufacturer.

Durability

Serviceable Life

9.1 The Mapegum WPS, Mapelastic, Mapelastic Smart, Mapelastic Turbo and Mapelastic AquaDefense Wet Area Membranes, when subjected to normal conditions of environment and use, are expected to have a serviceable life of at least 15 years and be compatible with ceramic or stone tile finishes with a design service life of 15-25 years.

Maintenance

10.1 No maintenance of the membranes will be required provided significant substrate movement does not occur and the tile finish remains intact. Regular checks must be made of the tiled areas to ensure they are sound and will not allow moisture to penetrate. Any cracks or damage must be repaired immediately by repairing the tiles, grout and sealant.

10.2 In the event of damage to a membrane, the tiles must be removed and the membrane repaired by removing the damaged portion and applying a patch with sufficient overlap over the damaged section.

10.3 Drainage outlets must be maintained to operate effectively, and tile finishes must be kept clean.

Internal Moisture

11.1 Mapegum WPS, Mapelastic, Mapelastic Smart, Mapelastic Turbo and Mapelastic AquaDefense Wet Area Membranes are impervious to water and when appropriately designed and installed will avoid the likelihood of water penetrating behind linings or entering concealed spaces.

11.2 Surfaces must be finished with ceramic or stone tiles. A means of compliance with NZBC Clause E3.3.3 and E3.3.4 is given in NZBC Acceptable Solution E3/AS1, Paragraph 3.1.1 (b), 3.1.2 (b) and 3.3.1 (b).

11.3 Falls in showers and shower areas must be a minimum of 1 in 50. In unenclosed showers, falls must extend a minimum of 1500 mm out from the shower rose. Floor wastes and drainage flanges must be provided and the floor must fall to the outlet.

11.4 Mapegum WPS, Mapelastic, Mapelastic Smart, Mapelastic Turbo and Mapelastic AquaDefense Wet Area Membranes are suitable for use to contain accidental overflow to meet NZBC Clause E3.3.2. A means of compliance for overflow is given in NZBC Acceptable Solution E3/AS1, Paragraph 2.

11.5 The waterproofing membrane must completely cover shower bases, and for unenclosed showers it must extend a minimum of 1500 mm out from the shower rose. Further design guidance on waterproofing wet areas, including waterproofing walls and junctions can be obtained from AS 3740, the BRANZ Good Practice Guide - Tiling, and flooring and wall lining manufacturers.

11.6 Where water resistant wall finishes such as prefinished sheet materials are used they must be installed as per the NZBC requirements. They must flash over the membrane a minimum of 30 mm.

11.7 BRANZ recommends the entire floor be covered by a waterproof membrane for bath, shower and spa rooms where timber and plywood floors are used.

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Installation Information

Installation Skill Level Requirement

12.1 Installation of the membranes must be completed by trained applicators approved by Mapei New Zealand Ltd

12.2 Installation of substrates must always be carried out in accordance with the Mapegum WPS, Mapelastic, Mapelastic Smart, Mapelastic Turbo and Mapelastic AquaDefense Wet Area Membranes Technical Literature and this Appraisal by, or under the supervision of, a Licensed Building Practitioner (LBP) with the relevant Licence Class.

Preparation of Substrates

13.1 Substrates must be dry, clean and stable before installation commences. Surfaces must be smooth and free from nibs, sharp edges, dust, dirt or other materials such as oil, grease or concrete formwork release agents.

13.2 The relative humidity of concrete substrates must be 75% or less before membrane application. The concrete substrates can be checked for dryness by using a hygrometer as set out in BRANZ Bulletin No. 585.

13.3 All voids, cracks, holes, joints and excessively rough areas must be filled to achieve an even and uniform surface. Junctions of substrate abutments, such as at wall/floor and wall/wall junctions must have a reinforcement installed as set out in the Technical Literature.

13.4 Refer to the product manufacturer for correct priming requirements.

Membrane Installation

14.1 Installation must not be undertaken where the substrate surface temperature is below 8°C or above 35°C.

14.2 Mapelastic, Mapelastic Turbo and Mapelastic Smart require the liquid and powder to be mixed and left to stand for 5 minutes before re-mixing, then applying. Mapegum WPS and Mapelastic AquaDefense must be thoroughly stirred before application.

14.3 The membrane must be applied in a minimum of two coats at the rates set out in the Technical Literature. Subsequent coats must be applied in an opposite direction to the previous coat. The total finished system thickness of the Mapegum WPS must be a minimum of 1.0 mm, Mapelastic AquaDefense membrane must be a minimum of 1.0 mm and the Mapelastic, Mapelastic Turbo and Mapelastic Smart Membranes must be a minimum of 2.0 mm.

14.4 Application can be made by roller (medium/long nap), brush (long bristle), or a notched steel trowel (finished with a flat steel trowel).

14.5 Reinforcement fabric or Mapeband is bedded into the wet layer between coats to provide movement protection at wall/wall and wall/floor junctions, or any other areas such as joints in the flooring substrate, floor cracks, or around penetrations in the membrane. In all other situations, reinforcement provisions as set out in this Appraisal and the Technical Literature apply.

14.6 Clean up may be undertaken with water.

14.7 For further information refer to the product TDS.

Tiling

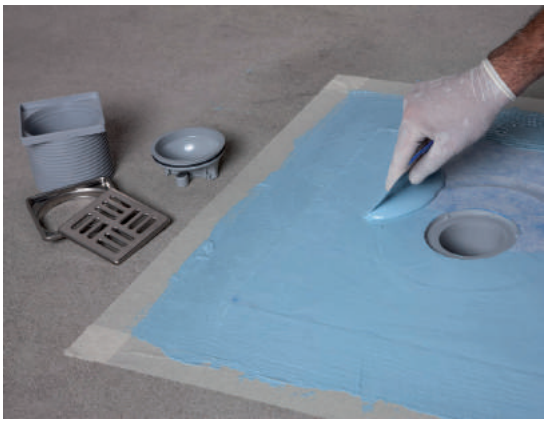
15.1 The membranes must be fully cured before tiling. The cured membranes must be protected at all times to prevent mechanical damage, so may require temporary covers until the finishing is completed.

15.2 Tiling must be undertaken in accordance with AS 3958.1 and the BRANZ Good Practice Guide - Tiling. The compatibility of the tile adhesive must be confirmed with the adhesive manufacturer or Mapei New Zealand Ltd.

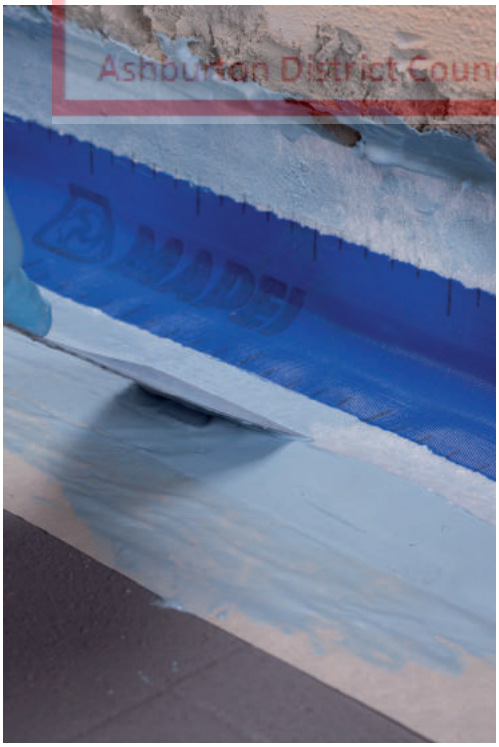
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Impregnating Drain Vertical fabric with Mapelastic AquaDefense



Application of Mapeband to a wall-floor joint with Mapelastic AquaDefense



Application of the first coat of Mapelastic AquaDefense



Application of the second coat of Mapelastic AquaDefense

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Inspections

16.1 The Technical Literature must be referred to during the inspection of membrane installations.

16.2 Critical areas of inspection are:

- Construction of substrates, including crack control and installation of bond breakers and movement control joints.
- Moisture content of the substrate prior to the application of the membrane.
- Acceptance of the substrate by the membrane installer prior to application of the membrane.
- Installation of the membrane to the manufacturer's instructions, particularly installation to the correct thickness and use of reinforcement.
- Membrane curing and integrity prior to the installation of tiles including protection from mechanical damage during curing and prior to tile installation.

Health and Safety

17.1 Safe use and handling procedures for the membranes are provided in the Technical Literature. The materials must be used in conjunction with the relevant Material Safety Data Sheet.

Basis of Appraisal

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

Tests

18.1 The following testing has been undertaken by various organisations:

- Mapegum WPS and Mapelastic Wet Area Membranes in accordance with; EN 14891 for initial tensile adhesion strength, tensile strength after water contact, tensile adhesion strength after heat ageing, tensile adhesion strength after contact with lime water, tensile adhesion strength after contact with chlorine water, tensile adhesion strength after freeze-thaw cycles, waterproofing and crack bridging ability; DIN 53504 for tensile strength and maximum elongation after exposure to air and water immersion (Mapegum WPS only) and; Mapei internal method for water absorption after exposure and water immersion.
- Mapelastic Smart in accordance with EN 1502-4 for bond strength to concrete, freeze thaw, flexibility, static and dynamic crack bridging, water vapour permeability, impermeability to water and bond strength after water immersion, heat ageing, freeze-thaw and alkali ageing.
- Mapelastic in accordance with; EN 14891 for crack bridging after 28 days exposure to air, crack bridging after 7 days exposure to air and 21 days immersion in water, adhesion to concrete surface after 28 days exposure to air, adhesion to concrete surface after 28 days exposure to air and 21 days immersion in water; DIN 52615 for resistance to water vapour transmission and; Mapei internal method for deformability under low temperatures.
- Mapegum WPS in accordance with; EN 1384 for tensile adhesion strength after exposure and water immersion; UNI 8202/22 for water absorption after exposure and water immersion and; DIN 53505 for shore A hardness.
- Mapelastic AquaDefense in accordance with AS/NZS 4858 Appendix A including effect of heat ageing, bleach, detergent and water on tensile and elongation, water vapour transmission to ASTM E96-92 and cyclic movement resistance requirements of AS/NZS4858:2004 Appendix B. Testing to ANSI 118.10-1999 including seam strength, breaking strength, dimensional stability, resistance to fungi, static head and shear strength to ceramic tile and cement mortar. Also tensile adhesion on a plywood substrate and low temperature flexibility of the membrane.
- Mapelastic Turbo in accordance with EN1504-2 and EN14891 for water vapour permeability, capillary adsorbtion and permeability to water, permeability to water, freeze-thaw cycling, crack-bridging ability, pull off adhesion and bond strength. Also tensile adhesion on a plywood substrate.

18.2 The above test methods and results have been reviewed by BRANZ and found to be satisfactory.

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18.3 Testing of Mapegum WPS and Mapelastic has been undertaken by BRANZ for durability in accordance with AS/NZS 4858: 2004, Appendix A covering tensile strength and elongation after immersion in water, bleach, detergent, and after heat ageing.

18.4 Testing for suitability of Mapelastic over particleboard in accordance with AS/NZS 4858: 2004, Appendix C has been undertaken by BRANZ and found to be satisfactory.

Other Investigations

19.1 An assessment was made of the durability of the Mapegum WPS, Mapelastic, Mapelastic Smart, Mapelastic Turbo and Mapelastic AquaDefense Wet Area Membranes by BRANZ technical experts.

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

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

Quality

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

20.2 The quality management system of the membranes manufacturer has been assessed and found to be satisfactory.

20.3 The quality of supply of the membrane system materials to the market is the responsibility of Mapei New Zealand Ltd.

20.4 Quality on site is the responsibility of the Mapei New Zealand Ltd trained applicators.

20.5 Designers are responsible for the building design, and building contractors are responsible for the quality of installation of the framing systems and substrates.

20.6 Building owners are responsible for the maintenance of the ceramic or stone tiles in accordance with the instructions of Mapei New Zealand Ltd.

Sources of Information

- AS/NZS 1170: 2002 Structural design actions.
- AS/NZS 2908.2: 2000 Cellulose-cement products – Flat sheet.
- AS/NZS 2269: 2012 Plywood-Structural.
- AS 3958.1: 2007 Guide to the installation of ceramic tiles.
- AS/NZS 4858: 2004 Wet area membranes.
- DIN 53504 May 1994 Determination of tensile stress/strain properties of rubber.
- EN 1348: 1997/A1 Adhesives for tiles – Determination of tensile adhesion strength for cementitious adhesives.
- EN 14891 March 2003 Liquid applied waterproofing membranes for use beneath ceramic tiling – Definitions, specifications and test methods.
- NZS 3101: 2006 The design of concrete structures.
- NZS 3602: 2003 Timber and wood-based products for use in buildings.
- NZS 3604: 2011 Timber-framed buildings.
- NZS 4229: 2013 Concrete masonry buildings not requiring specific engineering design.
- NZS 4230: 2004 Code of Practice for the design of masonry structures.
- Ministry of Business, Innovation and Employment Record of amendments - Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992.
- Good Practice Guide - Tiling, BRANZ, April 2015.
- UNI 8202 – 22: 1987 Building. Water proof sheets. Determination of behaviour in water.

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BRANZ

In the opinion of BRANZ, Mapegum WPS, Mapelastic, Mapelastic Smart, Mapelastic Turbo and Mapelastic Aquadefense Wet Area Membranes are fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided they are used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to Mapei New Zealand Ltd, and is valid until further notice, subject to the Conditions of Appraisal.

Conditions of Appraisal

1. This Appraisal:
   a) relates only to the product as described herein;
   b) must be read, considered and used in full together with the Technical Literature;
   c) does not address any Legislation, Regulations, Codes or Standards, not specifically named herein;
   d) is copyright of BRANZ.
2. Mapei New Zealand Ltd:
   a) continues to have the product reviewed by BRANZ;
   b) shall notify BRANZ of any changes in product specification or quality assurance measures prior to the product being marketed;
   c) abides by the BRANZ Appraisals Services Terms and Conditions;
   d) warrants that the product and the manufacturing process for the product are maintained at or above the standards, levels and quality assessed and found satisfactory by BRANZ pursuant to BRANZ's Appraisal of the product.
3. BRANZ makes no representation or warranty as to:
   a) the nature of individual examples of, batches of, or individual installations of the product, including methods and workmanship;
   b) the presence or absence of any patent or similar rights subsisting in the product or any other product;
   c) any guarantee or warranty offered by Mapei New Zealand Ltd.
4. Any reference in this Appraisal to any other publication shall be read as a reference to the version of the publication specified in this Appraisal.
5. BRANZ provides no certification, guarantee, indemnity or warranty, to Mapei New Zealand Ltd or any third party.

For BRANZ

Chelydra Percy
Chief Executive

Date of Issue:
09 February 2018

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GIB®

Wet Area Systems

Specification and installation manual



CBI 5113

FEBRUARY 2021

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NATIONAL SUPPORT

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RESIDENTIAL AND NON-RESIDENTIAL APPLICATIONS. BATHROOMS, LAUNDRIES, TOILETS AND KITCHENS.

Protection from internal moisture is an important consideration when designing interior lining systems for homes, multi-unit apartments, educational, healthcare and commercial applications.

The New Zealand Building Code sets out minimum standards for wet area spaces in residential dwellings. However, often higher levels of performance and protection from internal moisture is demanded.

The GIB® Wet Areas System specification and installation manual provides internal lining options and details for specifiers, builders and building owners.

USE ONLY THE CURRENT SPECIFICATION

This manual supersedes the publication GIB Aqualine® Wet Area Systems March 2007. Winstone Wallboards Ltd accepts no liability for reliance upon publications that have been superseded.

If you are unsure whether this is the current publication, call the GIB® Helpline on 0800 100 442 or go to gib.co.nz

BEWARE OF SUBSTITUTION

The performance of GIB® Wet Area Systems requires accurate design detailing and construction practices. All GIB® Systems have been developed specifically for New Zealand conditions and independently tested, assessed or appraised, to ensure the required level of performance. It is important to use GIB® components where specified and to closely follow the specified design details and construction practices, to be confident that the required level of performance and quality is achieved on site.

BRANZ Appraised
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This publication

This publication is a best practice guide to the design and construction of wall and ceiling linings in wet areas with intermittent water exposure within residential and non-residential buildings, as covered by NZ Building Code Clause E3 Internal Moisture.

The information is designed to be helpful to designers, contractors and home-owners wishing to achieve a result that is easy to incorporate into modern design, simple and clear to construct, and that will satisfy the needs, requirements and expectations of both the NZ Building Code and the end user.

Wet areas in the home often require relatively frequent and expensive renovation or repair, often because of the ingress of water to the structure of the building.

To form a complete wet area system it is important to specify compatible materials and systems, designed to cope with conditions that are common in wet areas, and to ensure correct installation using best practice.

WET AREAS

Generally, wet areas are described as spaces to where fresh water is reticulated, such as bathrooms, toilets, laundries and kitchens. Within wet areas the following requirements apply;

1. NZBC Clause E3.3.4 states that wall surfaces adjacent to sanitary fixtures or sanitary appliances must be impervious and easily cleaned.
2. NZBC Clause E3.3.6 states that surfaces of building elements likely to be splashed must be constructed in a way that prevents water splash from penetrating behind linings or into concealed spaces.

NZ Building Code Clause E3 also refers to other requirements not covered in this publication, such as ventilation, condensation control and overflow management. Ongoing maintenance of wet areas is also important to maximise service life.

GIB AQUALINE®, GIB TOUGHLINE® AQUA AND GIB WEATHERLINE®

Although able to cope with infrequent short-term exposure, standard gypsum plasterboard will have a shortened life expectancy when frequently exposed to water or a high moisture environment.

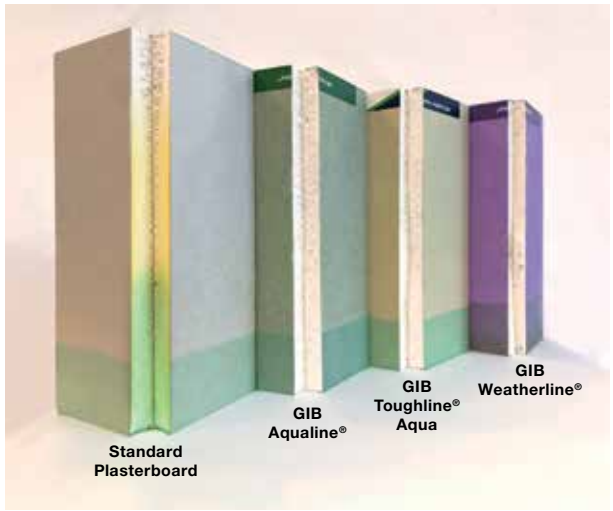
The NZ Building Code does not call for water resistant linings in wet areas but it is desirable to specify lining materials which will maintain their integrity longer when exposed more frequently to moisture, and to one-off events such as leaks or flooding.

GIB Aqualine®, GIB Toughline® Aqua and GIB Weatherline® feature a water-resistant polymer impregnated core, designed for wet area applications. These core formulations not only resist penetration of moisture through the lining into the framing behind, but also resist water “wicking” up the core, a common cause of long-term damage where a water-resistant lining has not been used.

WATER ABSORPTION TEST

The illustrations below show how GIB Aqualine®, GIB Toughline® Aqua and GIB Weatherline® compare with standard plasterboard after soaking for two-hours in green dye.





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WHERE TO USE GIB® WET AREA LININGS

In order to prolong the life expectancy of the space it is highly desirable to include wet area linings in situations where there is an increased risk of water or moisture damage. Applications include walls and ceilings in bath and shower rooms, and walls in laundries, toilets and kitchens.

BENEFITS

- Water resistant and durable linings help protect against water damage
- Proven substrate for paint, wallpaper, waterproofing membranes, tiles, sheet vinyl and rigid sheet shower linings
- Suitable for both residential and non-residential applications
- Dimensionally stable and an excellent substrate for ceramic tiles
- Conventional jointing methods
- Easy to cut and form openings
- Contains glass fibres and other additives to increase strength and fire resistance
- May be used in GIB® Bracing, GIB® Fire Rated and GIB Noise Control® Systems (see Compliance with the NZ Building Code, Clauses B1, C3 and G6). Consult the appropriate GIB® literature for installation details

HANDLING AND STORAGE

- GIB® plasterboard must be stored under cover, stacked flat and clear of the floor with sufficient support to avoid sagging
- GIB® plasterboard must be handled as a finishing material

LIMITATIONS

- GIB® wet area linings must not be used for bracing purposes in shower cubicles or above baths. For more information refer to page 9 of this manual
- Do not use GIB® wet area linings where exposed for extended periods to humidity levels above 90% RH, such as in group shower or steam rooms, or where exposed to moisture and chlorine rich environments such as in indoor swimming pools
- GIB® wet area linings used in a bathroom or other high humidity environment must not be directly applied to solid plaster (gypsum or cement), wood-based sheet linings or similar materials, masonry or concrete, without strapping or steel furring channels
- GIB® wet area linings must not be installed over a vapour barrier or a wall acting as a vapour barrier
- Cracked or damaged sheets must never be used
- GIB Aqualine® or GIB Toughline® Aqua must not be used in external applications
- GIB® plasterboard must not be exposed to temperatures in excess of 52°C for prolonged periods. Heat-generating devices may include halogen lighting, cooking elements, radiant heating, solid fuel exhausts and fire surrounds. Consult the appliance manufacturer for installation details

Table 1: GIB® Wet Area linings sheet dimensions and weights

Product	Sheet face colour	Thickness (mm)	Sheet width (mm)	Edge Type	Sheet length (mm)						Max. Weight (kg/m²)
					2400	2450	2700	3000	3600	4800	
GIB Aqualine®	Green	10	1200	TE/TE	■		■	■	■		8.0
			1200	TE/SE	■					■	
			1350	TE/SE	■				■		
		13	1200	TE/TE	■		■	■	■		11.0
GIB Toughline® Aqua	Mauve	13	1200	TE/TE	■		■	■			11.4
GIB Weatherline®	Purple	10	1200	SE/SE		■	■	■			9.0
		13	1200	SE/SE			■	■			11.5

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BOARD SUBSTITUTION OPTIONS

Acceptable GIB Aqualine® alternatives	
10mm GIB Aqualine® can be replaced with:	10mm GIB Weatherline® 13mm GIB Toughline® Aqua
13mm GIB Aqualine® can be replaced with:	13mm GIB Weatherline® 13mm GIB Toughline® Aqua

GIB® Wet Area System construction details in this manual refer to the use of GIB Aqualine®, GIB Toughline® Aqua and GIB Weatherline® sheets may also be used in place of GIB Aqualine®.

FLEXIBLE SHEET VINYL – SHOWERS AND OTHER WET AREAS

- GIB Aqualine®, GIB Toughline® Aqua and GIB Weatherline® are suitable substrates for flexible vinyl wall finishes in wet areas of residential, commercial or institutional buildings
- Framing requirements and installation procedures are presented in this literature, except that the lining gap at the floor is no more than 5mm when a pencil cove detail is used
- The installation of galvanised steel reinforcing angles behind internal lining corners is recommended for sheet vinyl applications in showers or shower over bath situations
- The lining must be jointed and stopped to a paint quality finish (Level 4) – trowel marks can telegraph even through a commercial grade 2mm vinyl
- A commercial grade vinyl is recommended in commercial or institutional bathrooms and showers
- In areas directly exposed to liquid water, all joints in flexible sheet vinyl must be heat welded
- Installation of flexible vinyl must be carried out strictly in accordance with the specifications provided by the suppliers/ manufacturers of the vinyl

RIGID SHEET SHOWER LININGS

- The wall surface must be free of dust before installation of the lining
- Avoid lining joints as much as possible and where necessary flush with plaster to achieve a level surface
- Do not preseal or paint areas which are to be covered by the rigid shower linings
- The suppliers of thin (usually 2-3mm) and rigid acrylic shower linings commonly recommend direct adhesive fixing to wall linings using solvent-based adhesives
- Care must be taken to ensure that rooms are adequately ventilated
- Water temperature changes will cause movement of the thin acrylic sheet, which in turn will stress the adhesive and wall lining substrate
- Consult the supplier of the shower lining for full installation details
- Suppliers of rigid sheet acrylic shower linings recommend a minimum of 24 hours for the adhesive to cure fully prior to the shower being put into service

WATERPROOF MEMBRANE SYSTEMS AND TILING

- A waterproof membrane system must be applied to lining materials used as a substrate for ceramic tiles in a shower or shower over bath situation
- The wall surface in a shower or shower over bath situation is not complete and ready for tiling until coated with a waterproof membrane system over the lining and once penetrations for shower mixers, taps and associated fittings are sealed
- The installation of galvanised steel reinforcing angles behind internal lining corners is required for tiled wall applications in showers or shower over bath situations
- In-situ waterproofing membrane materials manufactured to AS/NZS 4858:2004 “Wet Area Membranes” are recommended and must be applied to manufacturer’s recommendations. Typically, these types of membrane systems are not suitable for paint and wallpaper finishes
- Waterproof membrane systems must be fully cured and dry prior to application of tiling adhesives
- Preformed sheet membranes are also available and may be more suitable where curing times or specialist skills are an issue
- The details shown in this manual are generic in nature. For accurate detailing, follow the specifications provided by the supplier of the proprietary waterproof membrane system

For further information on tiling consult the BRANZ Good Practice Guide – Tiling.

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PENETRATIONS AND SEALANTS

As leaks and water ingress typically occur at junctions between building elements and at penetrations, it is essential that particular attention is given to these details at the time of installation. Lack of attention to detail can result in water damage that could remain undetected for a long time.

- Ensure that all cut-outs for pipe penetrations are made neatly, and slightly oversize, with a hole saw. These penetrations should be of a diameter no more than 12mm greater than that of the pipe
- Ensure shower mixer and tap penetrations are sealed with a proprietary flange system to prevent the passage of moisture into the wall cavity
- Sealants should be of a mould inhibiting type and be paintable. Neutral cure silicones will generally meet these requirements
- Surfaces should be dry and free from dust before application, a minimum of a 4mm joint width provided and the depth should not exceed the width
- Apply a bead of sealant to the full depth of the lining in the following locations:
  - Around all tap/pipe bodies
  - The gap between the bath rim and the bottom edge of the wet area lining
  - Between the upstand of preformed shower bases and the bottom edge of the lining
  - Where an impervious junction is required at the floor/wall line, carefully seal the gap between the bottom edge of the board and the finished floor. Leave a 5-10mm gap at the bottom of the wall lining for this purpose, ensuring the gap is free from dirt and dust
- Do not locate shower heads or taps on fire rated or intertenancy walls. Should this be unavoidable always use tested and approved proprietary penetration seals

RENOVATIONS

Bathrooms, kitchens and laundries are the most renovated rooms in the house, partly due to fashion considerations and partly because of damage sustained by ingress of water and moisture.

When renovating these rooms it is often easier and more cost-effective to remove the existing linings and replace them. This allows for a new start in the room and offers sound substrates for new surfaces such as tiling and painting, where otherwise flaking paint or damaged plasterboard may compromise good and sound finish or practice. At the very least re-lining will:

- Allow for inspection of framing where damage may have occurred and provide the opportunity to repair such damage
- Allow plumbing and electrics to be checked and altered or replaced where required
- Provide the opportunity to install thermal and acoustic insulation, water-resistant linings, and propriety plumbing penetration flange systems where appropriate
- Make the job easier

MAINTENANCE

Lack of maintenance is frequently the cause of premature and often expensive failure of components and building elements within wet areas.

It is important to regularly inspect and repair any potential problem before it becomes expensive to reinstate. Good maintenance should include:

- Ongoing ventilation. At the very least, good passive ventilation (e.g. window vents); but good active ventilation (e.g. extraction fans) of an appropriate size for the room is recommended
- Impervious coatings and surfaces should be checked for wear and damage and maintained and re-coated before ingress of water to the substrate occurs
- Regular cleaning with appropriate cleaners so that build-up of matter, such as mould, is well controlled
- Sealants at junctions and penetrations should be checked for adhesion on a regular basis and replaced where adhesion failure to substrates occurs
- Where pipe leaks have become evident, however small, they should be repaired promptly and any area around such leaks dried out completely before any other repairs are carried out

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Compliance with the NZ Building Code

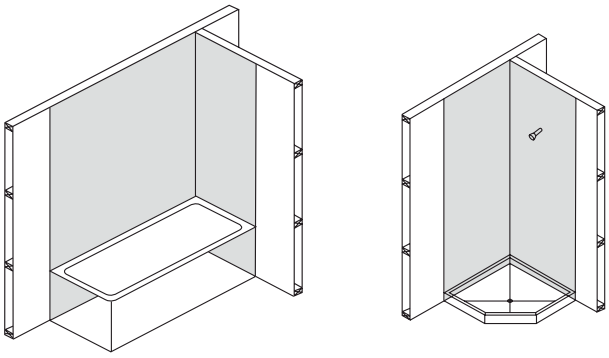
STRUCTURE – CLAUSE B1

The design and material specification for steel and timber framing used in GIB® Wet Area systems must be in accordance with the performance requirements of NZ Building Code Clause B1 (Structure).

Bracing elements are required to have a durability of 50 years. GIB® bracing elements are not to be located in shower cubicles or behind baths because of durability requirements, the likelihood of renovation, and practical issues associated with fixing bracing elements to perimeter framing members, such as at bath and shower tray locations.

Otherwise, GIB® Bracing Systems can be used in water-splash areas, provided these are maintained impervious for the life of the building.

GIB Aqualine®, GIB Toughline® Aqua and GIB Weatherline® can be used in place of GIB® Standard plasterboard in GIB® bracing elements. They can also be used in place of GIB Braceline® in GIB® bracing elements 900mm or longer, provided the perimeter of the element is fixed with GIB® Grabber 32mm x 6g screws at 100mm centres, using the GIB Braceline® corner fixing pattern. Refer to the GIB® Bracing System literature.



No bracing in the shaded areas.

DURABILITY – CLAUSE B2

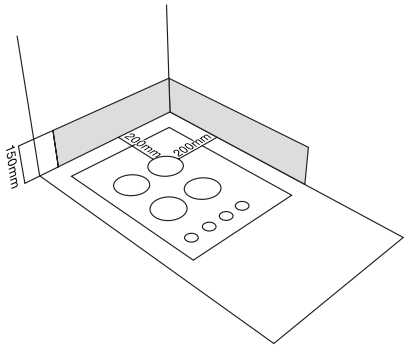
When installed and maintained in accordance with this literature, GIB® Wet Area systems tiled or vinyl covered have a serviceable life of at least 15 years. They comply with the requirements of NZ Building Code Clause B2 (Durability) for use in wet areas directly exposed to liquid water, e.g. showers, showers over baths and splash-backs.

When used as a general wet area lining and maintained under normal dry internal conditions, GIB® Wet Area Systems have a serviceable life of at least 50 years and comply with NZ Building Code Clause B2 (Durability) for use within toilets, kitchens, bathrooms and laundries not directly exposed to liquid water.

FIRE AFFECTING AREAS BEYOND THE SOURCE – CLAUSE C3

GIB® Fire Rated Systems provide passive fire protection in accordance with the requirements of NZ Building Code Clause C3. When GIB Aqualine® or GIB Toughline® Aqua is substituted into fire rated systems in place of the equivalent thickness GIB Fyreline®, the Fire Resistance Rating (FRR) of that system will be maintained.

The protection of combustible surfaces surrounding gas cooking appliances is covered by the latest version of AS/NZS 5601.1.



As a guide the following options are acceptable for wall surfaces within 200mm of the periphery of a gas element to a height of 150mm above the element for the full dimension (width and depth) of the cooktop surface area:

- 5mm tiles on GIB® plasterboard
- 5mm toughened glass on GIB® plasterboard
- or any system that can be demonstrated to meet the specific requirements of AS/NZS 5601.1

GIB® plasterboard products must not be exposed to temperatures in excess of 52°C for sustained periods. Check with the appliance manufacturer that this requirement will be met. It would be unusual for surfaces outside 200mm to exceed 52°C for sustained periods.

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INTERNAL MOISTURE – CLAUSE E3

The New Zealand Building Code Clauses that relate to wall surfaces are;

E3.3.4 - Wall surfaces adjacent to sanitary fixtures or sanitary appliances must be impervious and easily cleaned.

E3.3.5 - Surfaces of the building elements likely to be splashed or become contaminated in the course of the intended use of the building, must be impervious and easily cleaned.

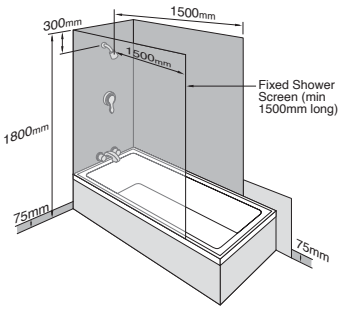
E3.3.6 - Surfaces of building elements likely to be splashed must be constructed in a way that prevents water splash from penetrating behind linings or into concealed spaces.

New Zealand Building Code Acceptable Solution E3/AS2 substantially refers to the Waterproof Membrane Association Incorporated (WMAI) Code of Practice for Internal Wet Area Membrane Systems (IWAM), August 2020.

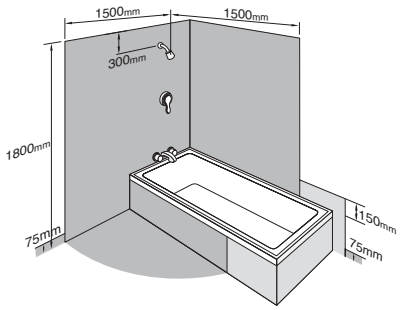
The IWAM Code of Practice refers to wet area membranes and over-surfaces that are easy to clean and suggests an extent as outlined below for a typical bathroom application. For further details refer to the IWAM Code of Practice which also lists suitable rigid sheet materials and tiling membranes.

Shaded areas in the diagrams below represent the minimum extent of wall surfaces requiring impervious sheet materials or waterproof membrane systems prior to tiling.

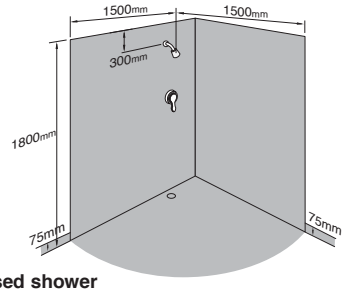
Enclosed shower over bath



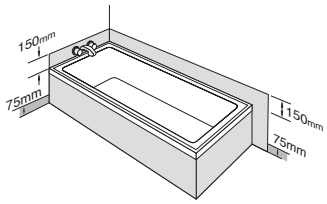
Unenclosed shower over bath



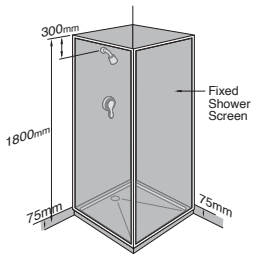
Unenclosed shower



Bath



Enclosed shower



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HAZARDOUS BUILDING MATERIALS – CLAUSE F2

At no stage during its serviceable life does GIB Aqualine® constitute a health hazard. It therefore meets the provisions of NZ Building Code Clause F2 (Hazardous Building Materials). Dust resulting from the sanding of stopping compounds may be a respiratory irritant and the use of a suitable facemask is recommended.

VENTILATION – CLAUSE G4

NZ Building Code Clause G4 (Ventilation) requires buildings to have a means of collecting or otherwise removing steam generated from laundering, utensil washing, bathing or showering. To prolong the life of interior linings and surface finishes and to minimise the risk of moisture related problems such as condensation and mould growth, adequate heating, thermal insulation and mechanical ventilation must be provided in kitchens, bathrooms and laundries.

AIRBORNE AND IMPACT SOUND – CLAUSE G6

GIB® Noise Control Systems can be used to provide ratings for Sound Transmission Class (STC) and Impact Insulation Class (IIC) in accordance with the requirements of NZ Building Code Clause G6 (Airborne and Impact Sound). When GIB Aqualine®, GIB Toughline® Aqua or GIB Weatherline® is substituted into GIB® Noise Control systems in place of the equivalent thickness GIB® Standard plasterboard or GIB Fyreline®, the STC and IIC rating of that system will be maintained. When GIB Aqualine®, GIB Toughline® Aqua or GIB Weatherline® is substituted in place of the equivalent thickness GIB Noiseline®, a small performance loss may occur. For further information refer to the GIB Noise Control® Systems literature or contact the GIB® Helpline 0800 100 442.

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TIMBER WALL FRAMING

Framing dimensions must comply with the requirements of NZS 3604:2011.

- The moisture content of timber framing shall be 18% or less at the time of lining
- Studs shall be spaced at 600mm centres maximum for both 10mm and 13mm GIB® plasterboard
- Nogs to be evenly spaced with a maximum spacing of 1350mm. Alternatively, nogs may be staggered 150mm maximum either side of a horizontal joint line
- Nogs are not required behind horizontal joints except in shower situations or specific fire or noise control systems

FASTENERS

- Minimum 32mm x 6g GIB® Grabber® High Thread screws.

FASTENER CENTRES

- 300mm centres to top and bottom plates and to perimeter studs
- Single fasteners to each stud where the horizontal joint crosses the studs
- Place fasteners 12mm from sheet edges and 18mm from sheet ends
- Daubs of GIBFix® adhesive at 300mm centres to intermediate studs
- Do not place adhesive at sheet edges or under fasteners. Sheet edges at door or window openings can be adhesive fixed unless forming part of the perimeter of a bracing element

For bracing, noise control or fire rating applications including fastener lengths consult the relevant GIB® technical publication.

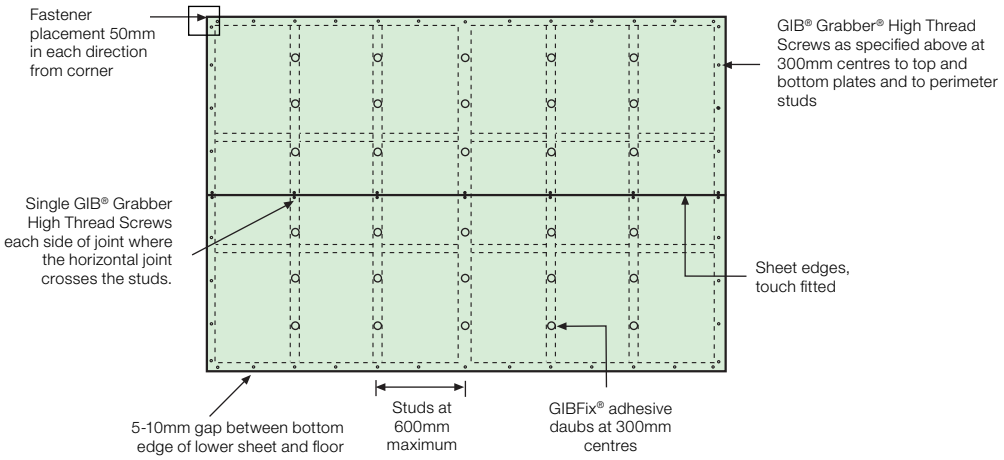
LINING

- Use minimum 10mm GIB® plasterboard
- Install the sheets leaving a 5-10mm gap at the floor line to allow for movement of the framing members and to allow for cleaning dirt and rubbish before sealing
- Sheets to be touch fitted.

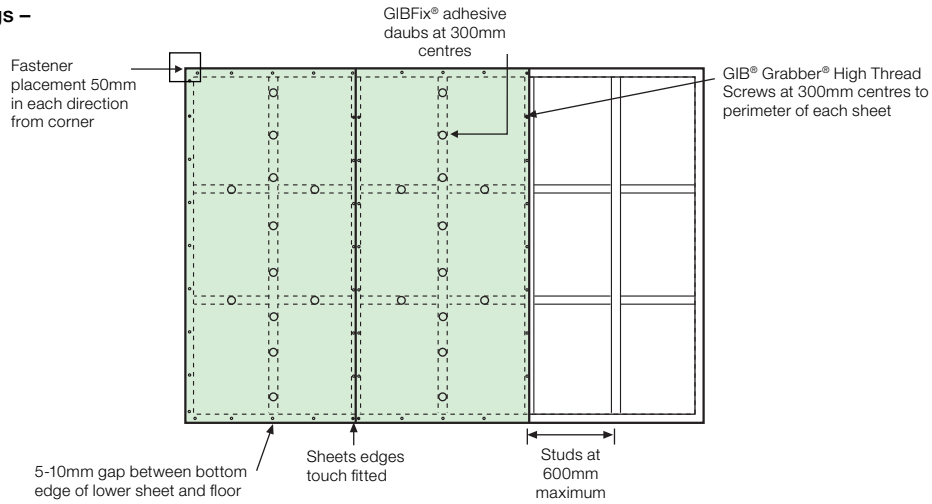
JOINTING

- Jointing shall be carried out in accordance with the instructions in the GIB® Site Guide.

Fastening the Linings – Horizontal Fixing Only



Fastening the Linings – Vertical Fixing Only



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STEEL WALL FRAMING

The minimum sheet thickness for fixing on light gauge 0.55mm base metal thickness (BMT) steel framing is 13mm GIB® plasterboard. For bracing, noise control or fire rating applications consult the relevant GIB® technical publication.

Steel frame for residential construction is in accordance with NZBC B1/AS1 9.1 NASH Standard Part 2 Light Steel Framed Buildings, or by specific design. 10mm GIB plasterboard is commonly used on minimum 0.75mm BMT residential steel framing.

FASTENERS

- Minimum 25mm x 6g GIB® Grabber® Self Tapping Screws.

FASTENER CENTRES

- 300mm centres to top and bottom channels and to end studs
- Single screws to each stud where the horizontal joint crosses the studs
- Place fasteners 12mm from sheet edges and 18mm from sheet ends
- Daubs of GIBFix® All-Bond adhesive or screws at 300mm centres to intermediate studs
- Do not place adhesive at sheet edges or under fasteners.
- Sheet edges at door or window openings can be adhesive fixed.

For bracing, noise control or fire rating applications including fastener lengths consult the relevant GIB® technical publication.

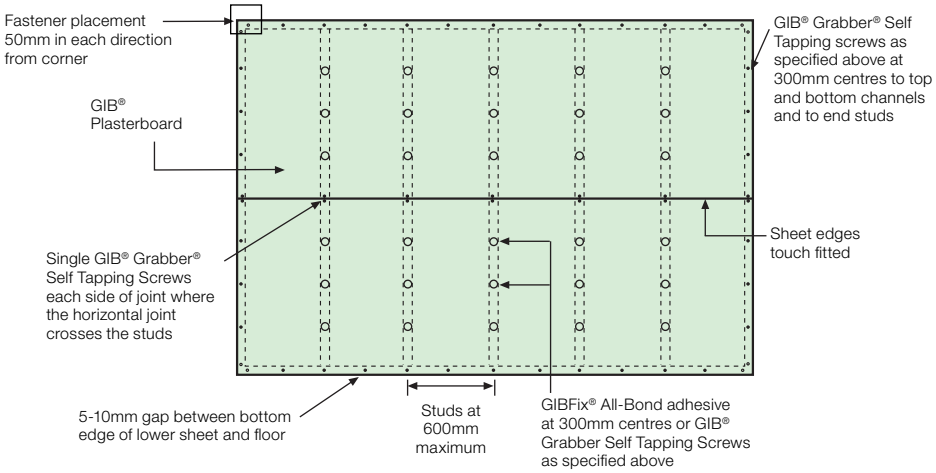
LINING

- Lay the sheets, leaving a 5-10mm gap at the floor line. Note: If friction fitted steel studs have been used, sheets must be fitted hard to the floor. Ensure floor is cured and dry
- Sheets to be touch fitted.

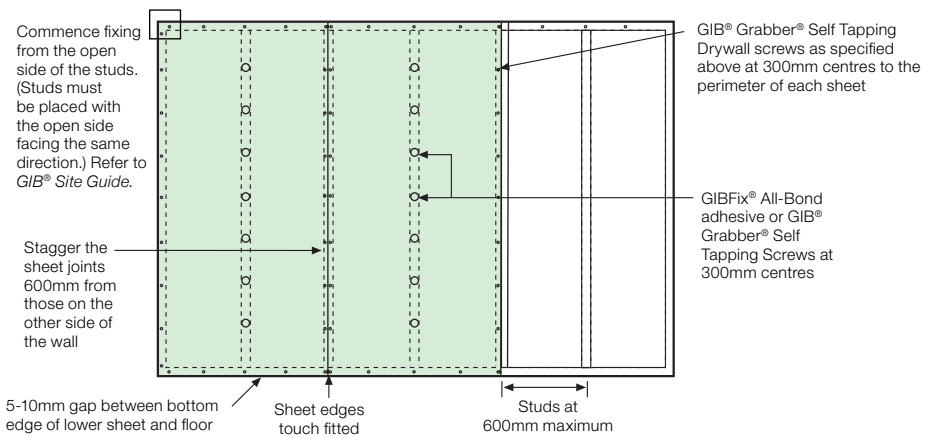
JOINTING

- Jointing shall be carried out in accordance with the instructions in the GIB® Site Guide

Fastening the Linings – Horizontal Fixing Only



Fastening the Linings – Vertical Fixing Only



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TIMBER WALL FRAMING

Framing dimensions and spacing must be appropriate for the tile weight and comply with the requirements of NZS 3604:2011 Timber Framed Buildings, or relevant specific design Standard.

NOGS

For impact protection in shower cubicles or shower over bath situations it is important that all sheet joints are made on solid framing. This may require vertical fixing or the installation of additional nogs. Also provide nogs:

- Adjacent to each pipe penetration and behind sink and tub flashings
- Between all studs above bath flanges and preformed shower bases

CORNER REINFORCING

- Prior to lining in tiled areas (shower cubicles and shower over bath only) the internal corners shall be reinforced with a minimum
- 32 x 32 x 0.55mm NZ18 or 45 x 45 x 0.55mm GIBFix® Angle. Each leg shall be fastened to the framing at 300mm centres

FASTENERS

- Minimum 32mm x 6g GIB® Grabber® High Thread Screws

FASTENER CENTRES

- 150mm centres to perimeter of wall and all intermediate studs
- Adhesive is not to be used in place of mechanical fasteners
- Place fasteners 12mm from sheet edges and 18mm from sheet ends
- Single fasteners to each stud where the horizontal joint crosses the studs
- Where relevant, fastener lengths must comply with the requirements of GIB® Fire Rated Systems or GIB® Noise Control Systems

For bracing, noise control or fire rating applications including fastener lengths consult the relevant GIB® technical publication.

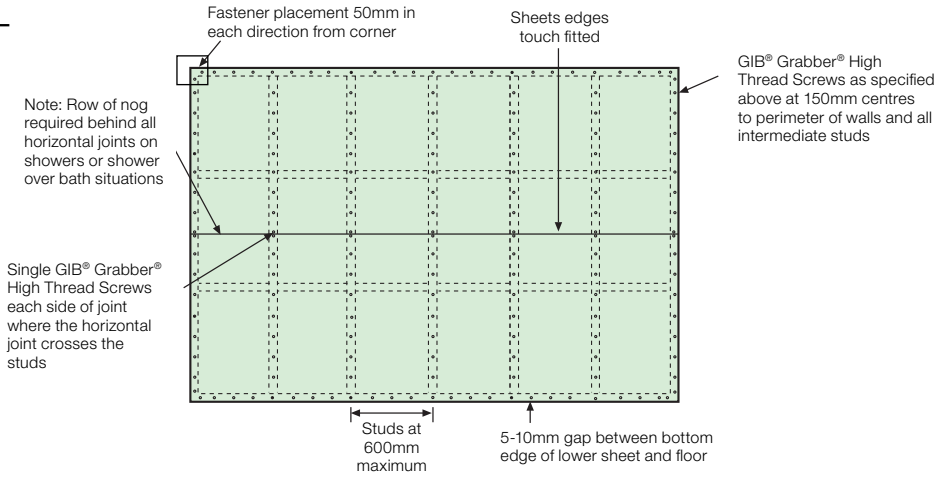
LINING AND TILE WEIGHTS

- Use minimum 10mm GIB® plasterboard
- For maximum permitted tile weights refer to pg 16 of this manual
- GIB® Wet Area linings may be fixed vertically or horizontally
- Sheets are touch fitted
- Provide a 5-10mm gap at the wall/floor junction and between the bottom edge of the lining and any bath rim or preformed shower base to allow for placement of sealant
- Do not tile on the resilient side of GIB Rail® or STWC Acoustic Clip (ST001) and channel noise control system
- GIB® Wet Area linings are suitable for tiling full height of walls, but if a wall is to be partially tiled (e.g. half high), only the area of wall under the tiles needs to be fixed as required for tiled areas. The remainder of the wall may be fixed as for non-tiled areas

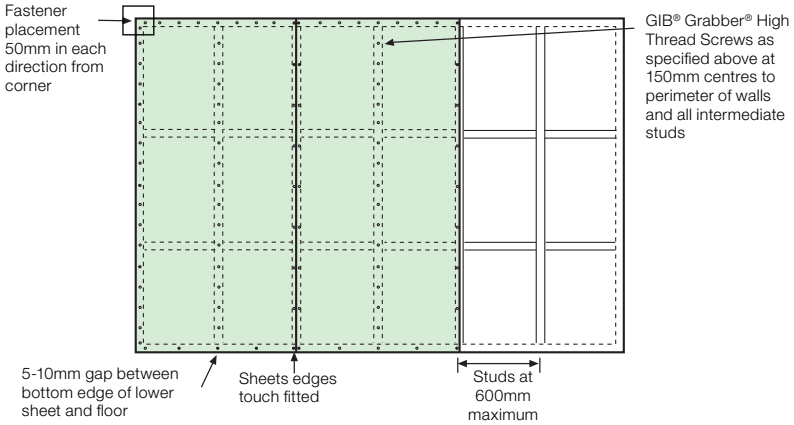
JOINTING

- Jointing shall be carried out in accordance with the instructions of the GIB® Site Guide

Fastening the Linings – Horizontal Fixing Only



Fastening the Linings – Vertical Fixing Only



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STEEL WALL FRAMING

Framing dimensions and spacing must be appropriate for the tile weight and comply with the requirements of NASH Standard Part 2:2019 Light Steel Framed Buildings, or relevant specific design Standard.

- Linings are placed hard to floor, bedded into a sealant bead
- Steel framing for tiling to have a minimum base metal thickness (BMT) of 0.75mm

NOGS

For impact protection in shower cubicles or shower over bath situations it is important that all sheet joints are made on solid framing. This may require vertical fixing or the installation of additional nogs. Also provide nogs:

- Adjacent to each pipe penetration and behind sink and tub flashings
- Between all studs above bath flanges and preformed shower bases

CORNER REINFORCING

- Prior to lining in tiled areas (shower cubicles and shower over bath only) the internal corners shall be reinforced with a minimum
- 32 x 32 x 0.55mm NZ18 or 45 x 45 x 0.55mm GIBFix® Angle. Each leg is fastened to the framing at 600mm centres

FASTENERS

- Minimum 32mm x 6g GIB® Grabber® Self Tapper screws

FASTENER CENTRES

- 150mm centres to perimeter of wall and all intermediate studs
- Adhesive is not to be used in place of mechanical fasteners
- Single screws to each stud where the horizontal joint crosses the studs
- Place fasteners 12mm from sheet edges and 18mm from sheet ends.

For bracing, noise control or fire rating applications including fastener lengths consult the relevant GIB® technical publication.

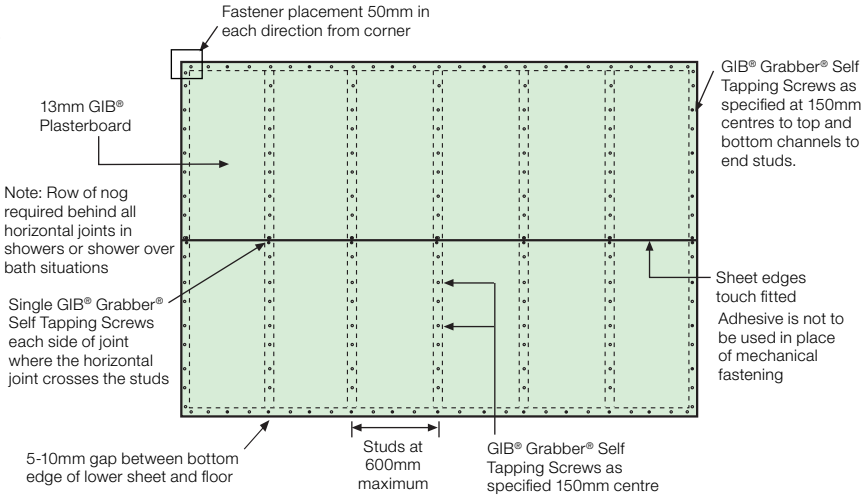
LINING AND TILE WEIGHTS

- Use minimum 13mm GIB® plasterboard
- For maximum permitted tile weights refer to pg 16 of this manual
- GIB® Wet Area linings may be fixed vertically or horizontally
- Sheets are touch fitted
- Provide a 5-10mm gap at the wall/floor junction and between the bottom edge of the lining and any bath rim or preformed shower base to allow for placement of sealant
- Do not tile on the resilient side of GIB Rail® or STWC Acoustic Clip (ST001) and channel noise control system
- GIB® Wet Area linings are suitable for tiling full height of walls, but if a wall is to be partially tiled (e.g. half high), only the area of wall under the tiles needs to be fixed as required for tiled areas. The remainder of the wall may be fixed as for non-tiled areas

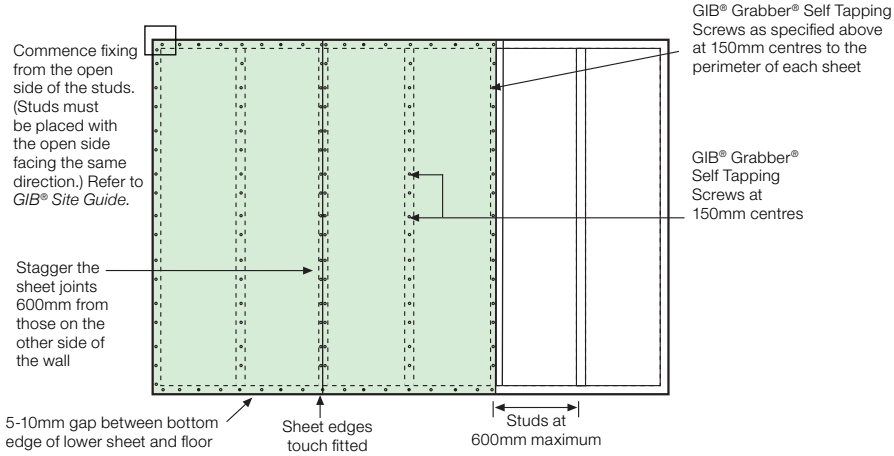
JOINTING

- Jointing shall be carried out in accordance with the instructions of the GIB® Site Guide

Fastening the Linings – Horizontal Fixing Only



Fastening the Linings – Vertical Fixing Only

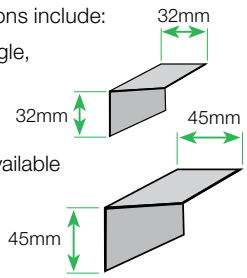


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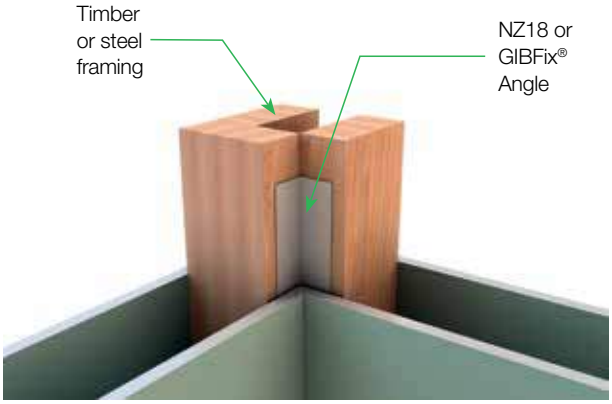
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METAL ANGLES FOR TILED INTERNAL CORNERS

- Prior to lining in tiled areas (shower cubicles and shower over bath only) the internal corners shall be reinforced with a minimum 32 x 32 x 0.55mm galvanised metal angle.
- Suitable GIB® metal angle options include:
  - GIB® Rondo® NZ18 metal angle, available length: 3.0m
  - GIBFix® Angle metal angle, available lengths: 2.4m and 2.7m



- Each side of the angle is secured to the framing with at 600mm centres
- Minimum height of the metal angle is 1800mm



WATERPROOF MEMBRANE SYSTEMS

A waterproof membrane system must be applied to all lining materials used as a substrate for ceramic tiles in a shower or shower over a bath application, or any other tiled application exposed to frequent water splash.

For further information see p10.

TILES AND TILE WEIGHTS

In areas likely to be directly exposed to water, tiles may be ceramic, porcelain or stone must comply with the over-surface finish requirements of the IWAM Code of Practice and be bedded with a suitable tile adhesive on the waterproof membrane system. See page 10 for the minimum extent of wall surfaces requiring impervious sheet materials or waterproof membrane systems prior to tiling.

Smaller mosaic tiles are often lighter, but the integrity of grout joints might be more prone to impact, whilst heavier tiles are larger and have less and deeper grout and sealant joints. For more information also see AS 3958:2007 Ceramic tiles – Guide to the installation of ceramic tiles.

Table 2: Recommended maximum tile weights

Maximum Tile Weights for GIB Aqualine®, GIB Toughline® Aqua or GIB Weatherline®			
Stud Centre (maximum)	**Fasteners Centre (maximum)**	**Lining Thickness**	**Tile Weight**
600mm maximum	150mm maximum	10mm	26kg/m^2
		13mm	40kg/m^2

ADHESIVE AND GROUT WEIGHTS

The weight of adhesive and grout can vary depending on the type of tile and the installation process used. The maximum tile weights stated in table 2 are conservative and refer to the tile weight excluding grout and adhesive used. An additional 3kg/m^2 has been factored into tile adhesion testing on top of the above stated tile weights to account for adhesive and grout weight used during the installation of the tile.

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CEILING FRAMING

Framing dimensions and spacing must comply with the requirements of NZS 3604:2011, NASH for steel or relevant NZ Standard.

For noise control or fire rating applications consult the relevant GIB® technical publication.

FASTENERS

- Steel battens – 25mm x 6g GIB® Grabber® Self Tapping screws
- Timber battens or Joists – 32mm x 6g GIB® Grabber® High Thread screws

ADHESIVES

- Steel battens - GIBFix® All-Bond
- Timber battens - GIBFix® All-Bond or GIBFix® One

FASTENERS CENTRES

- Single screws to the edges and centre of the sheets across each batten
- Single screw at 600mm maximum to the perimeter of the ceiling
- Screws to be 12mm from sheet edges
- Daubs of adhesive at 200mm centres between the screws
- Do not place adhesive at sheet edges or under fasteners, this may lead to screw pops

LINING

- The lining shall be fixed at right angles to the battens or joists
- Commence fixing from the centre of the sheets outwards.
- Sheets to be touch fitted
- Use long length sheets to minimise sheet end butt joints.
- Back-block sheet end butt joints
- See GIB® Site Guide for sheet edge backblocking requirements

BATTEN SPACINGS

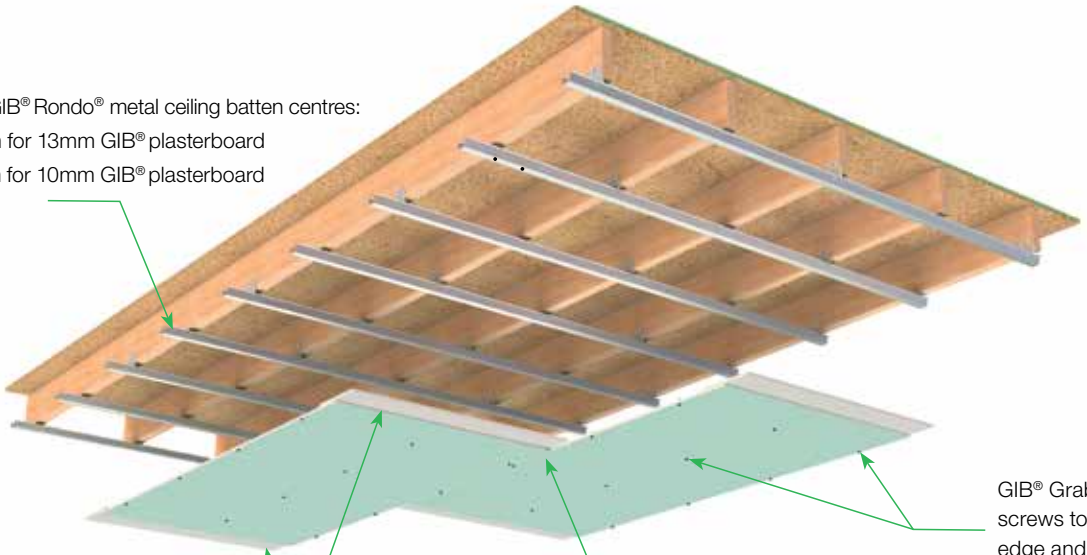
- 13mm GIB® plasterboard – 600mm centres maximum
- 10mm GIB® plasterboard – 450mm centres maximum

JOINTING

- All sheet joints must be paper tape reinforced and stopped in accordance with instructions in the GIB® Site Guide
- Do not fix tiles to GIB® plasterboard ceilings

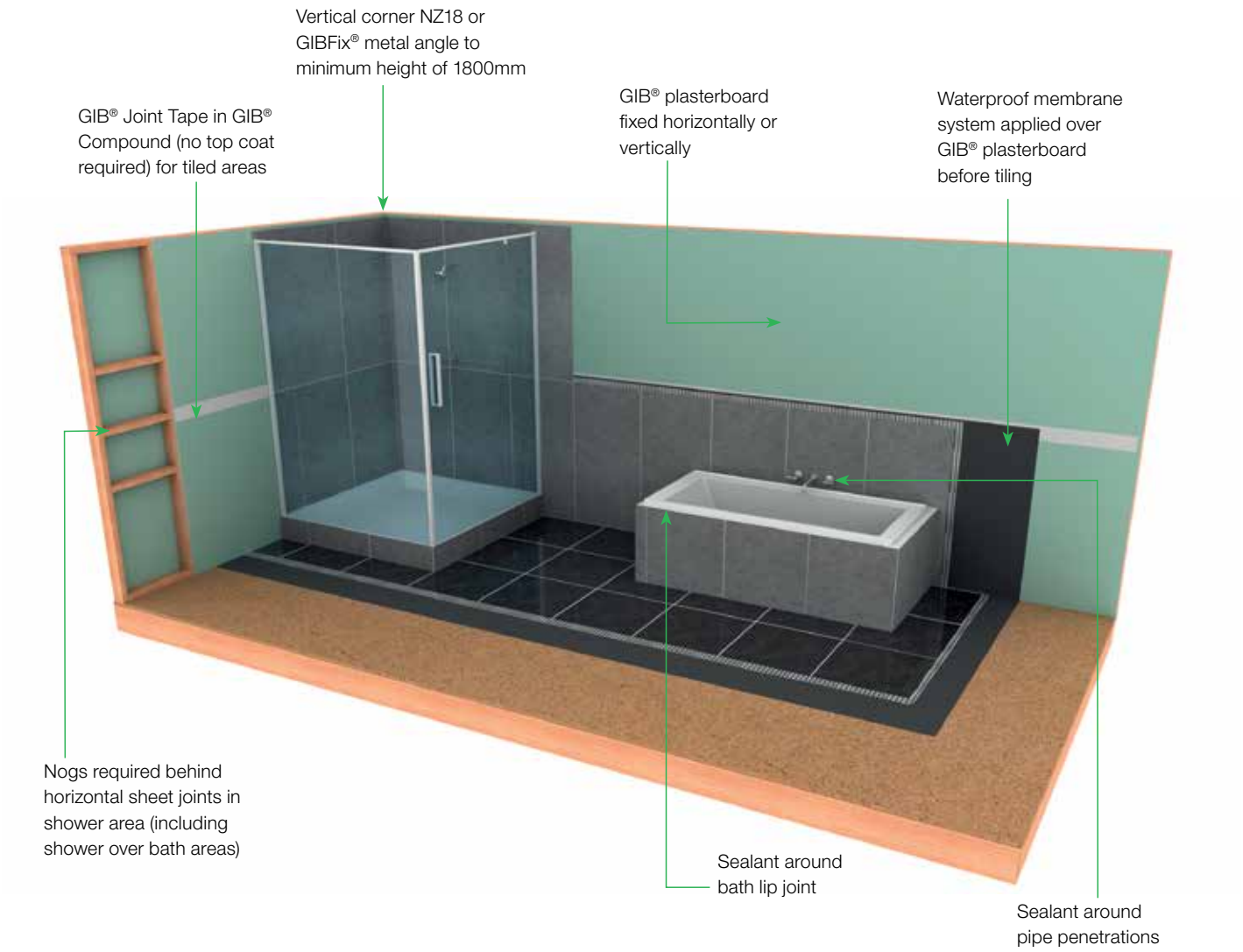
Maximum GIB® Rondo® metal ceiling batten centres:

- 600mm for 13mm GIB® plasterboard
- 450mm for 10mm GIB® plasterboard



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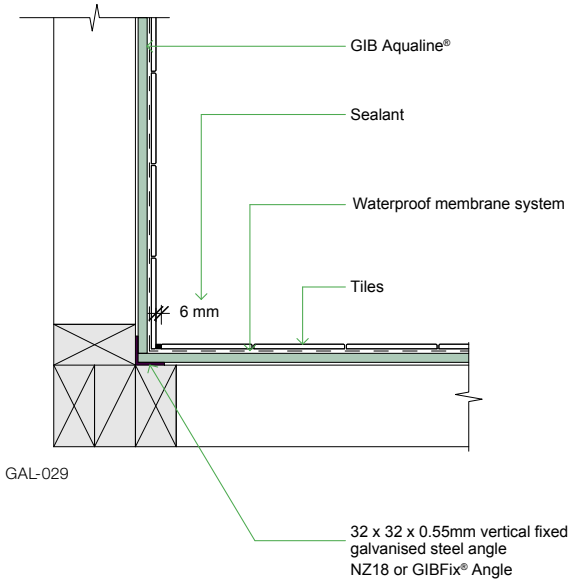
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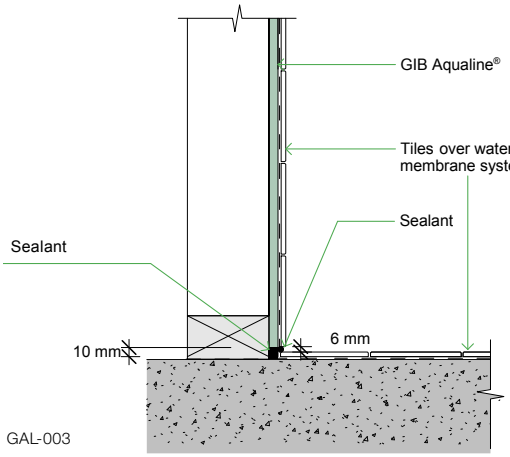
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A: TILED INTERNAL CORNER



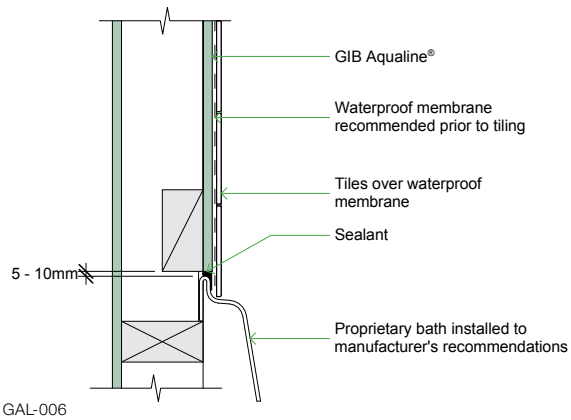
GAL-029

B: CERAMIC FLOOR LINING JUNCTION



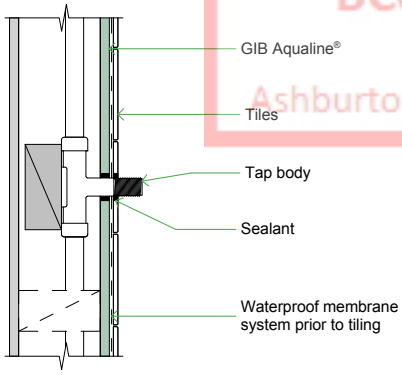
GAL-003

C: BATH LINING JUNCTION



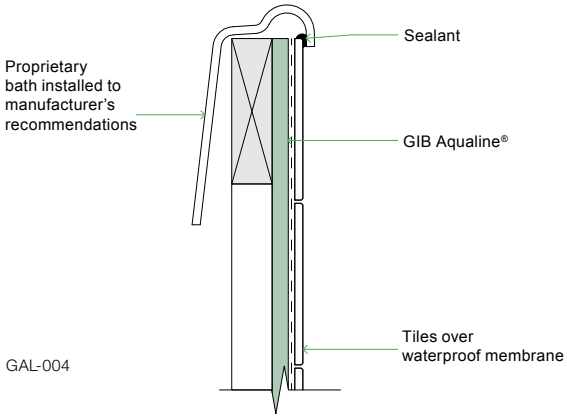
GAL-006

D: SEALING WET AREA PENETRATION



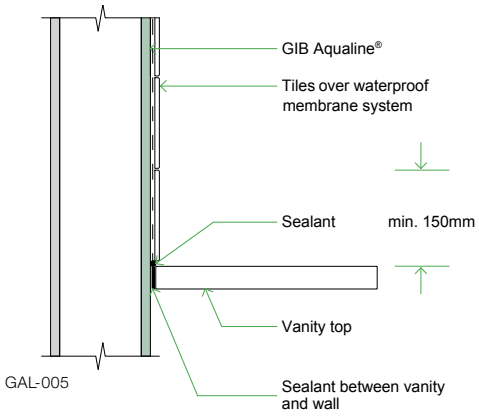
GAL-002

E: BATH CRADLE LINING DETAIL

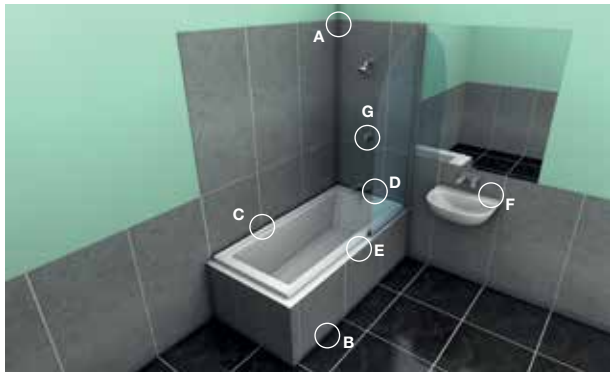


GAL-004

F: VANITY TOP LINING JUNCTION



GAL-005



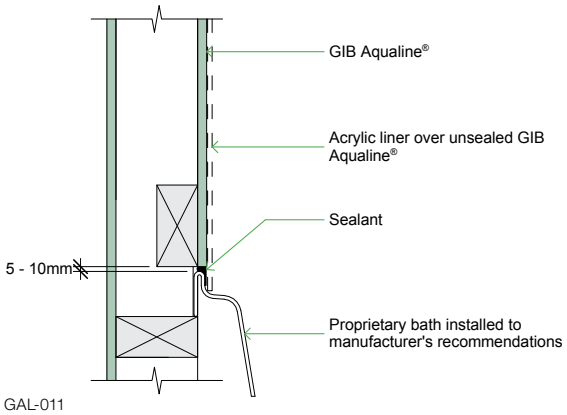
G: SHOWER MIXER PENETRATION IN WET WALL LININGS

Refer to the shower mixer manufacturer for shower mixer installation detailing including the use of proprietary products to prevent water or moisture ingress behind the wet wall lining.

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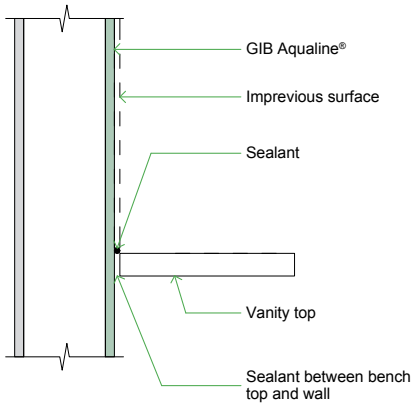
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A: BATH LINING JUNCTION



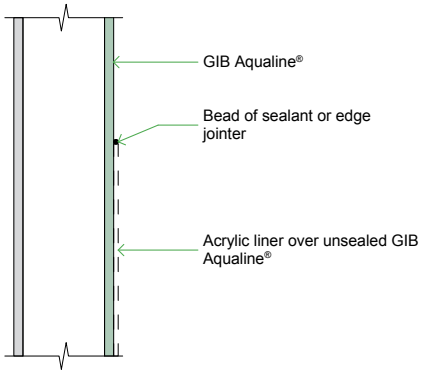
GAL-011

B: VANITY TOP LINING JUNCTION



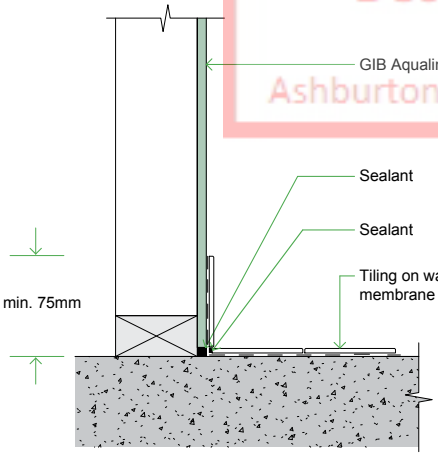
GAL-023A

C: UNSEALED PLASTERBOARD LINING



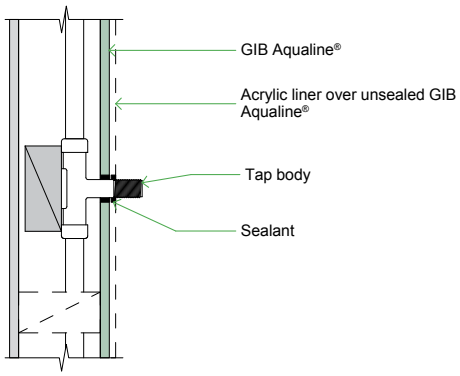
GAL-028

D: CERAMIC FLOOR SKIRTING LINING JUNCTION



GAL-001

E: SEALING SEMI WET AREA PENETRATION



GAL-019

F: SHOWER MIXER PENETRATION IN WET WALL LININGS

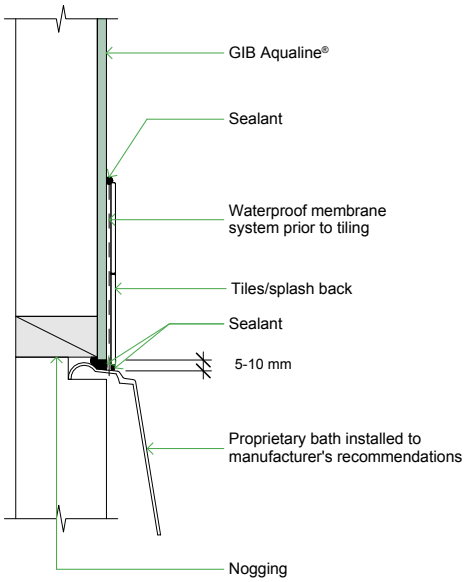
Refer to the shower mixer manufacturer for shower mixer installation detailing including the use of proprietary products to prevent water or moisture ingress behind the wet wall lining.



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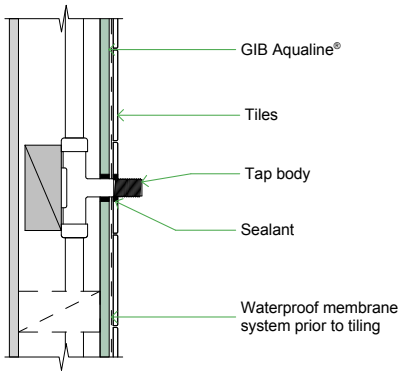
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A: BATH LINING JUNCTION



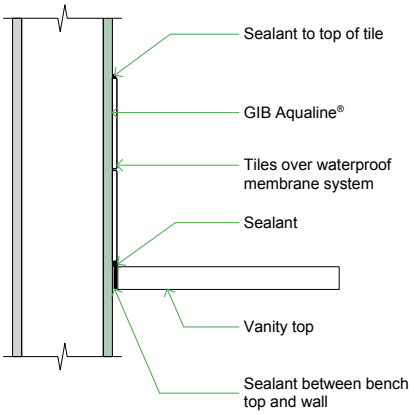
GAL-009

B: SEALING SEMI WET AREA PENETRATION



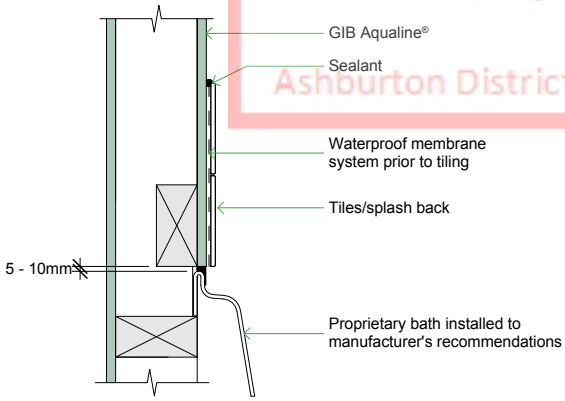
GAL-020

C: VANITY TOP LINING JUNCTION



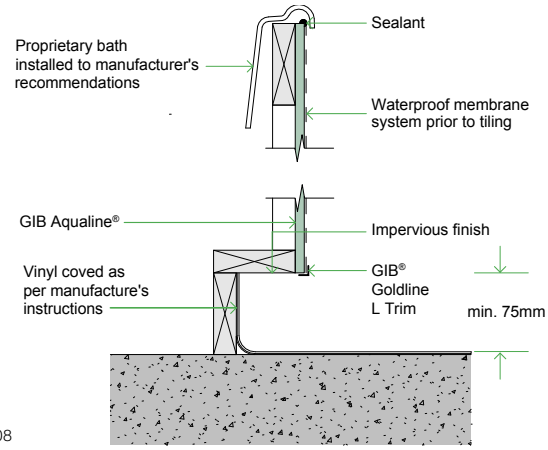
GAL-024

D: BATH LINING JUNCTION

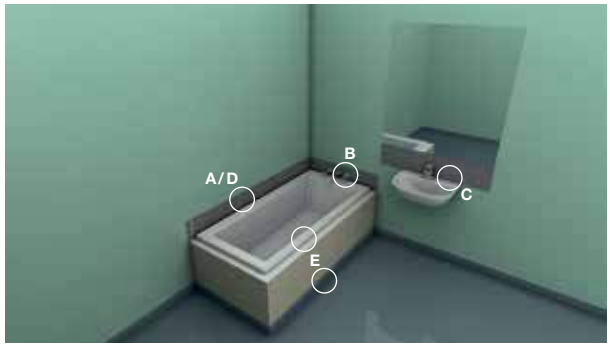


GAL-010

E: CRADLE VINYL LINING JUNCTION



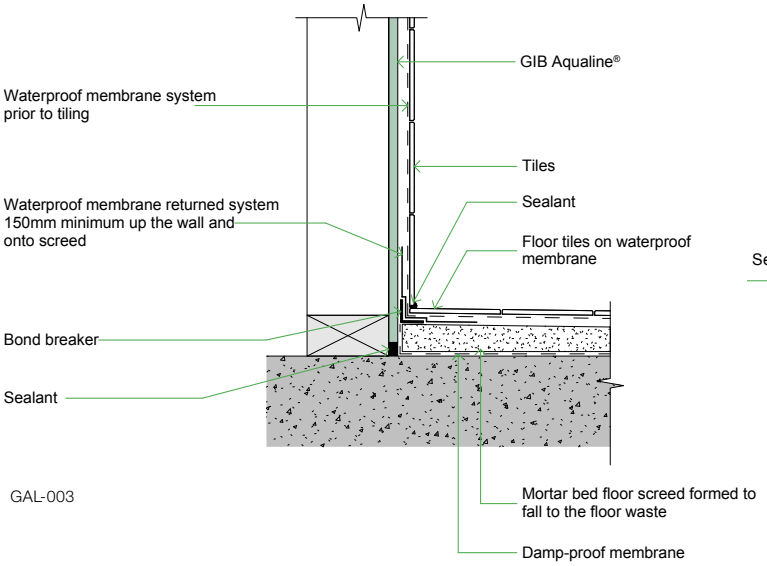
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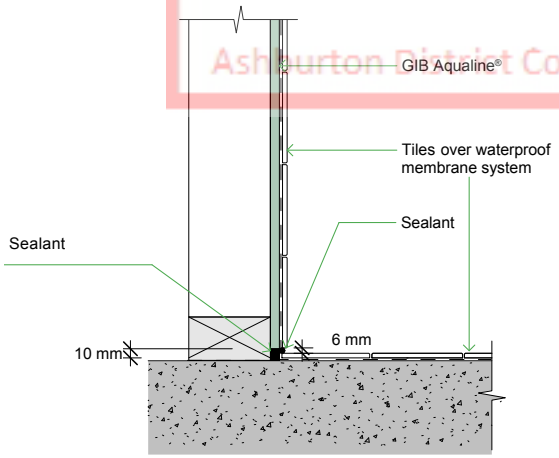
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A: MORTAR UNDER CERAMIC FLOOR LINING JUNCTION



GAL-003

C: CERAMIC FLOOR LINING JUNCTION

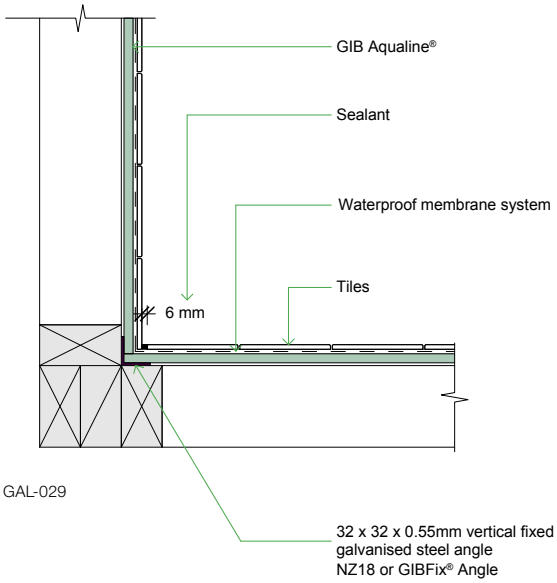


GAL-002

PREFORMED SHOWER BASE JUNCTIONS

Refer to the shower base manufacturer for proprietary shower tray installation detailing including wet wall lining junction detailing.

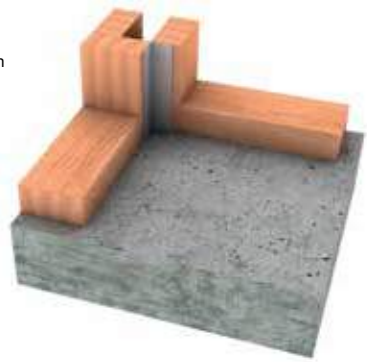
B: TILED INTERNAL CORNER



GAL-029

D: TILED INTERNAL CORNER METAL ANGLE POSITION

Refer to page 16 of this publication for specification and installation guidance.



GAL-030

E: SHOWER MIXER PENETRATION IN WET WALL LININGS

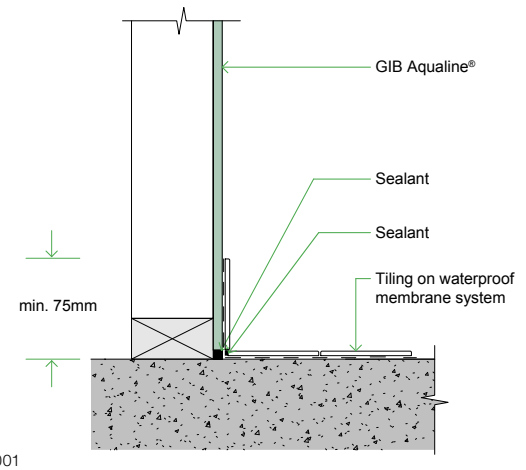
Refer to the shower mixer manufacturer for shower mixer installation detailing including the use of proprietary products to prevent water or moisture ingress behind the wet wall lining.



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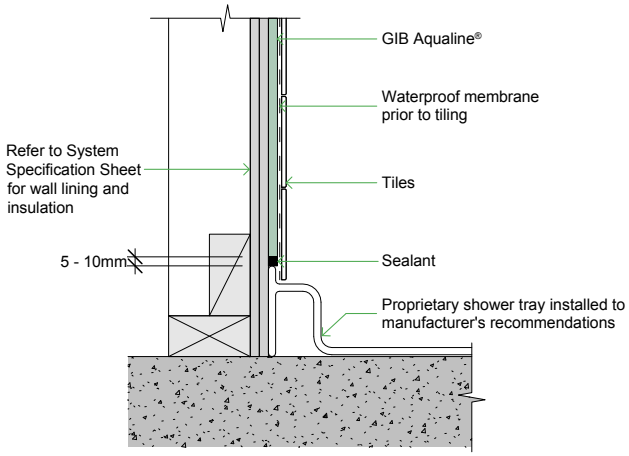
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A: CERAMIC FLOOR SKIRTING LINING JUNCTION



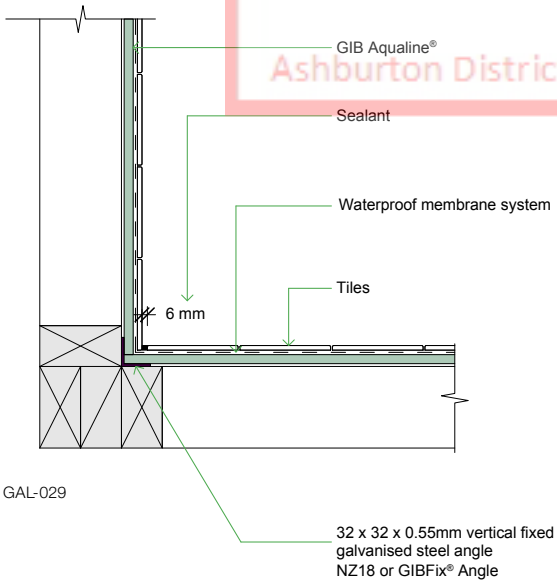
GAL-001

B: MOULDED SHOWER TRAY DOUBLE LINING JUNCTION



GAL-016

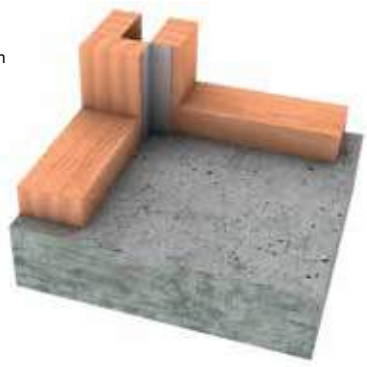
C: TILED INTERNAL CORNER



GAL-029

D: TILED INTERNAL CORNER METAL ANGLE POSITION

Refer to page 16 of this publication for specification and installation guidance.



GAL-030

E: SHOWER MIXER PENETRATION IN WET WALL LININGS

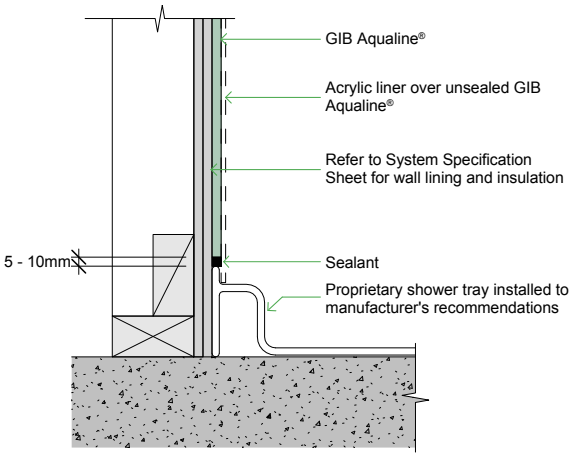
Refer to the shower mixer manufacturer for shower mixer installation detailing including the use of proprietary products to prevent water or moisture ingress behind the wet wall lining.



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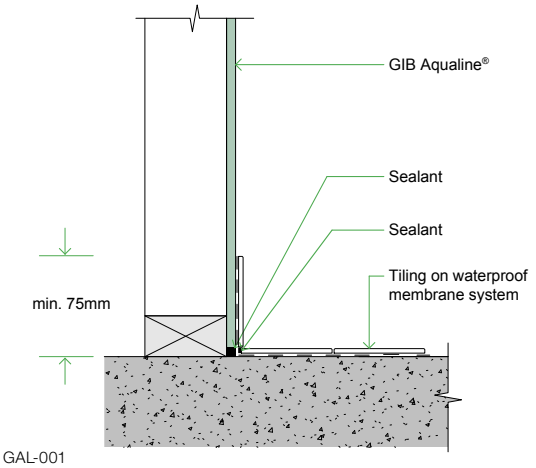
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A: MOULDED SHOWER TRAY DOUBLE LINING JUNCTION



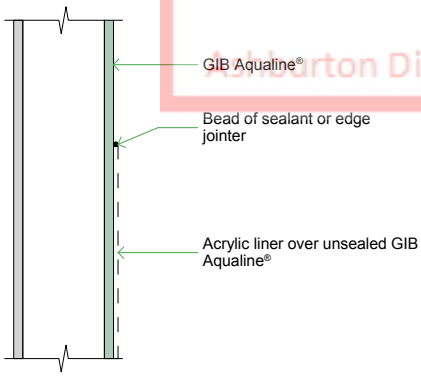
GAL-015

B: CERAMIC FLOOR SKIRTING LINING JUNCTION



GAL-001

C: UNSEALED PLASTERBOARD LINING



GAL-028

D: SHOWER MIXER PENETRATION IN WET WALL LININGS

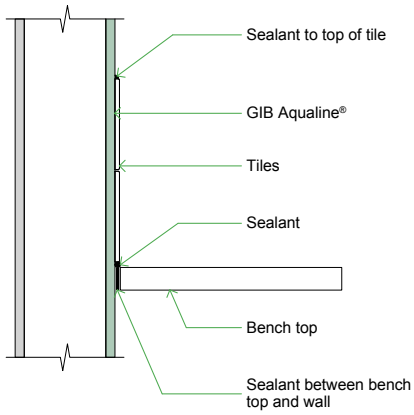
Refer to the shower mixer manufacturer for shower mixer installation detailing including the use of proprietary products to prevent water or moisture ingress behind the wet wall lining.



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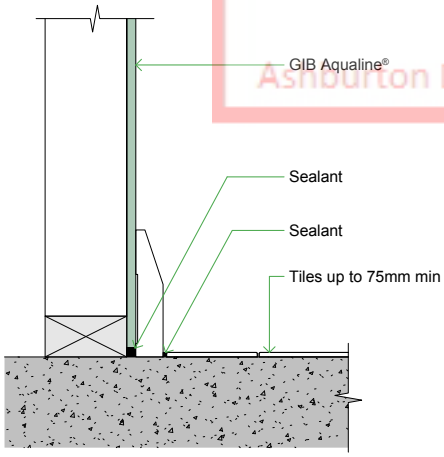
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A: BENCH TOP LINING JUNCTION



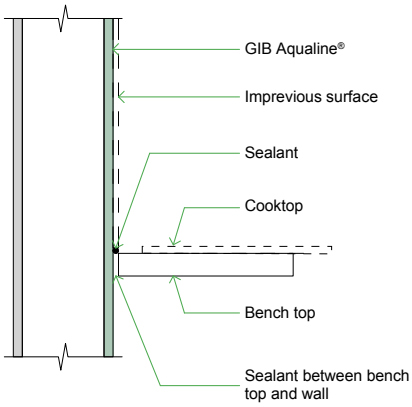
GAL-024

CERAMIC FLOOR SKIRTING LINING JUNCTION



GAL-001

B: COOKTOP LINING JUNCTION



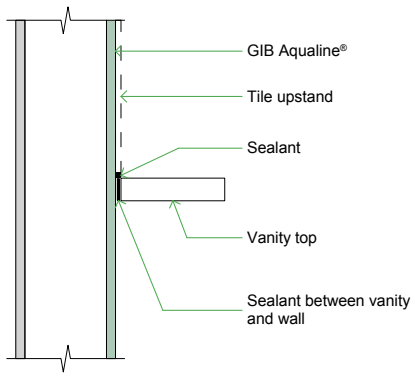
GAL-023B



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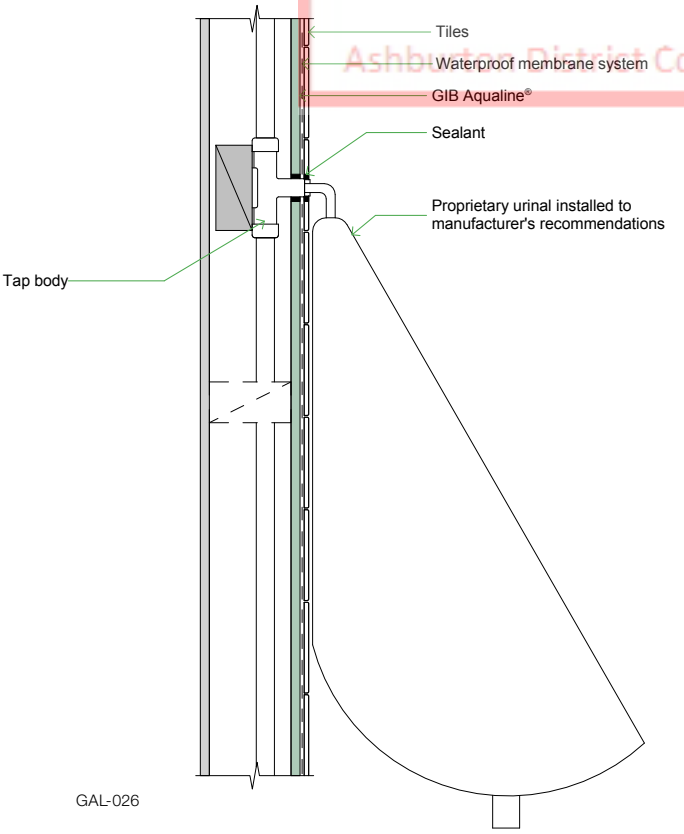
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A: VANITY TOP LINING JUNCTION



GAL-022

B: SEALING WET AREA PENETRATION LINING JUNCTION



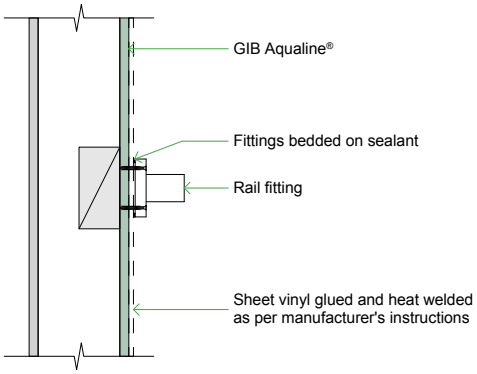
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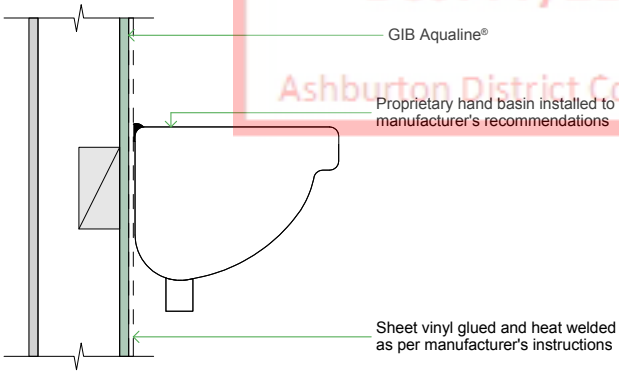
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A: SURFACE MOUNTED WITH NOG



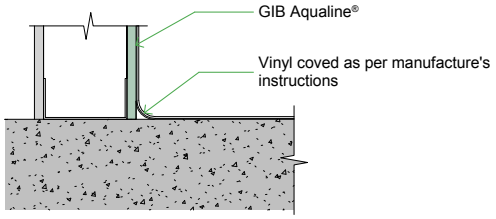
GAL-027

C: BASIN LINING JUNCTION



GAL-025

B: VINYL FLOOR LINING JUNCTION



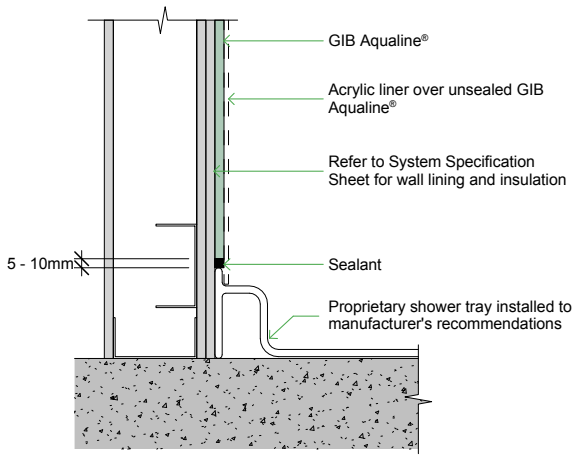
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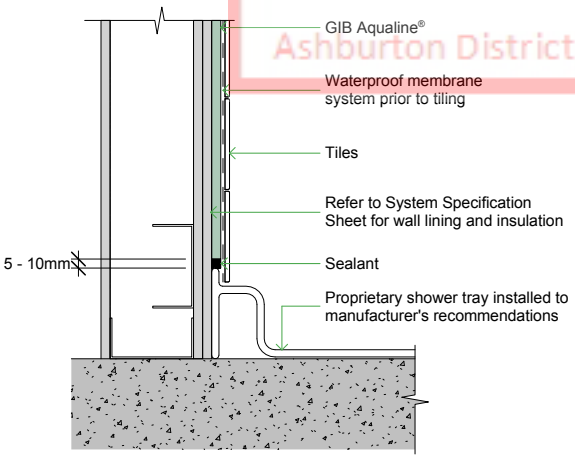
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A: MOULDED SHOWER TRAY DOUBLE LINING JUNCTION



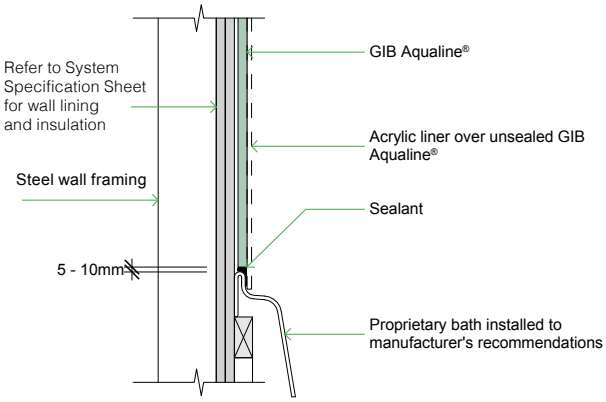
GAL-017

C: MOULDED SHOWER TRAY DOUBLE LINING JUNCTION



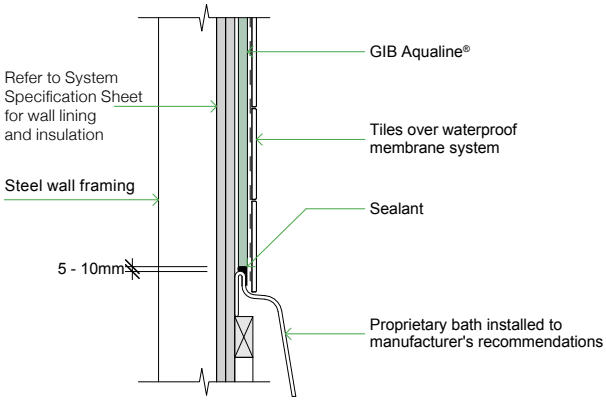
GAL-018

B: BATH DOUBLE LINING JUNCTION



GAL-013

D: BATH DOUBLE LINING JUNCTION



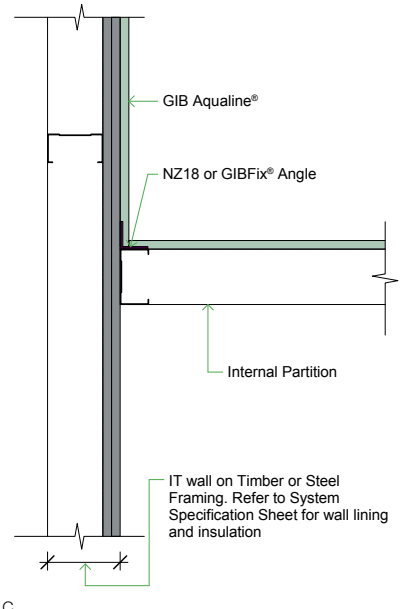
GAL-014

GIB® WET AREA SYSTEMS FIRE RESISTANCE AND NOISE CONTROL PERFORMANCE

Given recesses required for shower trays, bath upstands, etc., and the likelihood of renovations during the service life of the building, it is recommended that GIB® Wet Area linings in water splash areas are installed in addition to and over required fire and noise control systems in commercial or multi-residential applications.

Do not tile on the resilient side of a GIB Rail® or Acoustic Resilient Mount (ST-001) and channel noise control system.

E: INTERTENANCY WALL AND WET AREA WALL JUNCTION

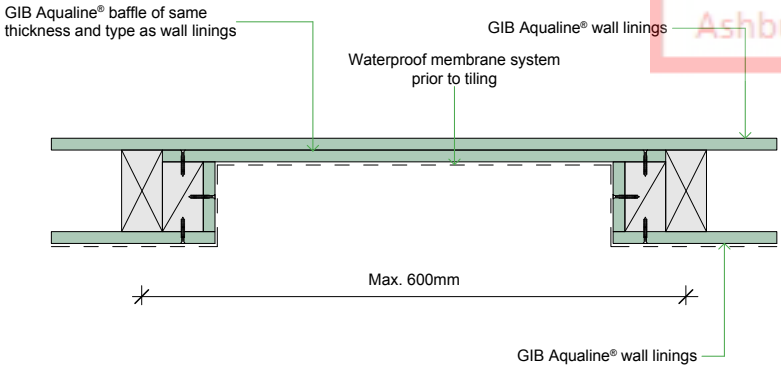


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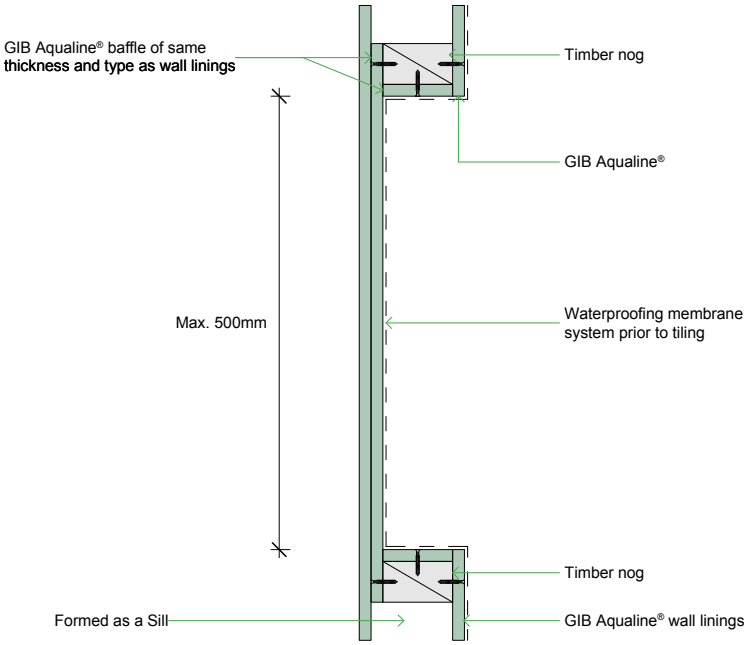
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TIMBER FRAME TILE RECESS



Larger recesses can be accommodated depending on specific framing layout provided 500mm is not exceeded in at least one direction.

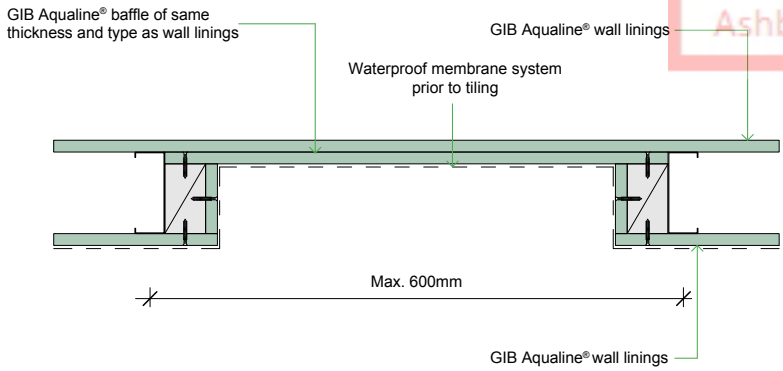


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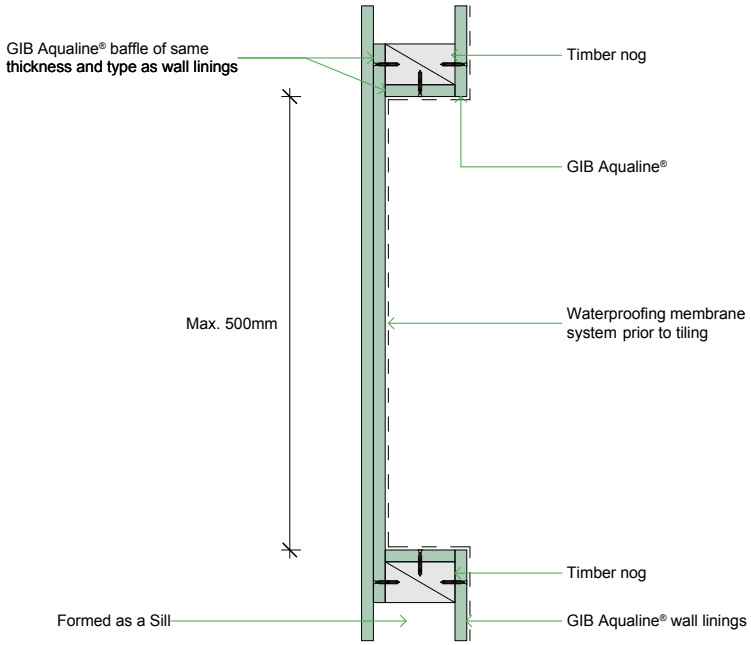
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STEEL FRAME TILE RECESS



Larger recesses can be accommodated depending on specific framing layout provided 500mm is not exceeded in at least one direction.



GAL-030

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GIB® Wet Area Systems, February 2021

LIMITATIONS

Winstone Wallboards Ltd accepts no liability if the GIB® Wet Area Systems and junction details are not installed in strict accordance with instructions contained within this publication.

USE ONLY THE CURRENT SPECIFICATION

This publication may be superseded by a new publication. Winstone Wallboards accepts no liability for reliance upon publications that have been superseded. You should check the GIB® website to ensure you are using the current publication. If you are unsure whether this is the current publication, simply call the GIB® Helpline on 0800 100 442.

SUBSTITUTION

GIB® Wet Area Systems have been specifically designed and tested to achieve the stated performance levels. To maintain the GIB® Product and System Warranty, all system components detailed in this publication must be used when specifying and installing GIB® Wet Area Systems.

TRADEMARKS

The names GIB®, GIB Fyreline®, GIB Ultraline®, GIB Toughline®, GIB Braceline® GIB Noiseline®, GIB Aqualine®, GIB Weatherline®, GIB Tradeset®, GIB Plus 4®, GIB-Cove®, GIB Lite Blue®, GIBFix®, GIB® Quiet Stud®, GIB Rail®, GIB Barrierline®, GIB X-Block®, GIB Fire Soundseal®, GIB Clip®, the colour mauve for GIB Toughline®, the colour blue for GIB Braceline® GIB Noiseline®, the colour pink for GIB Fyreline®, the colour green for GIB Aqualine®, the colour purple for GIB Weatherline® and the shield device are registered trademarks of Fletcher Building Holdings Limited.

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GIB®

FOR MORE INFORMATION VISIT

gib.co.nz

OR CALL THE GIB® HELPLINE

0800 100 442

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JamesHardie™

HardieBacker®
Cement Board

Installation Guide



MADE BETTER.
INSTALLS BETTER.
PERFORMS BETTER.™

ESPAÑOL AL OTRO LADO

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CUTTING CEMENT HARDIEBACKER® BOARD



- Use a straight edge as a guide to score the board's face and snap upward along the score line. We recommend using a carbide-tipped scoring knife, but a utility knife may also be used. The use of shears (manual, electric or pneumatic) is also acceptable.
- For cutouts and small holes, score around perimeter and break out from the face side with hammer.
- NEVER use high-speed power tools (e.g. saws, grinders, etc.) to cut James Hardie® products indoors as they may generate excessive silica dust.
- NEVER dry sweep – Use wet dust suppression methods or HEPA vacuum for clean-up.
- To further limit respirable silica dust exposures, wear a properly-fitted, NIOSH-approved dust mask or respirator (e.g. N-95 dust mask) in accordance with applicable government regulations and manufacturer instructions.

COUNTERTOP INSTALLATION

1 | Ensure cabinets are level and secure

- Use minimum 1/2 in exterior grade plywood or equivalent, positioned across the wood cabinet. Space between plywood supports is not to exceed 16 in on center.

2 | Determine layout of HardieBacker cement board

- Do not align HardieBacker cement board joints with plywood joints.
- Score and snap boards to required sizes and make necessary cutouts.
- We recommend an 1/8 in gap from board edges.

3 | Attach HardieBacker cement board to countertop

- Apply a supporting bed of dry-set mortar or modified thinset to plywood with a 1/4 in square-notched trowel. Mastic can also be used with a 5/32 in V-notched trowel.
- Use the fastener pattern as a guide. Fasten HardieBacker cement board with specified nails or screws (as listed in "Materials Required") every 8 in over the entire surface. Keep fasteners between 3/8 in and 3/4 in from board edges and 2 in from board corners.

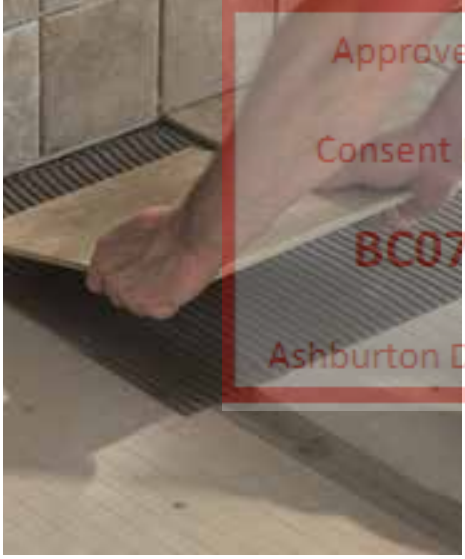
4 | Tape joints prior to tiling

- Prior to setting the tile, fill all joints with the same mortar used to set the tiles.
- Embed 2 in wide high-strength alkali-resistant glass fiber tape in the mortar and level.

5 | Exterior application (Limited to HardieBacker 500 in HZ10 climate zones) ‡ *Additional details on page 4*

- Follow Countertop installation steps 1 thru 4
- Mastic (organic adhesives) shall not be used in exterior applications

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FLOOR INSTALLATION

(Interior Application Only)

We recommend 1/4 in HardieBacker® board for floor applications, unless 1/2 in thickness is needed for transition.

1 | Ensure subfloor is structurally sound

On existing structures:

- Ensure subfloor is not damaged. Replace any loose, warped, uneven or damaged sections of floor.
- Make certain subfloor is a clean and flat surface.

For all floors:

- Use minimum 5/8 exterior grade plywood or 23/32 OSB with Exposure 1 classification or better, complying with local building codes and ANSI A108.11.
- Joist spacing not to exceed 24 in on center.
- The floor must be engineered not to exceed the L/360 deflection criteria (L/720 for natural stone), including live and dead design loads, for the specific joist spacing used.

2 | Determine layout of HardieBacker cement board

- Stagger all HardieBacker cement board joints. Do not align with subfloor joints.
- Never allow all four corners of boards to meet at one point.
- We recommend an 1/8 in gap between board edges.
- Keep sheet edges 1/8 in back from walls and cabinet bases.
- Score and snap boards to required sizes and make necessary cutouts.

3 | Attach HardieBacker cement board to subfloor

- Apply a supporting bed of mortar or modified thinset to subfloor using a 1/4 in square-notched trowel.
- Embed HardieBacker cement board firmly and evenly in the wet mortar.
- Use the fastener pattern as a guide. Fasten HardieBacker cement board with specified nails or screws (as listed in “Materials Required”) every 8 in over the entire surface. Keep fasteners between 3/8 in and 3/4 in from board edges and 2 in from board corners.
- Set fastener heads flush with the surface without overdriving.

4 | Tape joints prior to tiling

- Prior to setting the tile, fill all joints with the same mortar used to set the tiles.
- Embed 2 in wide high-strength alkali-resistant glass fiber tape in the mortar and level.



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WALL INSTALLATION

1 | Ensure framing is structurally sound

- Must comply with local building codes and ANSI A108.11.
- Use a minimum of 2 in x 4 in wood studs or 20-gauge metal studs, which must be straight, properly aligned and spaced a maximum of 16 in on center.
- In tub and shower enclosures, ensure that the framing is adequately reinforced at the corners.

2 | Determine layout of HardieBacker cement board

- Boards may be installed vertically or horizontally.
- Edges of the board parallel to framing must be supported by a structural framing member.
- Score and snap boards to required sizes and make necessary cutouts.

3 | Attach HardieBacker cement board to framing

- For interior installations, the use of a waterproof membrane, vapor barrier or vapor retarding membrane is optional unless the local building code requires it.
- If required by the local building code, install a code compliant waterproof membrane, vapor barrier or vapor retarder membrane, check with the membrane manufacturer for suitability for applicable conditions and follow the manufacturer's installation instructions for these materials.
- Install boards 1/4 in above floor, tub or shower pan and caulk accordingly.
- Fasten cement board with specified nails or screws (as listed in “Materials Required”) a maximum of 8 in on center at all supports.
- Keep fasteners 3/8 in from board edges and 2 in in from sheet corners.
- Set fastener heads flush with the surface, without overdriving.

4 | Tape joints prior to tiling

- Fill all joints with mortar (see “Materials Required”).
- Embed 2 in wide high-strength alkali-resistant glass fiber tape in the mortar and level.

5 | Exterior application (Limited to HardieBacker 500 in HZ10 climate zones)‡ *Additional details on page 4*

- Install HardieBacker 500 over sub-sheathing with a code approved water-resistive barrier, or in accordance with applicable code.
- May be used up to a height not exceeding the lesser of: through the second-story above grade or 30 feet above grade.
- Follow wall installation steps 1 thru 4



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FINISHING WITH TILE



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1. Refer to ANSI A108 and the mortar and tile manufacturers' published application guidelines for complete tiling instructions.
2. Wipe the surface of HardieBacker® cement board clean with a damp sponge just prior to adding mastic or mortar.
3. Spread the mastic or mortar with a notched trowel (Note: Please see "Materials Required" to see which setting material is required for your application).
4. Twist or press and beat in tiles complying with ANSI A137.1.
5. Allow a minimum of 24 hours curing set time before grouting.

FINISHING WITH NATURAL STONE

Natural stone often has hidden weaknesses which can result in surface cracks in finished floors. To reduce the risk of job failures, always consult The Marble Institute of America Handbook.

In addition to the steps outlined under "Floor Installation," the following is required:

- Always follow the recommendations of the flooring material manufacturer.
- Marble and natural stones must have sufficient flexural strength for use in flooring systems.* Where the quality and strength of the stone is unknown, the floor must be engineered not to exceed the L/720 deflection criteria, including live and dead design loads, for the specific joist spacing used. The strength of your natural stone will have an impact on the ultimate performance of your flooring system.

**Testing has shown that a minimum 2900 psi is preferable for flooring application.*

FINISHING WITH PAINT, WALLPAPER OR TEXTURE

(Interior Application Only)

1 | Painting or Wallpapering

Apply a drywall primer suitable for high-moisture areas, as recommended by the paint manufacturer. Paint HardieBacker board as you would drywall. If wallpapering, prime surface of HardieBacker board with a primer suitable for high-moisture areas as recommended by the wallpaper manufacturer.

2 | Texturing

Texture can be applied to HardieBacker board in the same way as drywall.

STEAM ROOM APPLICATION

HardieBacker® board is recognized for use in residential steam rooms when installed over conventional framing and in accordance with HardieBacker board printed installation instructions, TCNA guidelines (Tile Council of North America Handbook, www.tileusa.com), and local building codes. Questions and concerns regarding design and construction should be directed to a knowledgeable professional.

‡ EXTERIOR APPLICATION

(This application has limited warranty coverage. Refer to Exterior Warranty for coverage information on page 8)

HardieBacker 500 may be used up to a height not exceeding the lesser of: through the second-story above grade or 30 feet above grade. The HardieBacker 500 must be installed over sub-sheathing with a code approved water-resistive barrier, or in accordance with the applicable code. Install flashings, clearances, and other building practices per local code. James Hardie will assume no responsibility for water infiltration. Use a minimum No. 11 ga. 1¾ in long roofing nails or No. 8-1¾ in long

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(0.375 in HD) or ribbed wafer head corrosion resistant screws spaced a maximum of 8 in OC. The maximum weight of the overlayment (tiles, stones and veneers) is not to exceed the code limit of 15 lbs/sq ft. Exterior application is limited to HZ10® product zone only.

Follow installation procedure in accordance with the stone and mortar manufacturer's recommendations.[1] Stones must be free of any substance that may impede proper adhesion. Skim coat is recommended to be 1/8 in - 1/4 in thick and the tile/stone is to be installed while the skim coat is wet.

CAUTIONS: This product shall not be used in the following applications:

- As a backer board in balcony railings and balcony parapet walls.
- HardieBacker 500 may not be used to a height exceeding through the second-story above grade or greater than 30 feet above grade.

VINYL AND RESILIENT FLOORING *(Interior Application Only)*

Materials Required

1 | Fasteners

- Minimum 7/8 in long galvanized or polymer-coated 18-gauge chisel point staples with 1/4 in crown.
- Minimum 7/8 in long galvanized ring shanked underlayment flooring nails.
- Fasteners should be long enough to reach the bottom of the subfloor, but not penetrate it.
- Avoid using resin, rosin or cement-coated fasteners that can discolor vinyl flooring.

2 | Patch

- Use the cement-based, rapid-setting patching compound recommended by the floor covering manufacturer.
- Do not use a gypsum-based patch. Follow the patch manufacturer's instructions.

Preparation for Underlayment

1 | Ensure subfloor is structurally sound and properly installed

On existing floors:

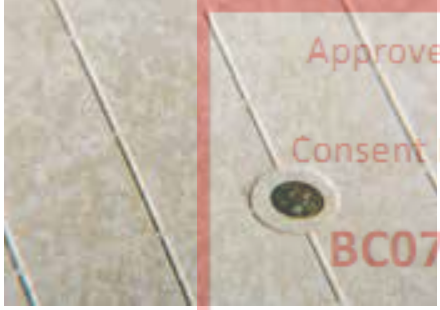
- HardieBacker® cement board may be installed under or over Vinyl Composition Tile (VCT) and other resilient flooring. For best results, remove existing floor covering, especially if it is in poor condition.
- If installing HardieBacker cement board over existing floor, ensure the floor is flat and floor covering is thoroughly adhered to the subfloor.

On all floors:

- Ensure subfloor is not damaged. Replace any loose, warped, uneven or damaged sections of floor.
- Make sure subfloor is dry, level and fastened correctly. All fasteners must be countersunk or flush with the subfloor. All seams or other areas that are not level must be sanded flat.
- Subfloor must be free of all debris, oil, grease, paint or other foreign substances.

[1] See IRC Table R703.4, IBC §2101.2 and §1405.10

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2 | Basements and crawl spaces

- Crawl spaces must be well ventilated with a minimum of 18 in between the ground and joists. A vapor barrier over the ground is required.

Underlayment Installation

1 | Determine layout of HardieBacker® cement board

- Install smooth side up.
- Install HardieBacker boards perpendicular to subfloor panels.
- Stagger all HardieBacker board joints. Do not align HardieBacker board joints with subfloor joints
- Never allow all four corners of boards to meet at one point.
- Lightly butt the board joints. Do not leave a gap or force edges together.
- Join factory-cut edges together in the body of the floor.
- Keep board edges 1/8 in back from walls and cabinet bases.

2 | Attach HardieBacker boards to subfloor

- Fasten one board at a time. HardieBacker boards must be flush with subfloor during installation.
- Begin the fastening pattern in a corner of the board, then fasten the two adjacent edges. Return to the corner and fasten in a diagonal pattern from that corner until the board is completely fastened.
- Place fasteners in a random, staggered pattern across HardieBacker board. Avoid fastening in a straight line.
- Fasten HardieBacker boards with proper fasteners (as listed in “Materials Required”) a maximum of 3 in on center around the perimeter and 6 in on center in the field.
- Keep fasteners between 3/8 in and 3/4 in from board edges and 2 in in from board corners.
- Fastener heads/crowns must be flush with or slightly countersunk a maximum of 1/16 in below the surface.

3 | Finishing surface and joints *(not necessary for carpet or wood flooring)*

- If necessary, lightly hand-sandseams to achieve a smooth transition between boards. Avoid over-sanding. Sanding will generate significant respirable silica dust and those in the immediate area must wear NIOSH-approved respiratory protection (e.g. N95) in accordance with applicable government regulations.
- Thoroughly clean HardieBacker board surface to remove all debris prior to patching.
- Using a wide flat trowel, apply a skim coat of patch (as listed in “Materials Required”) to all seams, sanded areas, hammer indentations, holes, gaps, gouges, chips and voids to achieve a smooth surface. Avoid building a ridge over the seams by feathering the patch out several inches on both sides of the seams.
- Obtaining a perfectly smooth surface may require more than one coat of patch.
- After the patch has thoroughly dried, lightly sand or scrape off any surface imperfections caused by the patch to achieve a smooth surface.
- Wait until patch is thoroughly dry before installing the floor covering.

4 | Flooring installation

- Prepared HardieBacker cement board surface must be free of all debris, oil, paint, caulk, joint compound and other foreign substances.
- Do not install floor covering seams directly over the HardieBacker board seams.
- Install floor covering according to the adhesive and floor covering manufacturers’ instructions.

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BASIC COMPOSITION

90% Portland cement and sand with selected additives. Contains no asbestos, formaldehyde, gypsum, paper facing, or abrasive aggregate.

1/4 in HardieBacker cement board:
Sheet size: 3 ft x 5 ft (EZ Grid® board) and 4 ft x 8 ft
Thickness: 1/4 in
Weight: 1.9 lbs. psf (9.3 kg/m2)
Complies with ASTM C1288 & ANSI A118.9

HardieBacker® 500 cement board:
Sheet sizes: 3 ft x 5 ft and 4 ft x 8 ft
Thickness: 0.42 in
Weight: 2.6 lbs. psf (12.7 kg/m2)
Complies with ASTM C1288 & ANSI A118.9

MATERIALS REQUIRED

1| Mortar

For floors:

- Latex or acrylic modified thinset (complying with ANSI A118.4).
- Dry-set mortar for use between subfloor and cement board only (complying with ANSI A118.1).

For walls and countertops:

- Latex or acrylic modified thinset (complying with ANSI A118.4).
- Type 1 mastic (complying with ANSI A136.1) (Not to be used in exterior applications).
- For Exterior applications, follow stone and mortar manufacturers recommendations.

2 | Tape

- 2 in wide high-strength alkali-resistant glass fiber tape.

3 | Fasteners

For floors and walls:

- Minimum 1-1/4 in (for interior) & 1-3/4 in (exterior walls) long corrosion-resistant roofing nails.
- Minimum 1-1/4 in (for Interior) & 1-3/4 in (exterior walls) long No. 8 x 0.375 in HD self-drilling corrosion-resistant ribbed waferhead screws.
- If compliance with ANSI A108.11 is not required, minimum 1 in long No. 8 x 0.323 in HD self-drilling corrosion-resistant ribbed buglehead screws may be used for floors.
- If applying HardieBacker 500 cement board over gypsum, use minimum 1-3/4 in long corrosion-resistant roofing nails.

For countertops:

- Minimum 3/4 in long corrosion-resistant roofing nails.
- Minimum 3/4 in long ribbed counter sinking corrosion-resistant screws.
- 18-gauge corrosion-resistant polymer coated 3/4 in staples with a 1/4 in crown.
- For HardieBacker 500 cement board, use minimum 1-1/4 in long corrosion-resistant roofing nails or ribbed countersinking screws.

For vinyl and resilient flooring: *(Interior Only)*

- Minimum 7/8 in long galvanized or polymer-coated 18-gauge chisel point staples with 1/4 in crown.
- Minimum 7/8 in long galvanized ring shanked nails.
- Fasteners should be long enough to reach the bottom of the subfloor, but not penetrate it.
- Avoid using resin, rosin or cement-coated fasteners that can discolor vinyl flooring.

HardieBacker board delivers more compressive and flexural strength than any board on the market.

SILICA WARNING: Refer to the product Safety Data Sheet before use. Do not handle until all safety precautions have been read and understood. Do not breathe dust from the product Do not eat, drink or smoke when using this product.

The hazard associated with fiber cement arises from crystalline silica present in the dust generated by activities such as cutting, rebating, drilling, routing, sawing, crushing, or otherwise abrading fiber cement, and when cleaning up, disposing of or moving the dust. When doing any of these activities in a manner that generates dust: (1) comply with the OSHA PEL for silica dust and/or other applicable law, (2) follow James Hardie instructions and best practices to reduce or limit the release of dust; (3) warn others in the area to avoid the dust; (4) when using mechanical saw or high speed cutting tools, work outdoors and use dust collection equipment; and (5) if no other dust controls are available, wear a dust mask or respirator that meets NIOSH requirements (e.g. N-95 dust mask). During clean-up, use a well maintained vacuum and filter appropriate for capturing fine (respirable) dust or use wet clean-up methods - never dry sweep.

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ENVIRONMENTAL CONSIDERATIONS

HardieBacker® board's proprietary cement formulation provides a moisture resistant wallboard and tile backer substrate that stands tough over time, reducing the need for product replacement. James Hardie has demonstrated a commitment to reducing energy consumption, while improving process efficiencies and waste management. It avoids the use of environmentally damaging materials and uses renewable resources that are abundant in the manufacture of HardieBacker cement board. HardieBacker cement board does not contain any glass fibers, gypsum, asbestos or formaldehyde. The company also focuses on water conservation and attempts to recycle water and waste product as much as possible during the manufacturing process.

RECOGNITIONS

HardieBacker cement board is recognized as an interior substrate by the following:

- International Code Council Evaluation Service ESR-2280
- City of Los Angeles Research Report No. 24862
- HUD Materials Release Nos. 1263 and 1268
- City of New York MEA No. 223-93M
- IBC 2509.2
- IRC R702.4.2

Consult these documents for additional information concerning conditions for use in applicable jurisdictions.

**Cementitious Backer Unit/Fiber-Cement Underlayment*

Compressive Strength Compressive Strength at Equilibrium Moisture Content (ASTM D2394)

1/4 in HardieBacker EZ Grid® cement board: 7000 psi (48 MPa)

HardieBacker 500 cement board: 6500 psi (45 MPa)

Non-Combustibility HardieBacker cement board is recognized as non-combustible in accordance with ASTM E136.

Surface Burning Characteristics When tested in accordance with ASTM method E-84: Flame Spread – 0, Fuel Contributed – 0, Smoke Developed – 5.

Fire Rated Assemblies HardieBacker cement board may be used as a component in one-hour fire-resistive wall construction; consult ESR-2280 website listings for recognized assemblies, or contact James Hardie's Technical Services at 1-800-9HARDIE (1-800-942-7343).

HARDIEBACKER WARRANTIES

INTERIOR APPLICATIONS

The HardieBacker cement board limited lifetime warranty covers both the product and replacement labor for the life of the product. Download a copy of the HardieBacker limited lifetime warranty from hardiebacker.com or obtain one from wherever James Hardie product are sold.

EXTERIOR APPLICATIONS

James Hardie offers a limited 10 year warranty for Hardiebacker 500 cement backerboard installed in exterior applications in HardieZone HZ10 regions only. To find out the HardieZone designation for your ZIP code, go to HardieZone.com

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CHOSEN BY PROS. UNRIVALED IN PERFORMANCE.

HardieBacker® Cement Board's **unique cement formulation** and structure provide the ideal combination of **strength, uniform composition and performance** that no other backer board can provide. That's why it was named **The Most Preferred Brand of Backer Board** by tile installers and contractors in the Tile and Stone Report*.



MADE BETTER

Compared to other cement boards, HardieBacker Cement Board offers the **highest flexural strength** and up to **3x the compressive strength** to enable a solid foundation for your tile job.



INSTALLS BETTER

HardieBacker Cement Board is easier to work with, regardless of how you cut it.

- **Less debris**, whether you're cutting manually or with power tools.
- **Cleaner cuts** and sharper edges for tighters seam lines.
- **Less dust**, which means minimal mess and cleanup.



PERFORMS BETTER

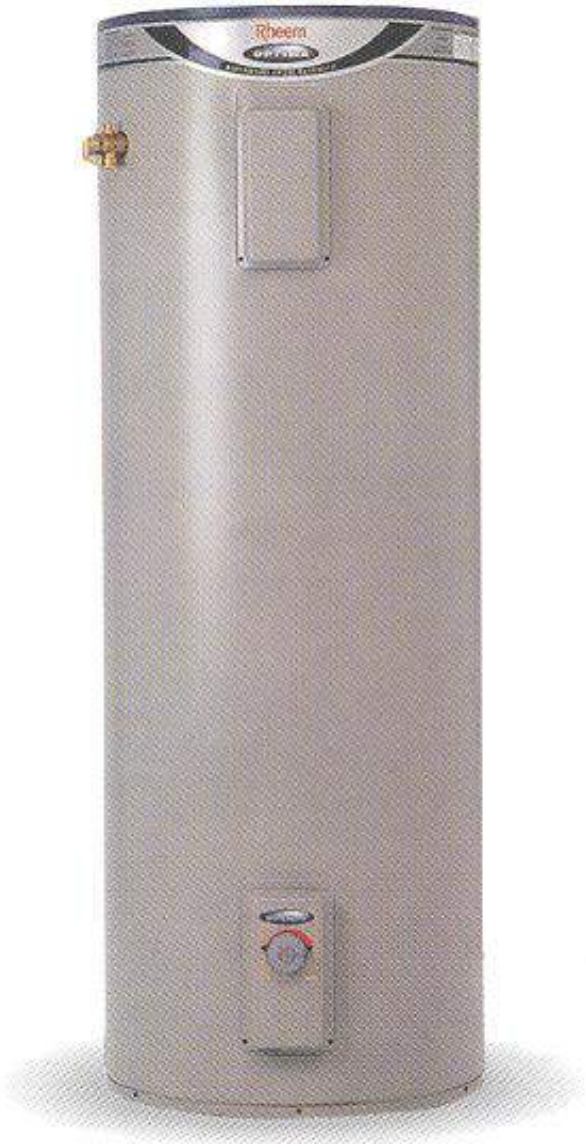
Our unique cement formulation resists moisture. Additionally, it provides excellent tile adhesion to help protect your work—and your reputation.

*According to the 2019 Tile and Stone Installation Contractor Market Study conducted by Clear Seas Research in partnership with the NTCA and TILE Magazine.

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Owner's Guide and Installation Instructions



Electric Domestic Water Heater

Install a Rheem

This water heater must be installed and serviced by an authorised person.
Please leave this guide with the householder.

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PATENTS

This water heater may be protected by one or more patents or registered designs in the name of Rheem Australia Pty Ltd.

TRADEMARKS

® Registered trademark of Rheem Australia Pty Ltd.
™ Trademark of Rheem Australia Pty Ltd.

Note: Every care has been taken to ensure the accuracy in preparation of this publication. No liability can be accepted for any consequences, which may arise as a result of its application.

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CONTENTS

HOUSEHOLDER - We recommend you read pages 4 to 17.
The other pages are intended for the installer but may be of interest

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ABOUT YOUR WATER HEATER

MODEL TYPE

The Rheem® water heater you have chosen is an Optima™ model.
The Optima model has a temperature adjusting knob on the lower front of the water heater. Optima models are available with either a single heating unit or with twin heating units. (refer to "Single Element Model" on page 7 and "Twin Element Model" on page 7).
The water heater can be installed indoor or outdoor. Optima models have an extended warranty (refer to the warranty on page 36).

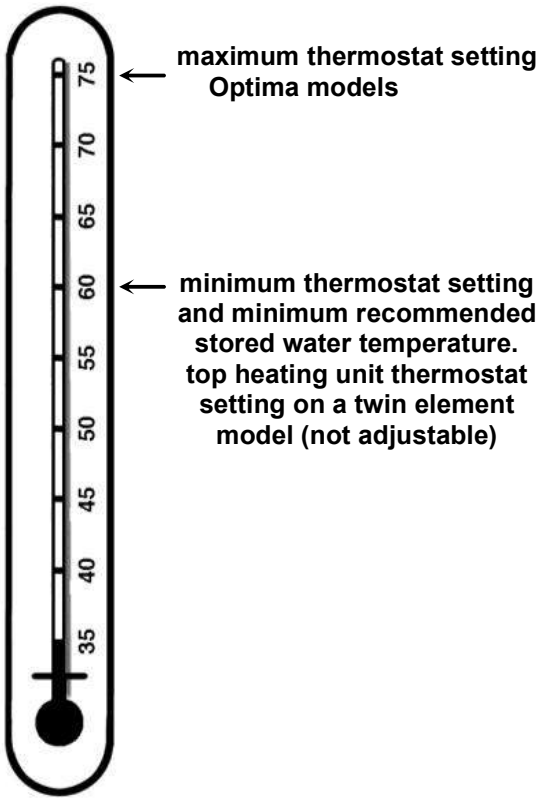
Water is stored in a vitreous enamel lined steel cylinder and heated by the electric immersion heating unit. The thermostat controls the temperature. Automatic safety controls are fitted to the water heater to provide safe and efficient operation.

MAINS PRESSURE

The water heater is designed to operate at mains pressure by connecting directly to the mains water supply. If the mains supply pressure in your area exceeds that shown on page 19, a pressure limiting valve must be fitted. The supply pressure should be greater than 350 kPa for true mains pressure operation to be achieved.

HOW HOT SHOULD THE WATER BE?

The water heater features an adjustable thermostat, which allows you to choose the most suitable temperature for your hot water needs. Refer to "Temperature Adjustment" on page 5.



To meet the requirements of the G12 Building Code the temperature of the stored water must not be below 60°C.

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HOTTER WATER INCREASES THE RISK OF SCALD INJURY

This water heater can deliver water at temperatures which can cause scalding. Check the water temperature before use, such as when entering a shower or filling a bath or basin, to ensure it is suitable for the application and will not cause scald injury.

We recommend and it may also be required by regulations that an approved temperature limiting device be fitted into the hot water pipe work to the bathroom and ensuite when an Optima water heater is installed.

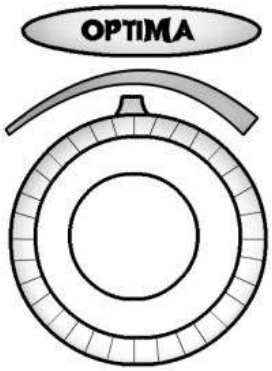
This will keep the water temperature below 55°C at the bathroom and ensuite. The risk of scald injury will be reduced and still allow hotter water to the kitchen and laundry.

THERMOSTAT

The thermostat automatically controls the electricity supply to the heating unit so a constant temperature is maintained. The thermostat and its protective over temperature cut out is mounted inside the front cover of the water heater. There is no need to switch the water heater off when it is not in use, except when you are on an extended holiday. The thermostat is fully automatic and power is only used when heating is required.

TEMPERATURE ADJUSTMENT

An Optima water heater features a user adjustable thermostat, which allows you to choose the most suitable temperature for your hot water needs. To adjust the temperature, push in the child resistant knob and turn anticlockwise to decrease or clockwise to increase the temperature setting. The Optima has a minimum temperature setting of 60°C and a maximum temperature setting of 75°C.



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⚠ WARNING

This water heater is only intended to be operated by persons who have the experience or the knowledge and the capabilities to do so. This water heater is not intended to be operated by persons with reduced physical, sensory or mental capabilities i.e. the infirm, or by children. Children should be supervised to ensure they do not interfere with the water heater.

This water heater uses 240 V AC power for the electrically operated components. The removal of the front cover(s) will expose 240 V wiring. It must only be removed by an authorised or qualified person.

Take care not to touch the power plug on a water heater fitted with a power supply cord and plug with wet hands.

SAFETY

This water heater is supplied with a thermostat, an over-temperature cut-out, and a combination temperature pressure relief valve.
These devices must not be. tampered with or removed.
The water heater must not be operated unless each of these devices is fitted and is in working order.

The operation of the over-temperature cut-out on the thermostat indicates a possibly dangerous situation. If the over-temperature cut-out operates, it must not be reset and the water heater must be serviced by an authorised or qualified person.

⚠ **Warning:** For continued safety of this water heater it must be installed, operated and maintained in accordance with the Owner's Guide and Installation Instructions.

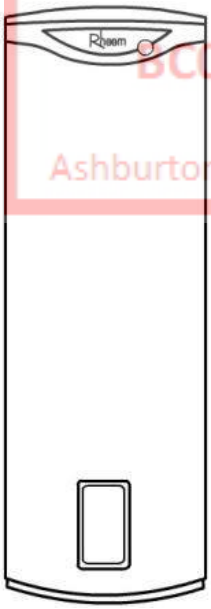
The warranty can become void if relief valves or other safety devices are tampered with or if the installation is not in accordance with these instructions.

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SINGLE ELEMENT MODEL

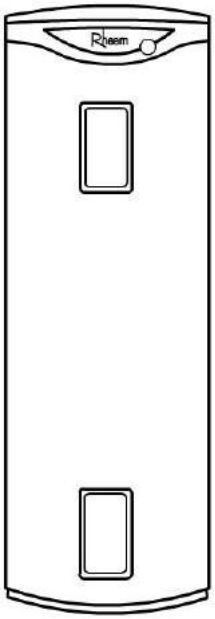
This type of water heater has one heating unit with its own thermostat. The heating unit is at the base of the water heater.



- **Continuous electricity supply**
  This type of connection is suited to where the storage capacity is less than the normal daily usage.
- **Off-Peak electricity supply**
  This type of connection will only allow heating to occur during set hours. A volume of water sufficient for the day's total use is heated and stored. This type of heating will be more economical due to reduced tariffs by the electricity authority.

TWIN ELEMENT MODEL

This type of water heater has two heating units, each with its own thermostat. One heating unit is at the base of the water heater and the other near the top.



- **Bottom heating unit**
  During normal operation this heating unit supplies all the hot water.
- **Top heating unit (Booster)**
  This heating unit only operates during periods of high demand to provide an additional supply of heated water.
- **Electrical connection**
  The two heating units are wired for non-simultaneous operation, so that only one heating unit can operate at a time. The bottom heating unit is usually connected to an Off-Peak (overnight) or time controlled electricity supply and the top heating unit to a continuous supply. Some electricity suppliers allow both heating units to be metered at the Off-Peak or controlled tariff.

NOTE: Power must be available to the top heating unit circuit at all times for this water heater to operate as designed.

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TO TURN OFF THE WATER HEATER

If you plan to be away from home for only a few nights, we suggest you leave the water heater switched on.

If it is necessary to turn off the water heater:

- Switch off the electrical supply at the isolating switch to the water heater.
- Unplug the power supply cord from the power outlet (power supply cord model only).
- Close the cold water isolation valve at the inlet to the water heater.

TO TURN ON THE WATER HEATER

- Open the cold water isolation valve fully on the cold water line to the water heater.
- Plug in the power supply cord at the power outlet (power supply cord model only).
- Switch on the electrical supply at the isolating switch to the water heater.

GOING ON HOLIDAY?

If you plan to be away from home for one or two nights, we suggest you leave the water heater switched on. However, if you plan to stay away more than a few nights, conserve energy by switching the water heater off at either the switchboard or isolating switch.

HOW DO I KNOW IF THE WATER HEATER IS INSTALLED CORRECTLY?

Installation requirements are shown on pages 18 to 26. The water heater must be installed by an authorised person and the installation must comply with National Standards AS/NZS 3500.4, AS/NZS 3000 and all local codes and regulatory authority requirements. The installation must conform with the New Zealand Building Code.

DOES THE WATER CHEMISTRY AFFECT THE WATER HEATER?

The water heater is suitable for most public water supplies, however some water chemistries may have detrimental effects on the cylinder and fittings. **If you are in a known harsh water area you must read page 11**. If you are not sure, have your water chemistry checked against the conditions described on page 11.

HOW LONG WILL THE WATER HEATER LAST?

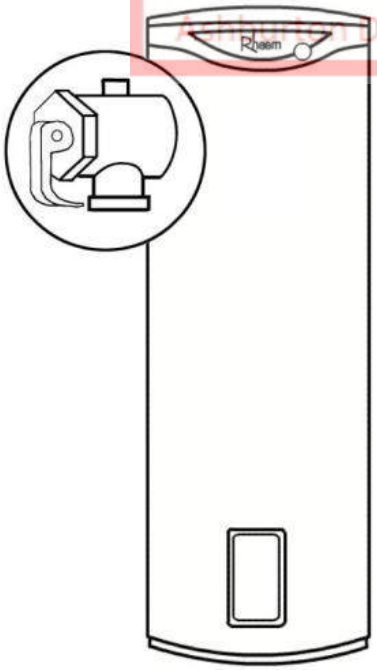
There are a number of factors that will affect the length of service the water heater will provide. These include the water chemistry, the water pressure, the water temperature (inlet and outlet) and the water usage pattern. However, your water heater is supported by a comprehensive warranty (refer to page 36).

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TEMPERATURE PRESSURE RELIEF VALVE

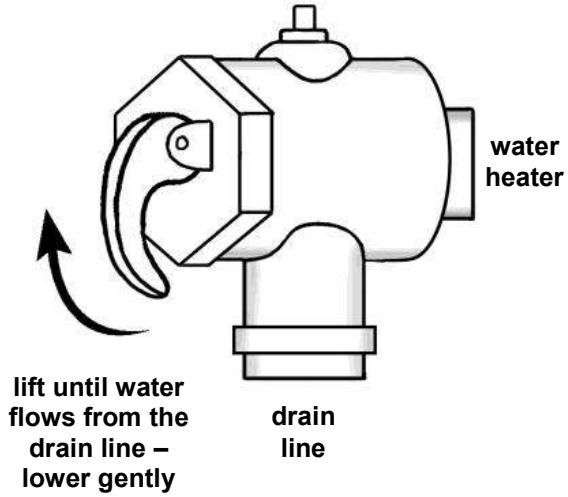
This valve is near the top of the water heater and is essential for its safe operation. It is possible for the valve to release a little water through the drain line during each heating period. This occurs as the water is heated and expands by approximately 1/50 of its volume.



Continuous leakage of water from the valve and its drain line may indicate a problem with the water heater (refer to "Temperature Pressure Relief Valve Running" on page 16).

⚠ **Warning:** Never block the outlet of this valve or its drain line for any reason.

Operate the easing lever on the temperature pressure relief valve once every six months. **It is very important you raise and lower the lever gently.**



⚠ **DANGER:** Failure to do this may result in the water heater cylinder failing, or under certain circumstances, exploding.

If water does not flow freely from the drain line when the lever is lifted, then the water heater should be checked by a Rheem Service Centre.

The temperature pressure relief valve should be checked for performance or replaced at intervals not exceeding 5 years, or more frequently in areas where there is a high incidence of water deposits (refer to "Water Supplies" on page 11).

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TEMPERATURE LIMITING VALVE

The valve should be checked for performance every twelve months. This can be performed by measuring the water temperature from a hot tap with a thermometer. If the water is being delivered at a temperature exceeding 55°C, phone a Rheem Service Centre.

The valve should be replaced at intervals not exceeding 5 years, or more frequently in areas where there is a high incidence of water deposits (refer to "Water Supplies" on page 11). Failure to do this may result in water at a temperature up to 70°C being delivered at the hot tap, increasing the risk of scald injury.

EXPANSION CONTROL VALVE

An expansion control valve must be fitted to the cold water line to the water heater. The expansion control valve may discharge a small quantity of water from its drain line during the heating period instead of the temperature pressure relief valve on the water heater.

Operate the easing lever on the expansion control valve once every six months. **It is very important you raise and lower the lever gently.** The expansion control valve should be checked for performance or replaced at intervals not exceeding 5 years, or more frequently in areas where there is a high incidence of water deposits.

GENERAL MAINTENANCE

The jacket of the water heater can be cleaned with a soft cloth and warm mild soapy water on a 3 monthly interval in coastal areas. Under no circumstances should abrasive materials or powders be used.

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WATER SUPPLIES

This water heater must be installed in accordance with this advice to be covered by the warranty.

This water heater is manufactured to suit the water conditions of most public reticulated water supplies. However, there are some known water chemistries which can have detrimental effects on the water heater and its operation and / or life expectancy. If you are unsure of your water chemistry, you may be able to obtain information from your local water supply authority. This water heater should only be connected to a water supply which complies with these guidelines for the water heater warranty to apply.

ANODE

The vitreous enamel lined cylinder of the water heater is only covered by warranty when the total dissolved solids (TDS) content in the water is less than 2500 mg/L and when the correct colour coded anode is installed. The use of an incorrect colour coded anode will void the cylinder warranty and may shorten the life of the water heater cylinder.

The correct colour coded anode must be selected and fitted to the water heater in accordance with the following advice and the Anode Selection chart on page 11 for warranty to apply to the water heater cylinder.

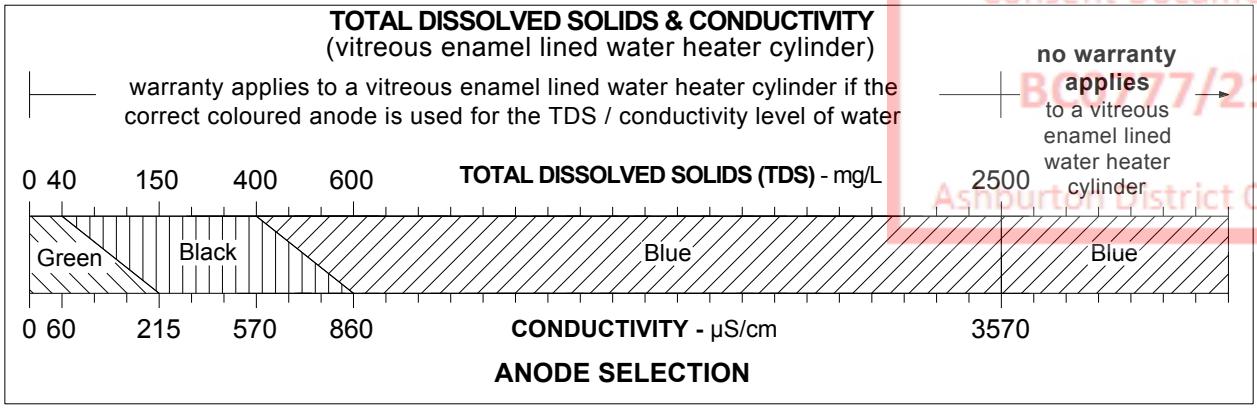
Total Dissolved Solids	Anode colour code
0 – 40 mg/L	Green
40 – 150 mg/L	Green or Black
150 – 400 mg/L	Black
400 – 600 mg/L	Black or Blue
600 – 2500 mg/L	Blue
2500 mg/L +	Blue (no cylinder warranty)

The changing of anodes must be carried out by a plumber or authorised service person.

Note: Some water analysis reports may state the conductivity of the water rather than the level of total dissolved solids. Conductivity, measured in microsiemens per centimetre (μS / cm), is directly proportional to the TDS content of the water. TDS, in mg / L, is approximately 70% of the conductivity in μS / cm.

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ANODE INSPECTION

The anode installed in your water heater will slowly dissipate whilst protecting the cylinder. The life of the water heater cylinder may be extended by arranging for an authorised person to inspect the anode and replace if required.

The suggested time after installation when the anode should be inspected is:

Optima 10 years

For water supplies which are either softened, desalinated or where the water supply may alternate between a water tank and a reticulated public supply or another supply, it is recommended the anode be inspected 3 years earlier than shown (refer to “Anode” on page 11).

CAUTION

If the water supply has a TDS greater than 150 mg/L and a green anode has not been changed to a black anode, or if the TDS is greater than 600 mg/L and the anode has not been changed to a blue anode, there is the possibility the anode may become overactive and hydrogen gas could accumulate in the top of the water heater during long periods of no use.

If, under these conditions, the water heater has not been used for two or more weeks the following procedure should be carried out before using any electrical appliances (automatic washing machines and dishwashers) which are connected to the hot water supply.

The hydrogen, which is highly flammable, should be vented safely by opening a hot tap and allowing the water to flow. There should be no smoking or naked flame near the tap whilst it is turned on. Any hydrogen gas will be dissipated. This is indicated by an unusual spurting of the water from the tap. Once the water runs freely, any hydrogen in the system will have been released.

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SATURATION INDEX

The saturation index is used as a measure of the water's corrosive or scaling properties.

In a corrosive water supply, the water can attack copper parts and cause them to fail. Where the saturation index is less than –1.0, the water is very corrosive and warranty does not apply to a copper sheathed heating unit. A corrosion resistant heating unit must be used for warranty to apply to the heating unit.

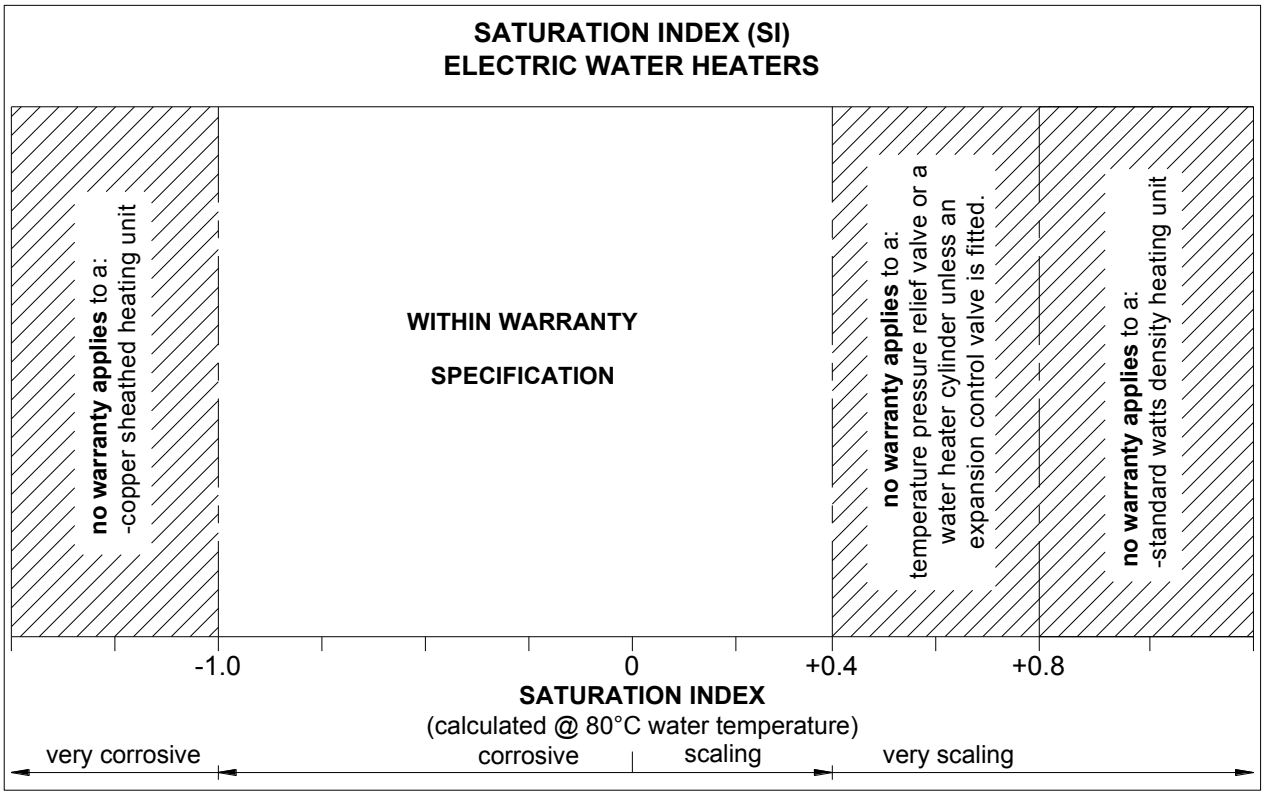
In a scaling water supply calcium carbonate is deposited out of the water onto any hot metallic surface. Where the saturation index exceeds +0.40, the water is very scaling. An expansion control valve must be fitted on the cold water line after the non-return valve to protect and for warranty to apply to the temperature pressure relief valve and water heater cylinder.

Where the saturation index exceeds +0.80, warranty does not apply to a standard watts density heating unit. A low watts density heating unit must be used for warranty to apply to the heating unit.

Water which is scaling may be treated with a water softening device to reduce the saturation index of the water.

Refer to the Saturation Index chart on page 13. Refer to the cold water connection detail on page 27 for the position of the expansion control valve.

Contact Rheem Service Centre if a replacement heating unit is required.



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CHANGE OF WATER SUPPLY

The changing or alternating from one water supply to another can have a detrimental effect on the operation and / or life expectation of a water heater cylinder, a temperature pressure relief valve and a heating unit.

Where there is a changeover from one water supply to another, e.g. a rainwater tank supply, bore water supply, desalinated water supply, public reticulated water supply or water brought in from another supply, then water chemistry information should be sought from the supplier or it should be tested to ensure the water supply meets the requirements given in these guidelines for warranty to apply.

SUMMARY OF WATER CHEMISTRY ADVICE AFFECTING WARRANTY

The warranty of this water heater does not apply on the components listed below if the water heater is connected at any time to a water supply with water chemistry of:

Water Chemistry	Component
Total Dissolved Solids (TDS) > 2500 mg/L	water heater cylinder
Total Dissolved Solids (TDS) not suitable for anode type	water heater cylinder
Saturation Index (SI) < -1.0	copper sheathed heating unit
Saturation Index (SI) > +0.4 (if expansion control valve is not fitted)	water heater cylinder temperature pressure relief valve
Saturation Index (SI) > +0.8	standard watts density heating unit

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SAVE A SERVICE CALL

Check the items below before making a service call. You will be charged for attending to any condition or fault that is not related to the manufacture or failure of a part.

NOT ENOUGH HOT WATER (OR NO HOT WATER)

- **Is the electricity switched on?**
  Inspect the isolating switch marked "HOT WATER" or "WATER HEATER" at the switchboard and the isolating switch (if one is installed) near the water heater and ensure they are turned on.

  Note: Check the electricity supply to which the water heater is connected. If on an Off-Peak or time controlled electricity supply, remember heating hours are restricted (refer to "Off-Peak Electricity Supply" on page 7).

  Check the fuse marked "HOT WATER" or "WATER HEATER" at the switchboard.

- **Twin element water heaters**
  A twin element non-simultaneous model must have power available to the top heating unit circuit at all times for the water heater to operate as designed.

- **Are you using more hot water than you think?**
  Is one outlet (especially the shower) using more hot water than you think? Very often it is not realised the amount of hot water used, particularly when showering. Carefully review the family's hot water usage. Have your plumber fit a flow control valve to each shower outlet to reduce water usage.

- **Temperature pressure relief valve running**
  Is the relief valve discharging too much water? (Refer to "Temperature Pressure Relief Valve Running" on page 16).

- **Thermostat setting**
  Ensure the thermostat setting is appropriate. You may choose to adjust the thermostat upwards to gain additional hot water capacity.
  Refer to "temperature Adjustment" on page 5

  ⚠ **Warning:** Hotter water increases the risk of scald injury.

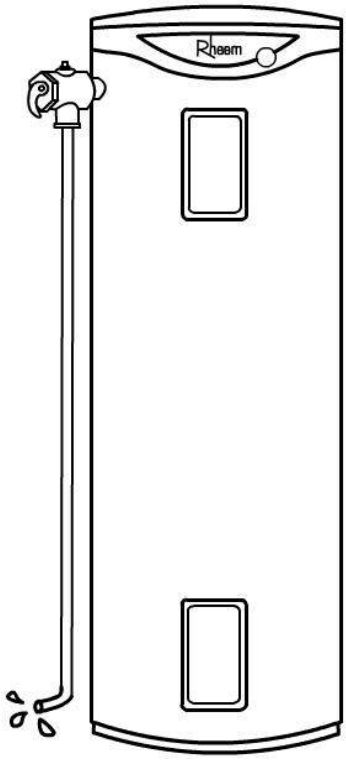
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- **Water heater size**
  Do you have the correct size water heater for your requirements? The sizing guide in the Rheem sales literature and on the Rheem website (www.rheem.co.nz) suggests average sizes that may be needed.

TEMPERATURE PRESSURE RELIEF VALVE RUNNING

- **Normal Operation**
  It is normal and desirable that this valve allows a small quantity of water to escape during the heating cycle. However, if it discharges more than a bucket full of water in 24 hours, there may be another problem.



- **Continuous dribble**
  Try gently raising the easing lever on the relief valve for a few seconds (refer to “Temperature Pressure Relief Valve” on page 9). This may dislodge a small particle of foreign matter and clear the fault. Release the lever gently.
- **Steady flows for long period (often at night)**
  This may indicate the mains water pressure sometimes rises above the designed pressure of the water heater. Ask your installing plumber to fit a pressure limiting valve.
- **Heavy flows of hot water until water heater is cold - then stops until water reheats**
  The water heater **must** be switched off at the switchboard. Phone a Rheem Service Centre

⚠ **Warning:** Never replace the relief valve with one of a higher pressure rating.

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EXPANSION CONTROL VALVE RUNNING

If an expansion control valve is fitted in the cold water line to the water heater (refer to page 27) it may discharge a small quantity of water instead of the temperature pressure relief valve on the water heater. The benefit is that energy is conserved as the discharged water is cooler.

HIGHER THAN EXPECTED ELECTRICITY BILLS

Should you at any time, feel your electricity account is higher than expected, we suggest you check the following points:

- Is the relief valve running excessively?

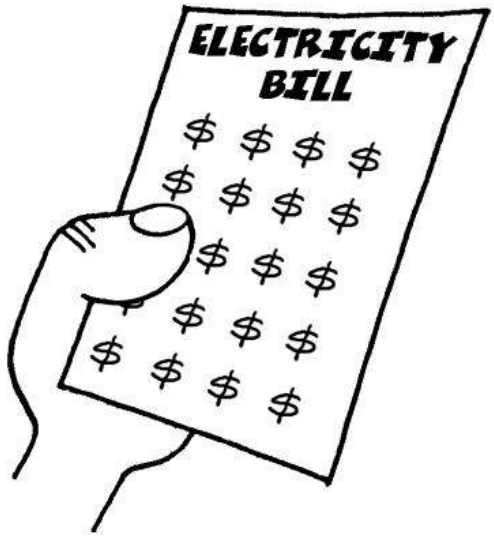
  Refer to "Temperature Pressure Relief Valve Running" on page 16.

- Is one outlet (especially the shower) using more hot water than you think?

  Refer to "Not Enough Hot Water" on page 15.

- Is there a leaking hot water pipe, dripping hot water tap, etc?

  Even a small leak will waste a surprising quantity of hot water and electricity. Replace faulty tap washers, and have your plumber rectify any leaking pipe work.



- Has there been an increase in hot water usage?

  An increase in hot water usage will result in an increase in water heater operation.

- Has your water heating tariff rate been increased by your electricity retailer since your previous account?

ELECTRICITY TARIFFS

The electricity tariff to which your water heater is connected will determine the overall operating cost of the system. It is important you are aware of this tariff, i.e. Off-Peak (overnight) or time controlled supply, Extended Off-Peak (overnight and day) or Extended time controlled supply, Domestic / Continuous. For types of tariffs, refer to "Single Element Model" on page 7 and "Twin Element Model" on page 7.

IF YOU HAVE CHECKED ALL THE FOREGOING AND STILL BELIEVE YOU NEED ASSISTANCE, PHONE A RHEEM SERVICE CENTRE.

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INSTALLATION

THIS WATER HEATER IS NOT SUITABLE FOR POOL HEATING

The installation must comply with the requirements of AS/NZS 3500.4, AS/NZS 3000 and all local codes and regulatory authority requirements. In New Zealand, the installation must conform with the New Zealand Building Code.

All packaging materials must be removed from the water heater prior to its installation. This includes the removal of the cardboard base of the carton from the underside of the water heater.

WATER HEATER LOCATION

This water heater is suitable for either outdoor or indoor installation (a model with a supply cord and plug is suitable for indoor installation only). Whether located outdoor or indoor, the water heater should be installed close to the most frequently used outlet and its position chosen with safety and service in mind.

Clearance must be allowed for servicing of the water heater. The water heater must be accessible without the use of a ladder or scaffold.



Make sure the temperature pressure relief valve lever is accessible and the front cover, thermostat, heating unit and if fitted, the side cover and temperature limiting valve can be removed for service.

You must be able to read the information on the rating plate. If possible leave headroom of one water heater height so the anode can be inspected or replaced. Remember you may have to take the entire water heater out later for servicing.

It is recommended the water heater be installed at ground or floor level and must stand vertically upright. The base of the water heater is made of corrosion resistant material, and it may be placed directly in contact with the supporting surface. It is not necessary to allow for free air circulation under the base of the water heater.

Note: The water heater should not be placed in direct contact with a concrete surface that is less than two months old and not fully cured as this may attack the metal coating of the water heater base. A moisture barrier should be used between the two surfaces in this instance.

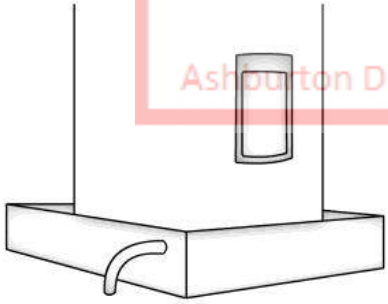
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Remember all local authorities have regulations about putting water heaters into roof spaces.

SAFE TRAY

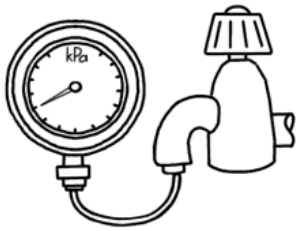
It is a requirement of AS/NZS 3500.4 that for a new installation, a water heater be installed in a safe tray where in the event of a leak, property may otherwise be damaged. Construction, installation and draining of a safe tray must comply with the abovementioned Standard.



MAINS WATER SUPPLY

Where the mains water supply pressure exceeds that shown in the table below, an approved pressure limiting valve is required and should be fitted as shown in the installation diagram (refer to diagram on page 27).

Model	025 to 160	250 to 400
Relief valve setting	1400 kPa	1000 kPa
Expansion control valve setting*	1200 kPa	850 kPa
Max. mains supply pressure		
With expansion control valve	950 kPa	650 kPa
Without expansion control valve	1120 kPa	800 kPa



* Expansion control valve not supplied with water heater

TANK WATER SUPPLY

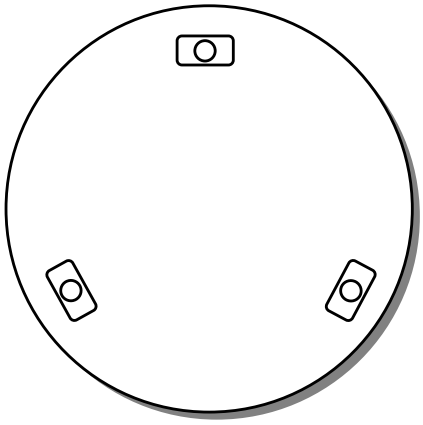
If the water heater is supplied with water from a tank supply and a pressure pump system is not installed, then the bottom of the supply tank must be at least 1 m above the highest point of the hot water plumbing system, including the water heater. Care must be taken to avoid air locks. The cold water line to the water heater should be adequately sized and fitted with a full flow gate valve or ball valve.

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Feet for Rheem Externally Mounted Cylinders

Optima 180, 300 and 400L Mains Pressure Water Heaters (3 pieces)



Outside diameters
180 model–488mm
300 model–580mm
400 model–690mm

Feet are 50mm in from edge of cylinder

Installation options:

1. Push tags into soft concrete at correct points according to cylinder diameter
2. Cut off tags and use a blob of construction adhesive to hold feet in place at correct points according to cylinder diameter
3. Cut off tags and screw feet into place on wooden platform at correct points according to cylinder diameter

Note: It is important that only three feet are used to avoid “rocking” and that the feet are positioned at 50mm from outside edge of cylinder to outside edge of feet.

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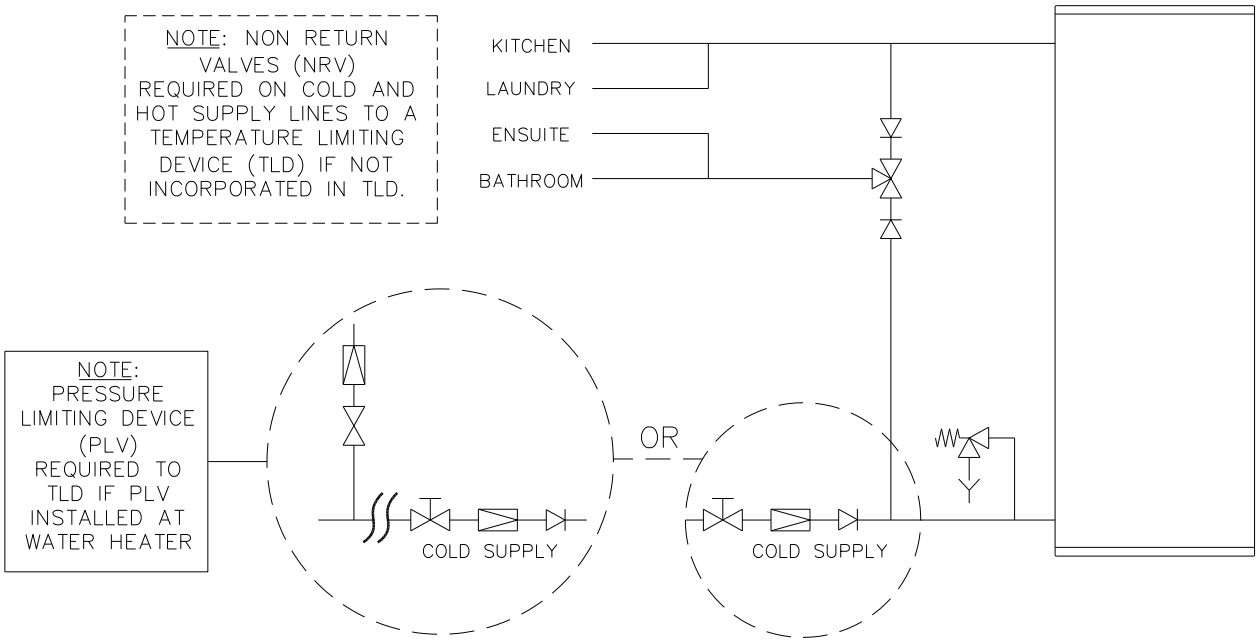
HOT WATER DELIVERY

This water heater can deliver water at temperatures which can cause scalding.

It is necessary and we recommend that a temperature limiting device be fitted between a Rheemglas or Optima water heater and the hot water outlets in any ablution area such as a bathroom or ensuite, to reduce the risk of scalding. The installing plumber may have a legal obligation to ensure the installation of this water heater meets the delivery water temperature requirements of AS/NZS 3500.4 so that scalding water temperatures are not delivered to a bathroom, ensuite or other ablution area.

Where a temperature limiting device is installed adjacent to the water heater, the cold water line to the temperature limiting device can be branched off the cold water line either before or after the isolation valve, pressure limiting valve and non return valve to the water heater. If an expansion control valve is required, it must always be installed after the non return valve and be the last valve prior to the water heater.

If a pressure limiting valve is installed on the cold water line to the water heater and the cold water line to a temperature limiting device branches off before this valve or from another cold water line in the premises, then a pressure limiting valve of an equal pressure setting may be required prior to the temperature limiting device.



Two Temperature Zones Using a Temperature Limiting Device

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CIRCULATED HOT WATER FLOW AND RETURN SYSTEM

If a Rheem water heater is to be installed as part of a circulated hot water flow and return system, a storage water heater able to provide a hot water outlet temperature of at least 60°C must be used. **Note:** The thermostat must always be above 60°C. Refer to the diagram on page 23

Temperature Limiting Device

A temperature limiting device cannot be installed in circulated hot water flow and return pipe work. The tempered water from a temperature limiting device cannot be circulated. Where a circulated hot water flow and return system is required in a building, a temperature limiting device can only be installed on a dead leg, branching off the circulated hot water flow and return pipe.

If circulated tempered water were to be returned back to the water heater, depending on the location of the return line connection on the water supply line to the water heater, then either: .

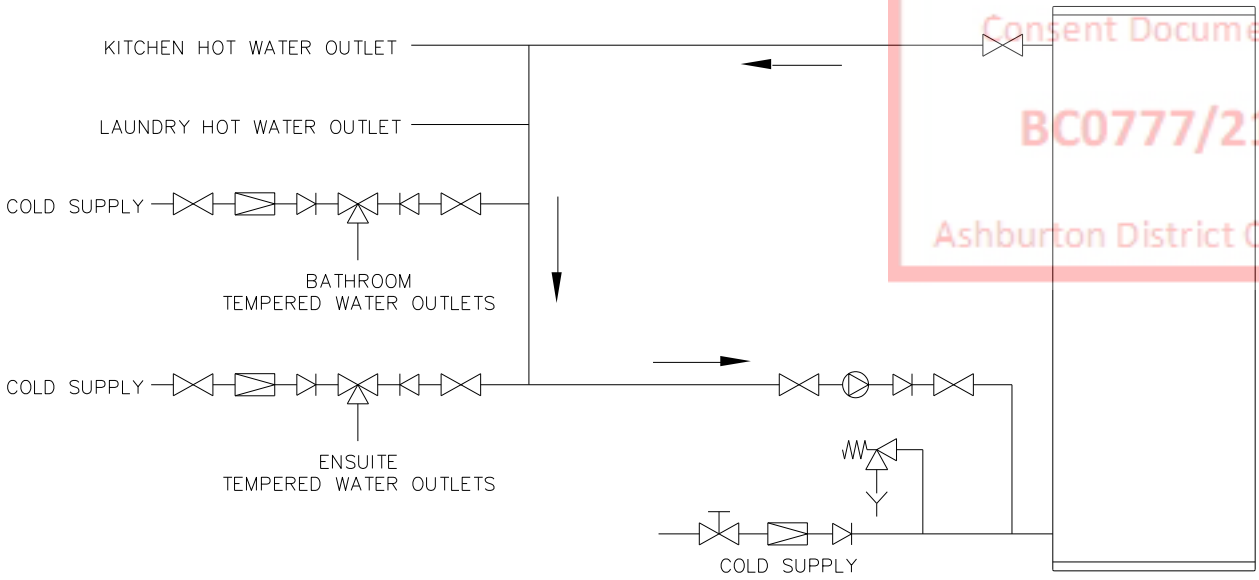
- water will be supplied to the cold water inlet of the temperature limiting device at a temperature exceeding the maximum recommended water supply temperature, or

- when the hot taps are closed no water will be supplied to the cold water inlet of the temperature limiting device whilst hot water will continue to be supplied to the hot water inlet of the temperature limiting device.

These conditions may result in either water at a temperature exceeding the requirements of AS/NZS 3500.4 being delivered to the hot water outlets in the ablution areas, or the device closing completely and not delivering water at all, or the device failing. Under either condition, the operation and performance of the device cannot be guaranteed.

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Circulated Hot Water Flow and Return
Continuous Electric Water Heater

Off-Peak or Time Controlled Electricity Supply

A single or twin element electric water heater connected to an Off-Peak electricity supply should not be installed as part of a circulated hot water flow and return system in a building. The benefits of the Off-Peak electricity supply will be significantly reduced.

REDUCING HEAT LOSSES

The cold water line to and the hot water line from the water heater must be insulated in accordance with the requirements of AS/NZS 3500.4. The insulation must be weatherproof and UV resistant if exposed. When using a hot water recirculation system, an increase in running costs can be expected due to the heat loss that occurs through the pipework.

The cold water line to and the hot water line from the water heater must be insulated in accordance with the requirements of AS/NZS 3500.4. The insulation must be weatherproof and UV resistant if exposed.

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ANODE

The vitreous enamel lined cylinder of the water heater is only covered by warranty when the total dissolved solids (TDS) content in the water is less than 2500 mg/L and when the correct colour coded anode is installed. The use of an incorrect colour coded anode will void the cylinder warranty and may shorten the life of the water heater cylinder.

The correct colour coded anode for the water supply being used must be selected and fitted to the water heater for warranty to apply to the water heater cylinder (refer to "Water Supplies" on page 11 and the Anode Selection chart on page 12). The black anode is typically fitted as standard.

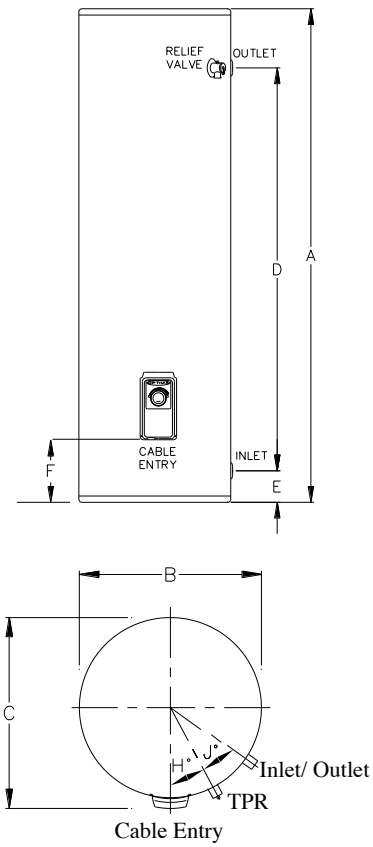
Total Dissolved Solids	Anode colour code
0 – 40 mg/L	Green
40 – 150 mg/L	Green or Black
150 – 400 mg/L	Black
400 – 600 mg/L	Black or Blue
600 – 2500 mg/L	Blue
2500 mg/L +	Blue (no cylinder warranty)

If the water supply has a TDS greater than 150 mg/L and a green anode has not been changed to a black anode, or if the TDS is greater than 600 mg/L and the anode has not been changed to a blue anode, there is the possibility the anode may become overactive and hydrogen gas could accumulate in the top of the water heater during long periods of no use. In areas where this is likely to occur, the installer should instruct the householder on how to dissipate the gas safely (refer to "Caution" on page 12).

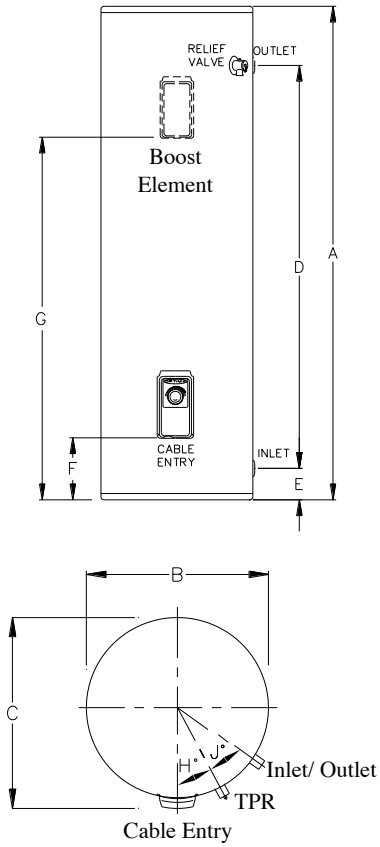
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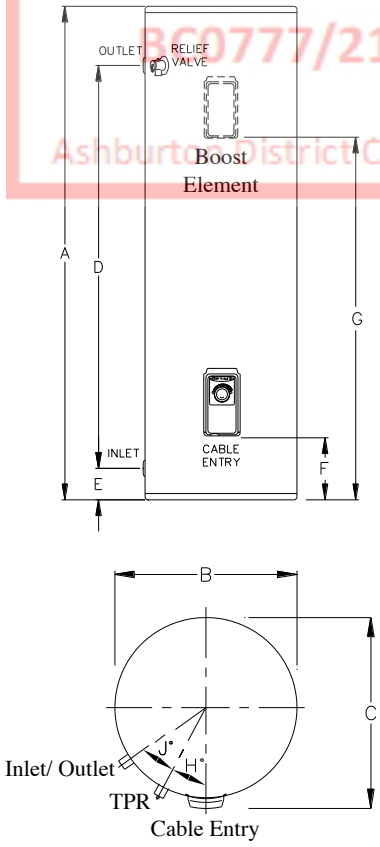
DIMENSIONS AND TECHNICAL DATA



Optima 180 Litre



Optima 300 Litre



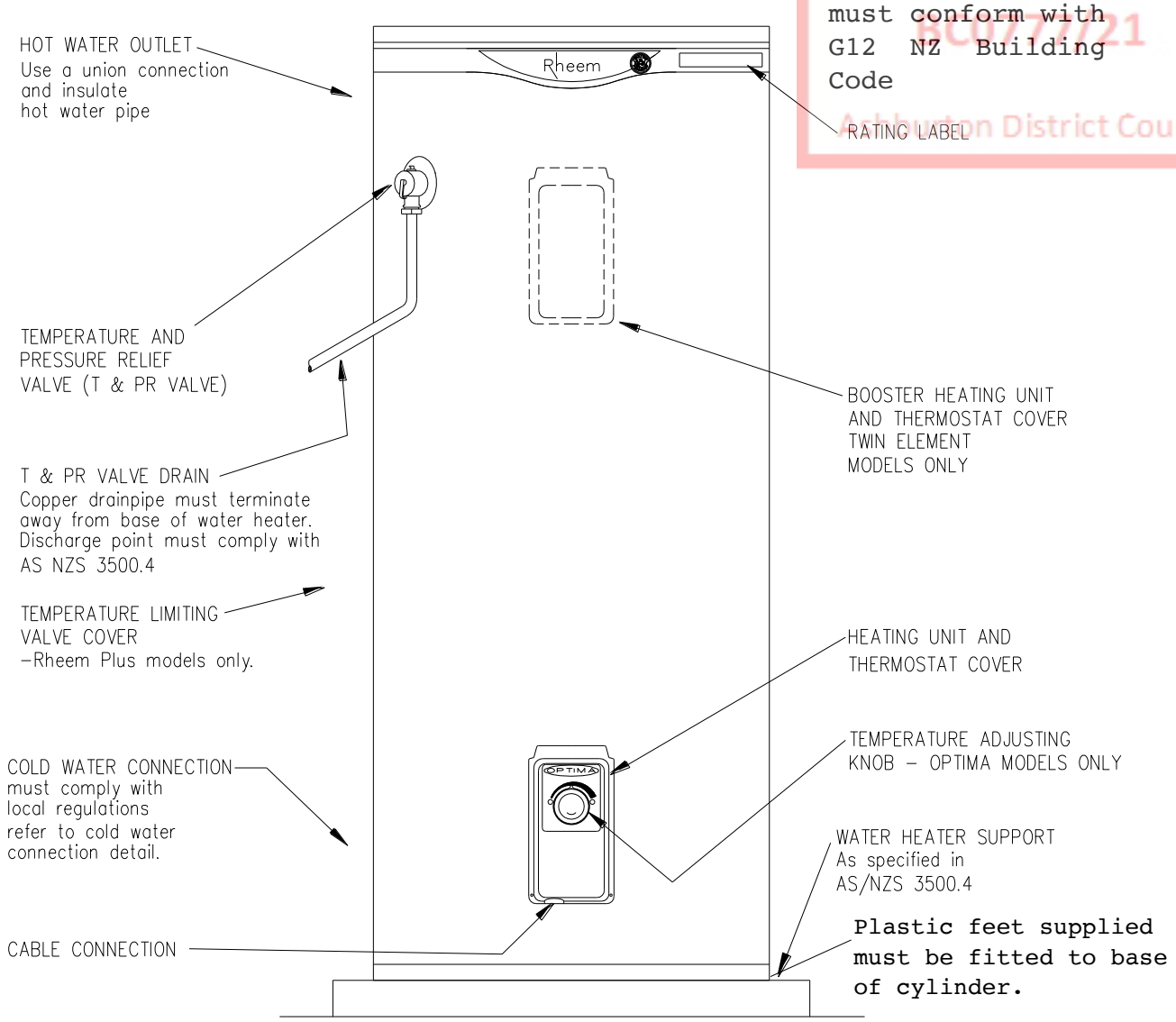
Optima 400 Litre

Optima Single Element Optima Twin Element			913 180 -	- 913 300	- 913 400
Hot Water Delivery		Litres	180	300	400
Boost Capacity		Litres	-	50	90
Dimensions	A	mm	1720	1825	1840
	B	mm	488	580	690
	C	mm	554	646	755
	D	mm	1482	1569	1479
	E	mm	74	74	121
	F	mm	90	90	120
	G	mm	-	1295	1346
	H	deg	23	18	53
	J	deg	22	18	30
Approx. Weight empty		kg	64	97	118

400 Litre models have left hand connections.
Technical data is subject to change.

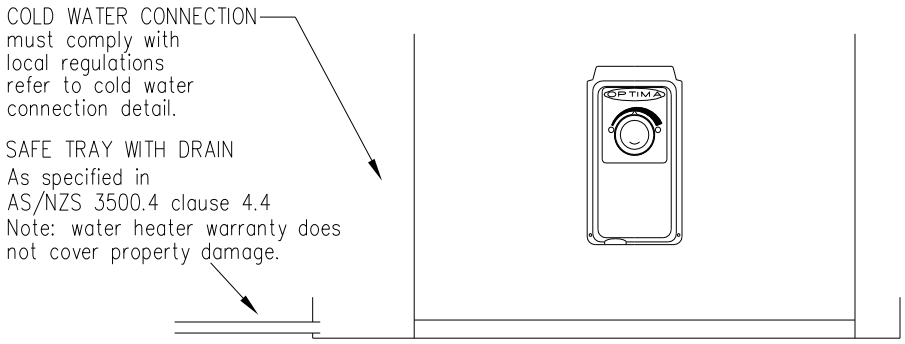
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Seismic strapping must conform with G12 NZ Building Code
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TYPICAL INSTALLATION – OUTDOOR LOCATION



OUTDOOR LOCATIONS

TYPICAL INSTALLATION – INDOOR LOCATION



INDOOR LOCATIONS

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CONNECTION SIZES

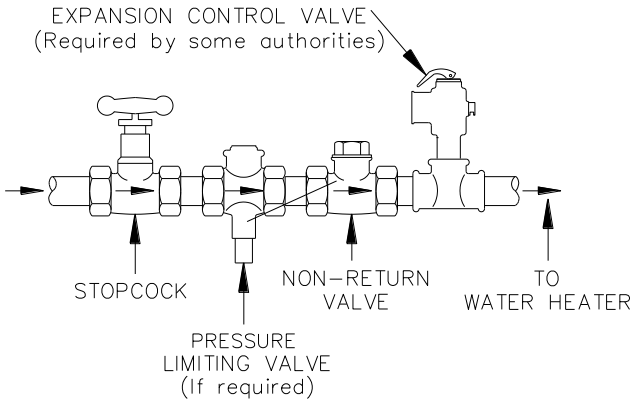
	Optima
• Hot water connection:	RP ¾/20
• Cold water connection:	RP ¾/20
• Relief valve connection:	RP ½/15

All plumbing work must be carried out by a qualified person and in accordance with the Plumbing Standard AS/NZS 3500.4 and local authority requirements.

WATER INLET AND OUTLET

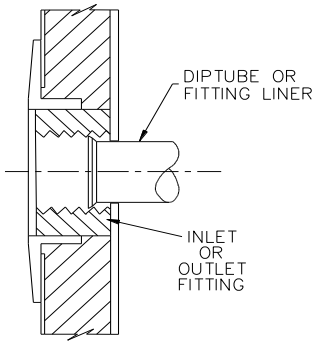
All pipe work must be cleared of foreign matter before connection and purged before attempting to operate the water heater. All olive compression fittings must use brass or copper olives. Use thread sealing tape or approved thread sealant on all fittings.

An isolation valve and non-return valve must be installed on the cold water line to the water heater. An acceptable arrangement is shown in the diagram. Refer also to "Hot Water Delivery" on page 21 and to "Mains Water Supply" on page 19.



A disconnection union must always be provided at the cold water inlet and hot water outlet on the water heater to allow for disconnection of the water heater.

This water heater has either a plastic dip tube or fitting liner in the inlet and outlet fittings (see diagram). These must be in place for the water heater to function properly. Do not remove or damage them by using heat nearby. They will be pushed into the correct position as the fitting is screwed in.



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PIPE SIZES

To achieve true mains pressure operation, the cold water line to the water heater should be the same size or bigger than the hot water line from the water heater.

The pipe sizing for hot water supply systems should be carried out by persons competent to do so, choosing the most suitable pipe size for each individual application. Reference to the technical specifications of the water heater and local regulatory authority requirements must be made.

TEMPERATURE PRESSURE RELIEF VALVE

The temperature pressure relief valve is shipped either under the top flap of the water heater carton or behind the front cover or in a plastic bag attached to the water heater. The temperature pressure relief valve must be fitted before the water heater is operated. Before fitting the relief valve, make sure the probe has not been bent. Seal the thread with Teflon tape - never hemp. Make sure the tape does not hang over the end of the thread.

Screw the valve into the correct opening (refer to the installation diagram on page 25) leaving the valve outlet pointing downwards. Do not use a wrench on the valve body - use the spanner flats provided. A copper drain line must be fitted to the temperature pressure relief valve (refer to "Relief Valve Drain" on page 27).

EXPANSION CONTROL VALVE

Local regulations may make it mandatory to install an expansion control valve (ECV) in the cold water line to the water heater. In other areas, an ECV is required if the saturation index is greater than +0.4 (refer to “Water Supplies” on page 11).

The expansion control valve must always be installed after the non return valve and be the last valve installed prior to the water heater (refer to diagram on page 27). A copper drain line must be fitted to the expansion control valve (refer to "Relief Valve Drain" on page 27).

The valve must be insulated with closed cell polymer insulation or similar (minimum thickness 9 mm) and the insulation installed so as not to impede the operation of the valve. The insulation must be weatherproof and UV resistant if exposed.

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RELIEF VALVE DRAIN

DN15 copper drain lines must be fitted to the temperature pressure relief valve and expansion control valve (if one is installed) to carry the discharge clear of the water heater. Connect the drain lines to the valves using disconnection unions. The drain line from the valve to the point of discharge should be as short as possible, have a continuous fall all the way from the water heater to the discharge outlet and have no tap, valves or other restrictions in the pipe work. A drain line from a relief valve must comply with the requirements of AS/NZS 3500.4. or G12 NZ Building Code

A drain line must be comply with AS/NZS 3500 or G12 NZ Building code.

Subject to local regulatory authority approval, the drain lines from the temperature pressure relief valve and expansion control valve from an individual water heater may be interconnected. Refer to local regulations.

The outlet of a drain line must be in such a position that flow out of the pipe can be easily seen, but arranged so discharge will not cause injury, damage or nuisance. The termination point of a drain line must comply with the requirements of AS/NZS 3500.4. Drain lines must not discharge into a safe tray.

In locations where water pipes are prone to freezing, drain lines must be insulated, must not exceed 300 mm in length and are to discharge into a tundish through an air gap of between 75 mm and 150 mm.

If a drain line discharges into a tundish, the drain line from the tundish must be not less than DN20. The drain line from a tundish must meet the same requirements as for a drain line from a relief valve.

Warning: As the function of the temperature pressure relief valve on this water heater is to discharge high temperature water under certain conditions, it is strongly recommended the pipe work downstream of the relief valve be capable of carrying water exceeding 93°C. Failure to observe this precaution may result in damage to pipe work and property.

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CONNECTIONS – ELECTRICAL

The power supply to the water heater must not be switched on until the water heater is filled with water and a satisfactory megger reading is obtained.

All electrical work and permanent wiring must be carried out by a qualified person and in accordance with the Wiring Rules AS/NZS 3000 and local authority requirements.

WATER HEATER

A water heater not fitted with a supply cord and plug must be directly connected to a 240 V AC, 50 Hz mains power supply with an isolating switch installed at the switchboard.

The power supply to a twin element model should be Off-Peak (overnight) to the bottom heating unit and continuous to the top heating unit. The power supply to a single element model can be either an Off-Peak (overnight), Extended Off-Peak (overnight and day) or continuous electricity supply. Check with the local electricity supply authority as to their requirements.
An Off-Peak (overnight) power supply will provide the maximum financial savings. Discuss the power supply requirements with the householder.

A flexible 20 mm conduit is required for the electrical cable to the water heater. The conduit is to be connected to the unit with a 20 mm terminator. Connect the power supply wires directly to the terminal block and earth tab connection, ensuring there are no excess wire loops inside the front cover. The temperature rating of the power supply wires insulation must suit this application.

THERMOSTAT SETTING

The thermostat on an Optima model is user adjustable from 60°C to 75°C.

The thermostat is adjusted by turning the knob anticlockwise to decrease the temperature setting and clockwise to increase the temperature setting. The top thermostat on a twin element model is fixed at 60°C.

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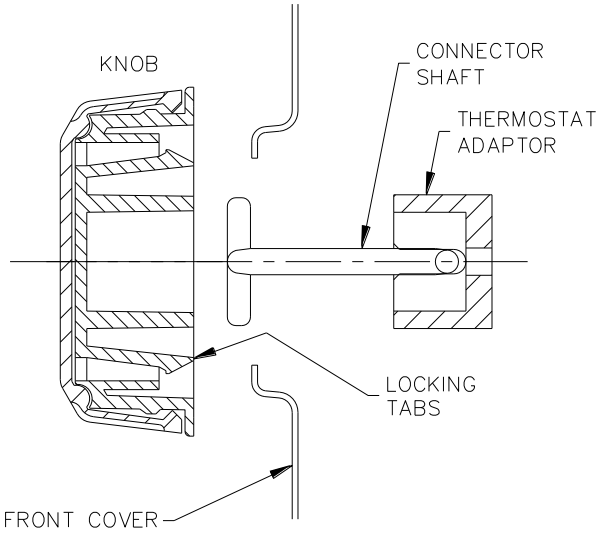
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For reasons of safety and economy, we advise the thermostat be set at the lowest temperature that will provide sufficient hot water. Dishwasher running costs can be adversely affected if the thermostat is set below 65°C. Discuss the thermostat setting requirements with the householder.

ASSEMBLY OF ADJUSTER MECHANISM ON OPTIMA MODEL

When the front cover has been removed, reassemble as follows:

- Remove the knob from the front cover by depressing the locking tabs on the inside of the front cover.
- Turn the thermostat to the lowest temperature (refer to “Temperature Adjustment” on page 5).
- Fit the front cover.
- Insert the connector shaft through the hole into the thermostat adaptor slots.

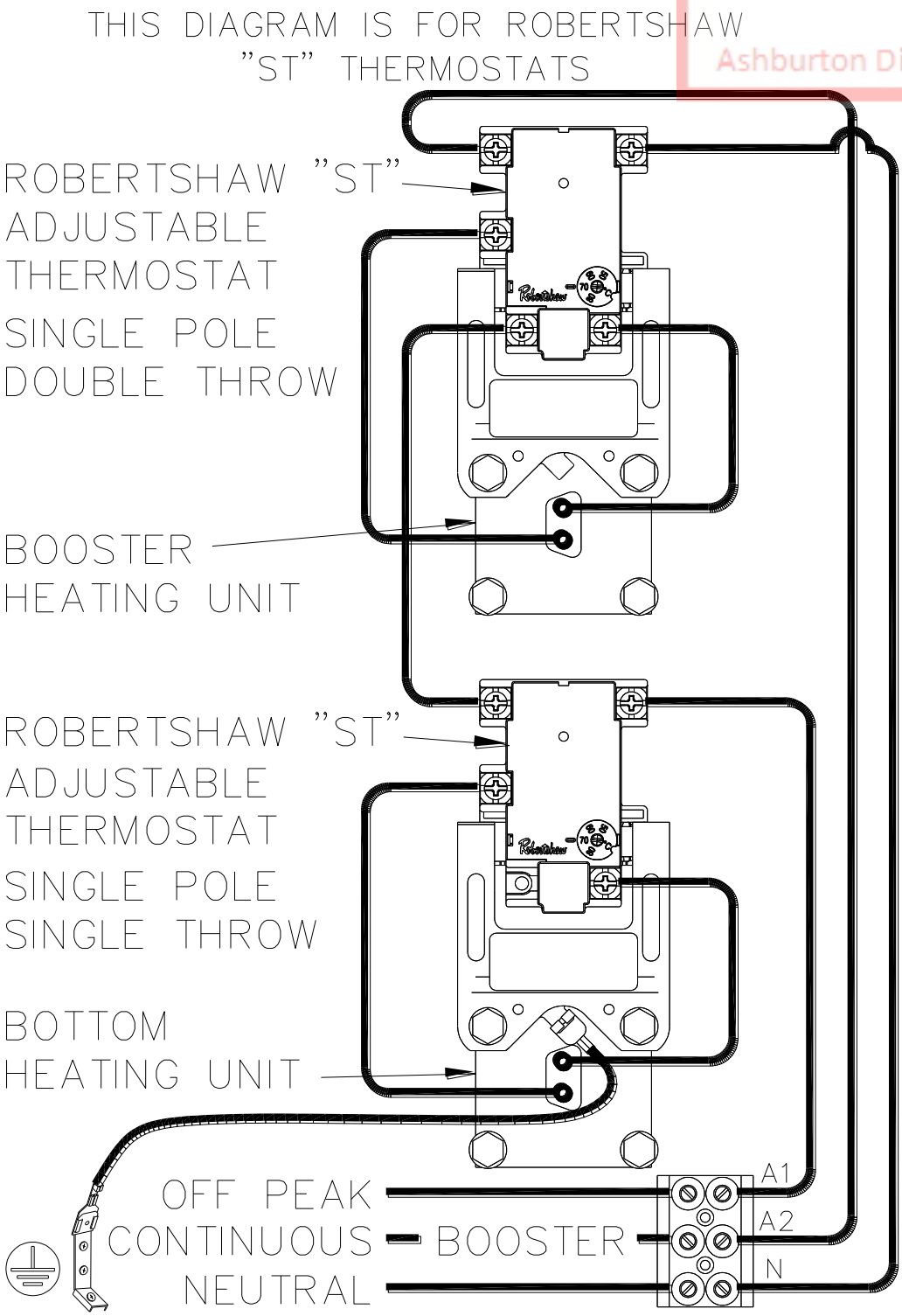


- Align the knob slots over the ' T ' drive on the connector shaft, with the dial at the lowest setting – a firm push with the hand on the knob front face will engage the locking tabs.

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WIRING DIAGRAM TWIN ELEMENT ELECTRIC WATER HEATERS
NON-SIMULTANEOUS OPERATION OFF-PEAK CONNECTION



Electrical Circuit for Twin Element Models – Robertshaw "ST" Thermostats

The active from the continuous supply must be connected to the top heating unit circuit and the active from the Off-Peak or time controlled supply must be connected to the bottom heating unit circuit.

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TO FILL AND TURN ON THE WATER HEATER

The power supply to the water heater must not be switched on until the water heater is filled with water and a satisfactory megger reading is obtained.

- Open all of the hot water taps in the house (don't forget the shower).
- Open the cold water isolation valve fully on the cold water line to the water heater.

  Air will be forced out of the taps.
- Close each tap as water flows freely from it.
- Check the pipe work for leaks.
- Switch on the electrical supply at the isolating switch to the water heater.

Explain to the householder or a responsible officer the functions and operation of the water heater. Upon completion of the installation and commissioning of the water heater, leave this guide with the householder or a responsible officer.

TO TURN OFF THE WATER HEATER

If it is necessary to turn off the water heater on completion of the installation, such as on a building site or where the premises is vacant, then;

- Switch off the electrical supply at the isolating switch to the water heater.
- Close the cold water isolation valve at the inlet to the water heater.

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DRAINING THE WATER HEATER

To drain the water heater:

- Turn off the water heater (refer to "To Turn Off The Water Heater" on page 33).
- Close all hot water taps.
- Operate the relief valve release lever - do not let the lever snap back or you will damage the valve seat.

  Operating the lever will release the pressure in the water heater.
- Undo the union at the cold water inlet to the water heater and attach a hose to the water heater side of the union.

  Let the other end of the hose go to a drain.
- Operate the relief valve again.

  This will let air into the water heater and allow the water to drain through the hose.

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RHEEM ELECTRIC DOMESTIC MAINS PRESSURE WATER HEATER WARRANTY

WARRANTY CONDITIONS

1. This warranty is applicable only to water heaters manufactured from 1st Oct 2010.
2. The water heater must be installed in accordance with the water heater installation instructions, supplied with the water heater, and in accordance with all relevant statutory and local requirements of the State in which the water heater is installed.
3. Where a failed component or water heater is replaced under warranty, the balance of the original warranty period will remain effective. The replaced component or water heater does not carry a new warranty.
4. Where the water heater is installed outside the boundaries of a metropolitan area as defined by Rheem or further than 25 km from a regional Rheem branch office, or a Rheem Service Centre the cost of transport, insurance and traveling costs between the nearest Rheem Service Centre's premises and the installed site shall be the owner's responsibility.
5. Where the water heater is installed in a position that does not allow safe, ready access, the cost of accessing the site safely, including the cost of additional materials handling and / or safety equipment, shall be the owner's responsibility.
6. The warranty only applies to the water heater and original or genuine (company) component replacement parts and therefore does not cover any plumbing or electrical parts supplied by the installer and not an integral part of the water heater, e.g. pressure limiting valve; isolation valves; non-return valves; electrical switches; pumps or fuse.
7. The water heater must be sized to supply the hot water demand in accordance with the guidelines in the water heater literature.

WARRANTY EXCLUSIONS

1. REPAIR AND REPLACEMENT WORK WILL BE CARRIED OUT AS SET OUT IN THE WATER HEATER WARRANTY, HOWEVER THE FOLLOWING EXCLUSIONS MAY CAUSE THE WATER HEATER WARRANTY TO BECOME VOID AND MAY INCUR A SERVICE CHARGE AND / OR COST OF PARTS.

a) Accidental damage to the water heater or any component, including: Acts of God; failure due to misuse; incorrect installation; attempts to repair the water heater other than by a Rheem Service Centre or the Rheem Service Department.
b) Where it is found there is nothing wrong with the water heater; where the complaint is related to excessive discharge from the temperature and / or pressure relief valve due to high water pressure; where there is no flow of hot water due to faulty plumbing; where water leaks are related to plumbing and not the water heater or water heater components; where there is a failure of electricity or water supplies; where the supply of electricity or water does not comply with relevant codes or acts.
c) Where the water heater or water heater component has failed directly or indirectly as a result of: excessive water pressure; excessive temperature and / or thermal input; blocked overflow / vent drain; corrosive atmosphere; ice formation in the pipe work to or from the water heater.
d) Where the water heater is located in a position that does not comply with the water heater installation instructions or relevant statutory requirements, causing the need for major dismantling or removal of cupboards, doors or walls, or use of special equipment to bring the water heater to floor or ground level or to a serviceable position.
e) Where the water heater has been connected at any time to a water supply that does not comply with the water supply guidelines as outlined in the Owner's Guide and Installation Instructions.

2. SUBJECT TO ANY STATUTORY PROVISIONS TO THE CONTRARY, THIS WARRANTY EXCLUDES ANY AND ALL CLAIMS FOR DAMAGE TO FURNITURE, CARPETS, WALLS, FOUNDATIONS OR ANY OTHER CONSEQUENTIAL LOSS EITHER DIRECTLY OR INDIRECTLY DUE TO LEAKAGE FROM THE WATER HEATER, OR DUE TO LEAKAGE FROM FITTINGS AND / OR PIPE WORK OF METAL, PLASTIC OR OTHER MATERIALS CAUSED BY WATER TEMPERATURE, WORKMANSHIP OR OTHER MODES OF FAILURE.

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RHEEM ELECTRIC DOMESTIC MAINS PRESSURE WATER HEATER WARRANTY

WARRANTY

In addition to your legal rights, Rheem New Zealand makes the following promise to the customer. We will repair, or if necessary, replace a defective domestic water heater, or part, which has failed due to faulty manufacture on the following terms and conditions.

Component	Installation	Model	Warranty Period	Warranty
All components (from date of installation)	All installations	Optima	Up to 3 Years	New component or water heater, free of charge, including labour.
Inner Cylinder (from date of installation)	Water heater installed in a "single-family domestic dwelling" With a thermostat set below 76˚C	Optima	First 5 years	New water heater, free of charge, including labour.
			Years 6-10	New water heater, free of charge, with installation and labour costs being the responsibility of the owner.
	Water heater installed in other than a "single-family domestic dwelling" With a thermostat set below 76˚C	Optima	First 12 months	New component or water heater, free of charge, including labour.
			Years 2-5	New water heater, free of charge, with installation and labour costs being the responsibility of the owner.

DURABILITY

Your Rheem water heater meets the durability standards of the New Zealand Building Code provided the water heater is:

1. Installed in accordance with the New Zealand Building Code and the Rheem installation instructions
2. Maintained in accordance with these instructions
3. Not damaged in any way
4. Stored correctly prior to use,
5. Your water quality remains within the requirements stated in the installation instructions

Warranty Conditions: see Page 35

Note: The water heater must be installed and maintained in accordance with the Rheem Installation Guides supplied with the water heater, and comply fully with all the requirements of the New Zealand Building Code.

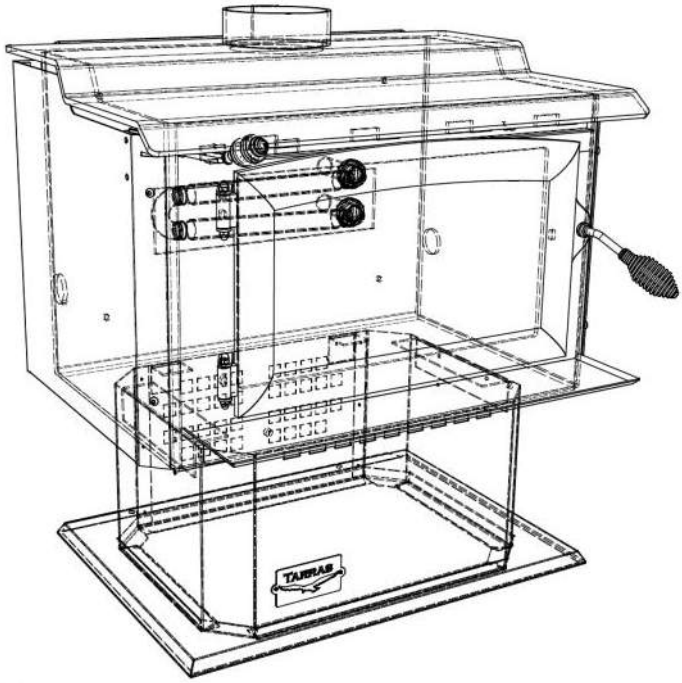
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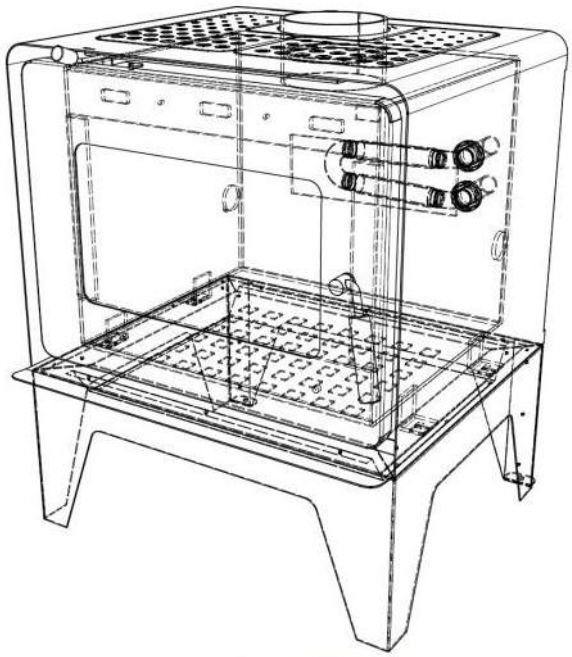
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Issued: Nov 2019 V2.8

WOODSMAN
Warming kiwi homes since 1887.

Specifications and Installation Instructions for Woodsman Solid Fuel Burners





The installation of any Woodsman solid fuel burner requires a Building Consent prior to installation commencing. We recommend the installation of a Woodsman solid fuel burner or flue system be undertaken by the holder of a current SFAIT (Solid Fuel Appliance Installation Technician) qualification issued by the NZHHA (NZ Home Heating Association Inc.).
www.nzhha.co.nz

Proudly Manufactured By:

harris HOME FIRES

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Testing and Certification

MODEL	AS/NZS 2918:2001, APP B	AS/NZ 2918:2001, APP E	AS/NZS 4012:1999	AS/NZS 4013:1999	ECan Cert Number
ECR NoVo	Complies	N/A	67%	0.9g/kg	153733
ECR NoVo Wet	Complies	N/A	65%	0.9g/kg	155148
Totara	Complies	Complies	67%	0.9g/kg	110220
Matai ECR MkIII	Complies	N/A	71%	0.7g/kg	102148
Matai ECR MkV	Complies	N/A	65%	0.7g/kg	102454
IMF	Complies	Complies	N/A	3.9g/kg	N/A
Flare - Wood	Complies	N/A	68%	0.97g/kg	134775
Flare - Wood WB	Complies	N/A	65%	0.89g/kg	135021
Flare - Multi	Complies	N/A	N/A	N/A	N/A
RMF	Complies	N/A	83%	3.9g/kg	N/A
Strongman	Complies	N/A	N/A	N/A	N/A
Aspen	Complies	N/A	71%	0.5g/kg	111306
Aspen WB	Complies	N/A	65%	0.5g/kg	111307
Brunner MKII	Complies	N/A	71%	0.5g/kg	142896
Brunner MKII WB	Complies	N/A	65%	0.5g/kg	142897
Tasman MKII	Complies	N/A	71%	0.5g/kg	142898
Tasman MKII WB	Complies	N/A	65%	0.5g/kg	142899
Tarras MKIII	Complies	N/A	69%	0.37g/kg	143492
Tarras MKIII WB	Complies	N/A	65%	0.5g/kg	143494

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Minimum Safe Installation Clearances to COMBUSTIBLE Materials

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	BRUNNER MKII & TASMAN MKII	BRUNNER MKII & TASMAN MKII With Rear Deflector Fitted (see Page 7)	FLARE-WOOD	TARRAS MKIII	TARRAS MKIII With Rear Deflector Fitted (see Page 7)
A	200	120	100	230	160
B	450	450	320	480	460
C	300	300	300	300	300
D	118	118	110	67	67
E	230	240	120	250	220
F	345	265	281	372	302
G	758	758	635	863	843
H	535	545	449	611	581
J	850	850	850	898	898
K	1025	945	933	1052	982
L	1437	1451	1287	1544	1500
M	1220	1230	1122	1304	1274
N	680	680	652	680	680
O	615	615	600	600	600
Flue Shield Requirements (See Page 6)	1200 With flue shield deflector fitted	1200 With flue shield deflector fitted	1200 With flue shield deflector fitted	1200 With flue shield deflector fitted	1200 With flue shield deflector fitted

	ECR MkIII, MkIV, MkV	ECR NoVo With Rear Deflector Fitted (see Page 7)	ASPEN	RMF	FLARE-MULTI	STRONGMAN
A	100	110	255	125	100	300
B	400	490	435	500	350	875*
C	300	300	300	300	300	GRAPH 1
D	150	115	118	150	110	150
E	200	200	230	180	150	380
F	251	265	404	276	281	441
G	690	800	743	790	665	1233**
H	512	517	521	492	479	711
J	880	850	850	880	850	1015
K	807	792	1084	832	933	1364
L	1280	1259	1417	1252	1329	1928
M	1110	1049	1219	1060	1152	1616
N	556	527	680	556	652	923
O	580	450	615	580	600	715
Flue Shield Requirements (See Page 6)	900	1200	1200	900	1200 With flue shield deflector fitted	1200

Notes:

Dimensions **A**, **B** & **E** are taken from the combustible wall to the closest point of the appliance including panels.

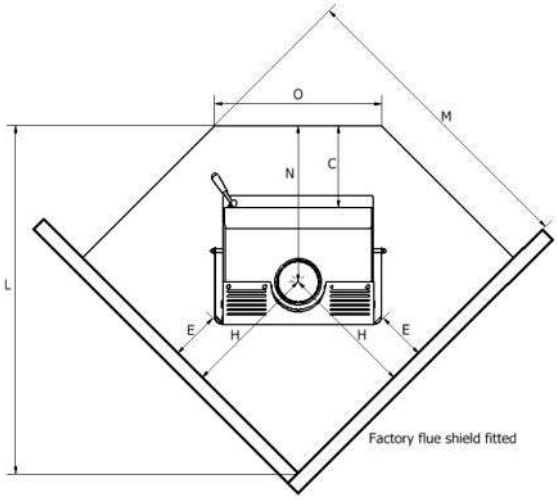
Dimension **C** is measured from the edge of the hearth to the closest point of the firebox door frame as in AS/NZS 2918:2001 3.3.2

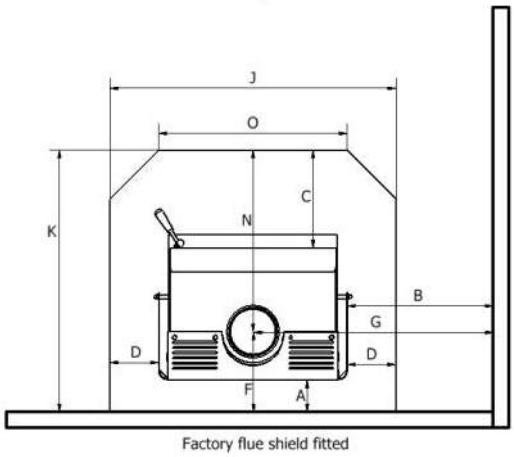
Dimensions **F**, **G** & **H** are not clearances that need to be adhered to. They are measurements for the purpose of locating the flue centre when the appliance is installed with the minimum safe clearances.

*610mm with firebox side panels fitted.

**968mm with firebox side panels fitted.

All dimensions are given in millimetres (mm).

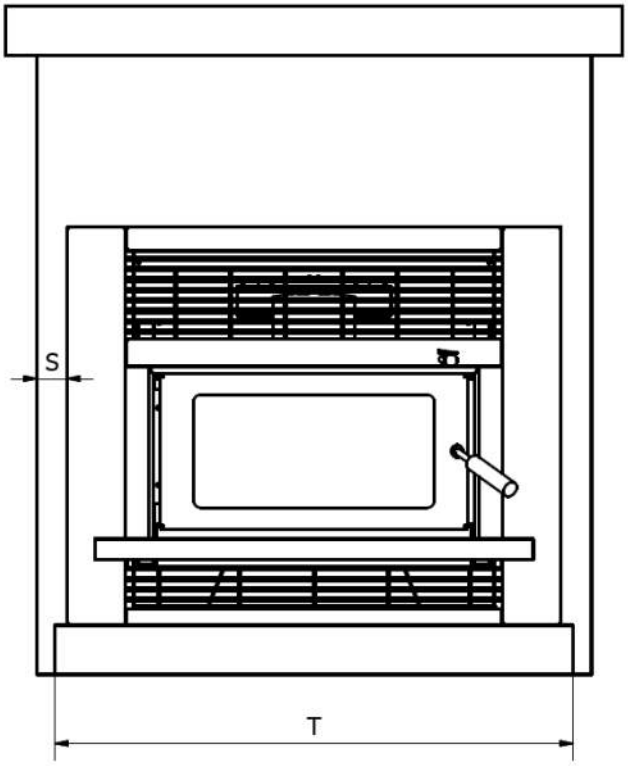


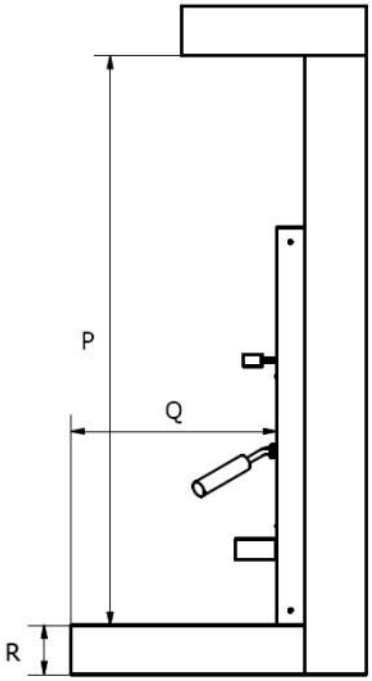


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Minimum Safe Installation Clearances to COMBUSTIBLE Materials





	IMF	Totara
P	980	1060*
Q	Graph 1	Graph 1
R	Graph 1	Graph 1
S	50	50
T	840	840

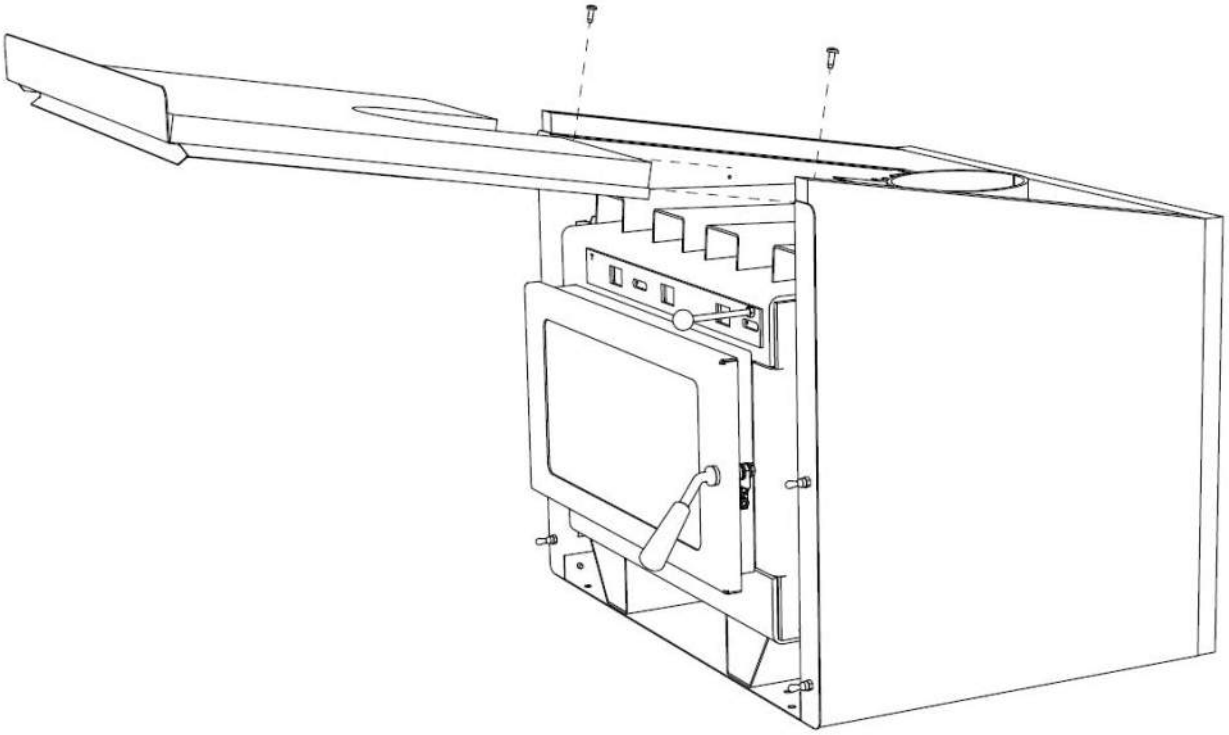
* Dimension P can be 920mm with a factory supplied heat deflector fitted

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Totara Insert Installation

When installing the Totara into a masonry situation, it is important to ensure that the flue is sealed and secured into the flue spigot.
In some tight situations, it may be very difficult to get access. In those cases, the top section of the cabinet is able to be removed by removing 2 screws and sliding it forward (as shown below). You then have access to the flue spigot to perform the task. Once completed, ensure that the top section of the cabinet is properly put back in its correct position, otherwise heat will escape into the cavity.



Additional Insulation in Cavity

In some installations, the cavity size leaves large open spaces around the insert cabinet. Even though the fascia may cover the opening, it is not air tight and there can be significant heat loss up the chimney.
This can reduce the effectiveness of the appliance and is likely to cause problems for the owner.

It is recommended that additional **non-combustible** insulation be used to pack around the cavity between the fire and the masonry to reduce (but not completely eliminate) air flow up the chimney and heat loss.

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Ceiling Heights

All Woodsman free standing fires have been tested and approved to ASNZ 2918:2001 App B with a ceiling height of 2.4m and with the factory flue shield fitted in the below configurations. In some cases, the top of the flue shield terminates within 600mm of the ceiling height (refer to ASNZ 2918:2001 **4.5.2**) but all ceiling temperatures did not exceed the allowable limit in these cases and are therefore able to be installed. Reports are available on request for Councils.

If the ceiling height is less than 2.4m, then heat shielding is required as per AS/NZ 2918:2001 Table 3.2

Factory Flue Shields

Standard 900mm high flue shield:
ECR MKIII, ECR MKV & RMF

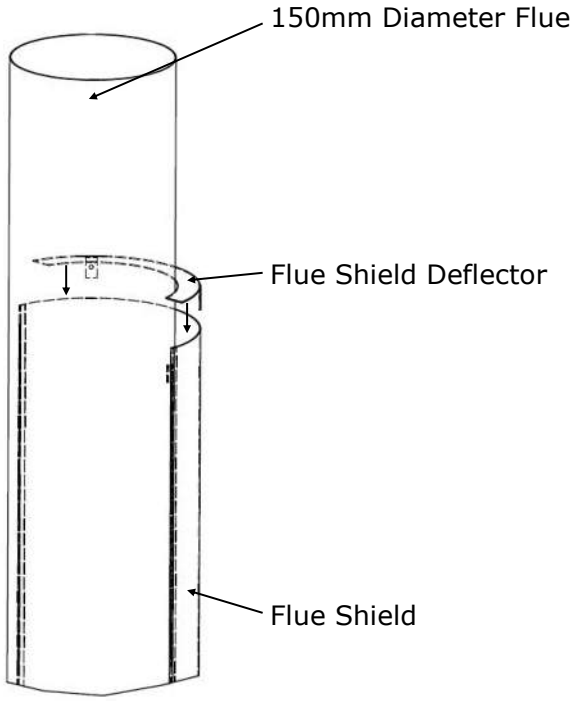
Standard 1200mm high flue shield:
Brunner, Tasman, Aspen, ECR NoVo & Strongman, Serene

1200mm high flue shield with flue shield deflector (REQUIRED)
Tarras MKII, Tarras MKIII, Brunner/Tasman MKII & Flare (All Variants) - See Below

IMPORTANT - Flue shields should be no further than 10mm off the top of the fire box

Fitting the Flue Shield Deflector

for Tarras MKII, Tarras MKIII, Brunner/Tasman MKII and Flare (All Variants)



To fit the heat shield deflector:

- Place the deflector on top of the heat shield and ensure no large gaps
- Fix in place by securing the tabs with rivets to the heat shield

WARNING

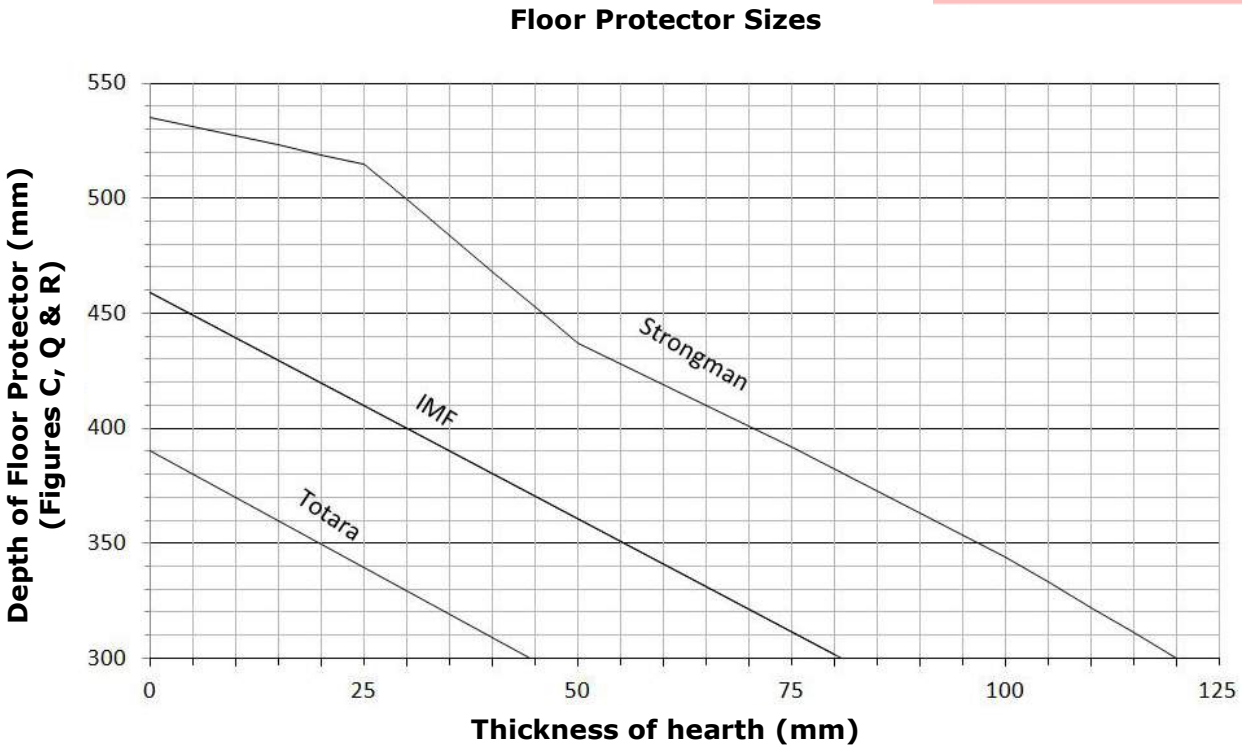
This part is required to be installed on the listed models with ALL types of flue kits. Failure to do so, may cause the ceiling to over heat. The part is located in the fire itself and not the flue kit packaging.

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Floor Protector Graph

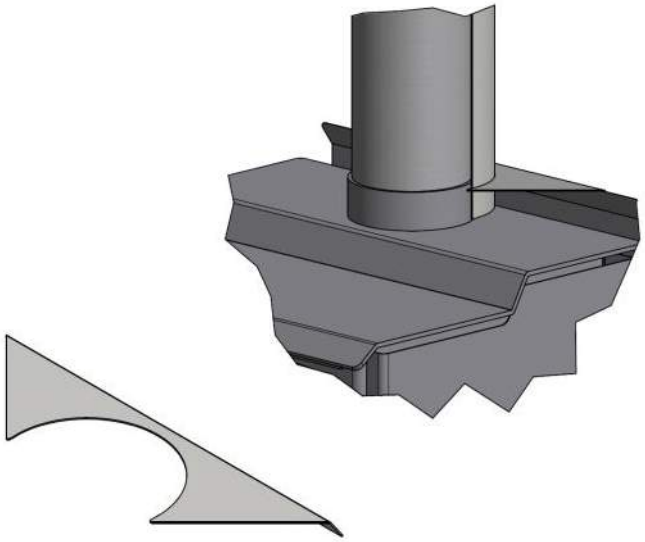
Graph 1



This graph refers to Page 4 dimension C and Page 5 dimension Q & R.

The floor protector distance out in front of the fire (taken from the door), is dependent on the thickness of the floor protector. The thicker the floor protector is above the surrounding combustible floor, the less this distance is out in front of the fire.

Rear Deflector



The rear deflector is used for reducing rear clearances for applicable fires (see page 4 for details). It is located loose in the firebox.

To fit the rear deflector, simply attach it to the rear shield of the fire using 2 rivets in the predrilled holes.

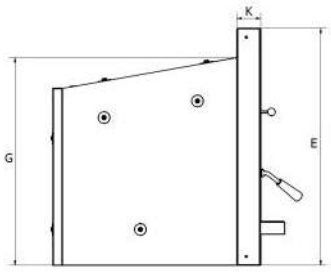
The rear deflector should be positioned tight up against the flue shield as shown.

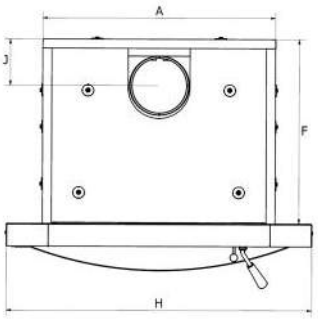
Available for:
Brunner MKII, Tasman MKII, ECR NoVo & Tarras MKIII

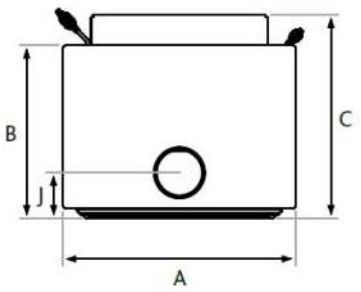
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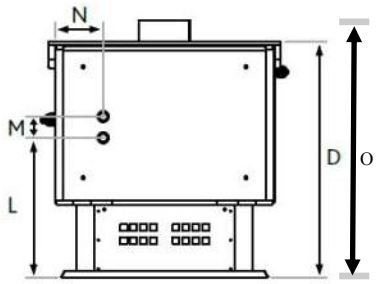
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Dimensions









	All Dimensions In MM	TOTARA	ECR MKIII, V	ECR NoVo	BRUNNER MKII & TASMAN MKII	ASPEN	TARRAS MKIII	FLARE WOOD	RMF	STRONG-MAN	IMF Deluxe
A	Overall Stove Width	642	580	620	615	615	765	630	580	715	590
B	Stove Depth Door Frame to Rear		390	382	525	520	522	540	390	521	
C	Overall Stove Depth Ledge to rear		450	466	630	633	640	602	450	590	
D	Floor to Stove Top Plate		620	651	758	725	774	768(Ped) 764 (Box & Leg)	593	697	
E	Insert Fascia Height	650									740
F	Insert Depth	506									480
G	Insert Maximum Height	570									590
H	Insert Fascia Width	840									850
J	Flue Centre to Back of Unit	136	150	155	145	149	142	181	150	141	115
K	Insert Fascia Depth	62									120/65
L	Wetback Height		283	414	478	450	479	502			
M	Wetback Centres		130	65	65	65	65	65			
N	Wetback Position		290	108	107	106	180	133			
O	Overall Stove Height		640	701	808	775	824	780	643	747	

Disclaimer;
While every attempt is made to ensure this information is as accurate as possible, a tolerance of +/- 5mm should be allowed for in these dimensions

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Reducing Clearances

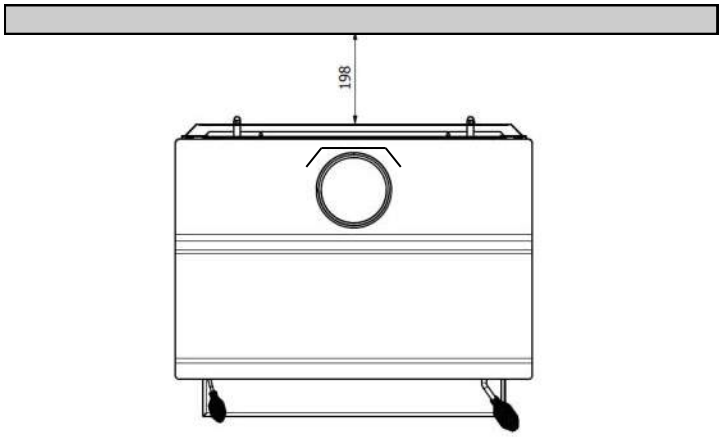
The clearances that are provided on page 4 are to combustible materials. You can safely reduce those clearances by following the instructions located in AS/NZS 2918:2001 table 3.1 and 3.2

You can reduce the clearances by placing a non-combustible heat shield, with an air gap behind it and vented top and bottom, between the fire and the combustible wall. Masonry may be used as a heat shield material. The heat shield must extend a minimum of **450mm** beyond the top of the appliance and must be of appropriate width to ensure that the unshielded rear clearance is adhered to beyond the sides of the heat shield. See example below.

Clearance factors for heat shields which are within 45 degrees of the vertical

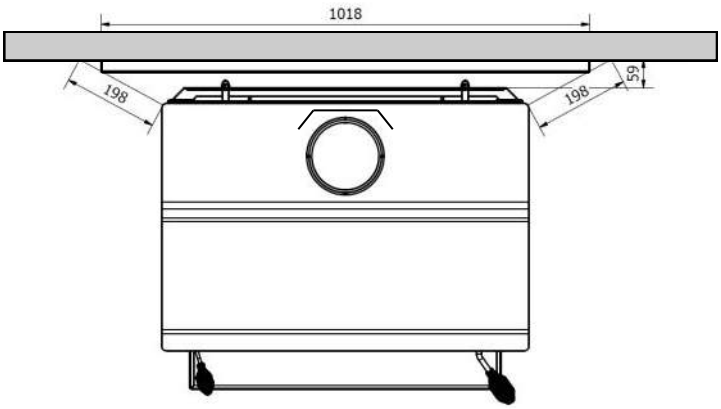
Heat Shield Construction	Minimum Air Gap Dimension	Clearance Factor
Single layer of continuous material	12mm	0.4
Single layer of continuous material	25mm	0.3
Two spaced layers of continuous material	12mm + 12mm	0.2

A non-combustible material in direct contact with a combustible material, with no air gap, is **NOT** considered a heat shield (unless the material has been tested in accordance with AS/NZS 2918:2001 Appendix A).
All clearance dimensions are taken from the combustible material to the appliance, ignoring the non-combustible in-between.



Unshielded Dimension for Woodsman Tarras MKII

Rear Clearance - 198mm (combustible to stove)



Heat shield with 25mm air gap with Woodsman Tarras MKII

Heat Shield - Single layer of continuous material with 25mm air gap.
Size 1018mm wide x 1222mm high

Reduced Rear Clearance - 59mm (combustible to stove)
Calculation: **198mm x 0.3 = 59mm**

WARNING - This is only an example, you must refer to the full AS/NZS 2918:2001 document for more details and consult your local building inspector. Where heat shields are used to reduce appliance dimensions, additional flue shielding may be required (refer 4.5.2).

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Ashburton District Council

Installation Instructions

It is recommended this appliance should be installed by a trained and NZHHA qualified installer.

Warning: the appliance and flue system shall be installed in accordance with AS/NZS 2918 and the appropriate requirements of relevant building code/codes.

Warning: appliances installed in accordance with this standard shall comply with the requirements of AS/NZS 4013 where required by the regulatory authority, i.e. the appliance shall be identifiable by a compliance plate with the marking "Tested to AS/NZS 4013".

Any modification of the appliance that has not been approved in writing by the testing authority is considered to be in breach of the approval granted for compliance with AS/NZS 4013.

Caution: mixing of appliance or flue system components from different sources or modifying the dimensional specification of components may result in hazardous conditions. Where such action is considered, the manufacturer should be consulted in the first instance.

Caution: cracked and broken components e.g. glass panels or ceramic tiles, may render the installation unsafe.

- Maintain a clearance of at least 1 metre between front of the appliance and building structure or any other substantial immovable object.
- If the appliance is installed on a heat sensitive floor, the floor should be protected with a floor protector, which shall extend entirely beneath the heater. For the correct floor protector sizes, refer to dimensions on page 4. For the minimum required material, see table below.
- Your appliance shall be seismically restrained, including the floor protector using the provided holes or brackets. The restraints should be sufficient enough to resist a seismic loading equal to 0.4 times the mass of the appliance. We recommend a minimum of 8mm dynabolts on concrete floors and 8mm coach screws for wooden floors of appropriate length.
- **Ventilation** - Where an appliance is installed in an enclosed location the area shall be ventilated to permit unrestricted operation of the flue. NOTE: For installations in well sealed buildings, the minimum recommended ventilation area is one-half the cross-sectional area of the flue. Where exhaust fans or additional combustion appliances are installed in the sealed enclosure, additional ventilation may be required.

Minimum Material Specifications For Floor Protectors on a Floor of Combustible Material

MODEL	SPECIFICATION
ASPEN	9mm Eterpan LD + 8mm ceramic tiles (or equivalent)
ECR (MkIII, IV, V) RMF TOTARA*	8mm ceramic tiles only (or equivalent)
STRONGMAN	24mm Eterpan LD (or equivalent)
BRUNNER MKII TASMAN MKII TARRAS MKIII FLARE (All Variants) ECR NoVo SERENE	Ash Floor Protector. Any non-combustible material of any thickness

*The Totara is also approved with 1mm sheet steel with a 10mm spacing above combustible material. For use when extending hearths.

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Minimum Flue Height

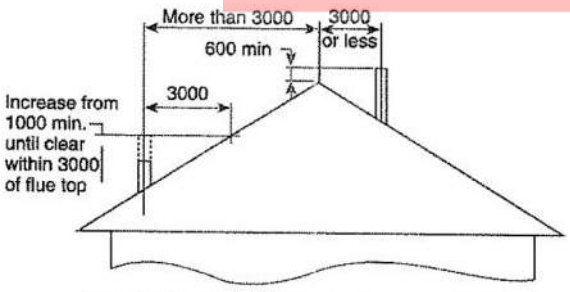
The top of the flue system should be at least 600mm above the highest point of the roof ridgeline, if the point of intersection of the flue system and the roof-line is less than 3 metres from the ridgeline horizontally.

If the point of intersection of the flue system and the roofline is greater than 3 metres horizontally, the top of the flue system shall be at least 1 metre above the point of inter-section with the roofline. (refer FIG 3)

The total flue height should be no less than 4.6m from the level of the hearth.

FIG 3.

DIMENSIONS IN MILLIMETRES



MINIMUM HEIGHT OF FLUE SYSTEM EXIT

These are considered to be **minimum dimensions,** and depending on local conditions, **taller flue system heights may be required for satisfactory performance.**

Flue Installation Detail

Your Woodsman appliance should be installed with a HeatSaver Flue System.

A HeatSaver Flue System is available from all authorised Woodsman dealers throughout New Zea-land.

The HeatSaver Flue System contains a complete installation drawing and correct clearances from the ceiling level up. Minimum clearances from the appliance to nearby combustible surfaces are given in FIGS 1 & 2.

Use of a flue system other than a genuine HeatSaver Flue System may affect the safety of the in-stallation, and may affect your Woodsman warranty.

Insist on a genuine HeatSaver Flue System.

Installation requirements for Woodsman fireplace inserts and flue system where timber framing is less than 50mm from the chimney structure.

Installation should be carried out by a qualified installer who will ensure:

- That the minimum clearances determined by tests in accordance with AS/NZS 2918:2001 are complied with to prevent overheating of nearby combustibles.
- That the minimum opening size of **600mm wide x 600mm high x 500mm deep** is availa-ble when firebricks are removed, and that extra provision also be made for plumbing where a hot water booster is fitted (where permitted).
- That any flue requirements specific to the model being installed are met in full - refer HeatSaver Flue System Instructions.
- Where the fireplace opening is in a heat sensitive wall, a non-metallic heat resistant material shall extend not less than 50mm beyond each side of the appliance and 150mm beyond the top of the appliance.
- Clearance of at least 1 metre between the front of the appliance and building structure, or any other substantial material object.
- That the insulating floor protector of non-combustible material is provided, extending not less than the dimensions shown in the chart. (Refer Table 2)
- A fireplace appliance shall not be connected to a flue common with an open fireplace.

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Sealing Flue Joints

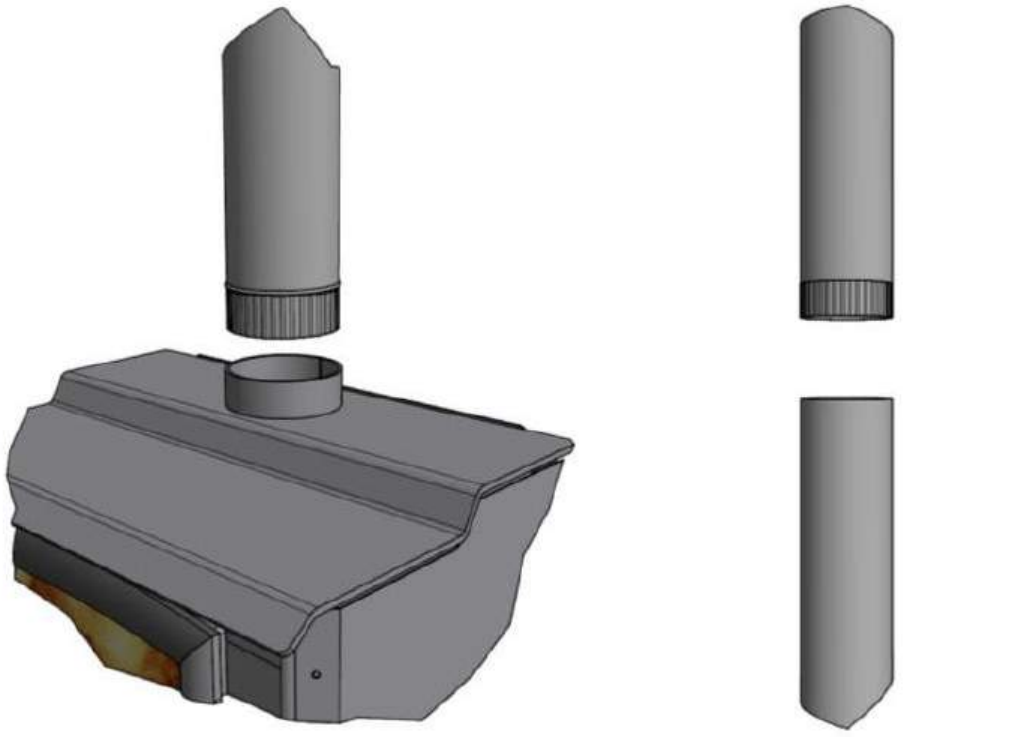
IMPORTANT

All Flue Joints Are Required To Be Sealed Using Flue Cement

It is extremely important that ALL flue joints are sealed at the time of installation using flue cement or a suitable exhaust cement.
If flue joints are not sealed properly, it can lead to performance issues with the fire such as;

- Lower heat output of the fire, due to decreased performance
- Blocked flue
- Smoke coming out the door when open, due to decreased suction
- Hard to light

The formation of soot and creosote will not seal the flues, especially on the lower lengths, as the high temperatures inhibit its formation.



Any issues that arise as a result of the flues not being sealed, are not covered by the warranty and are not the responsibility of the manufacturer.
It is the installers responsibility to ensure that this is done at the time of installation.

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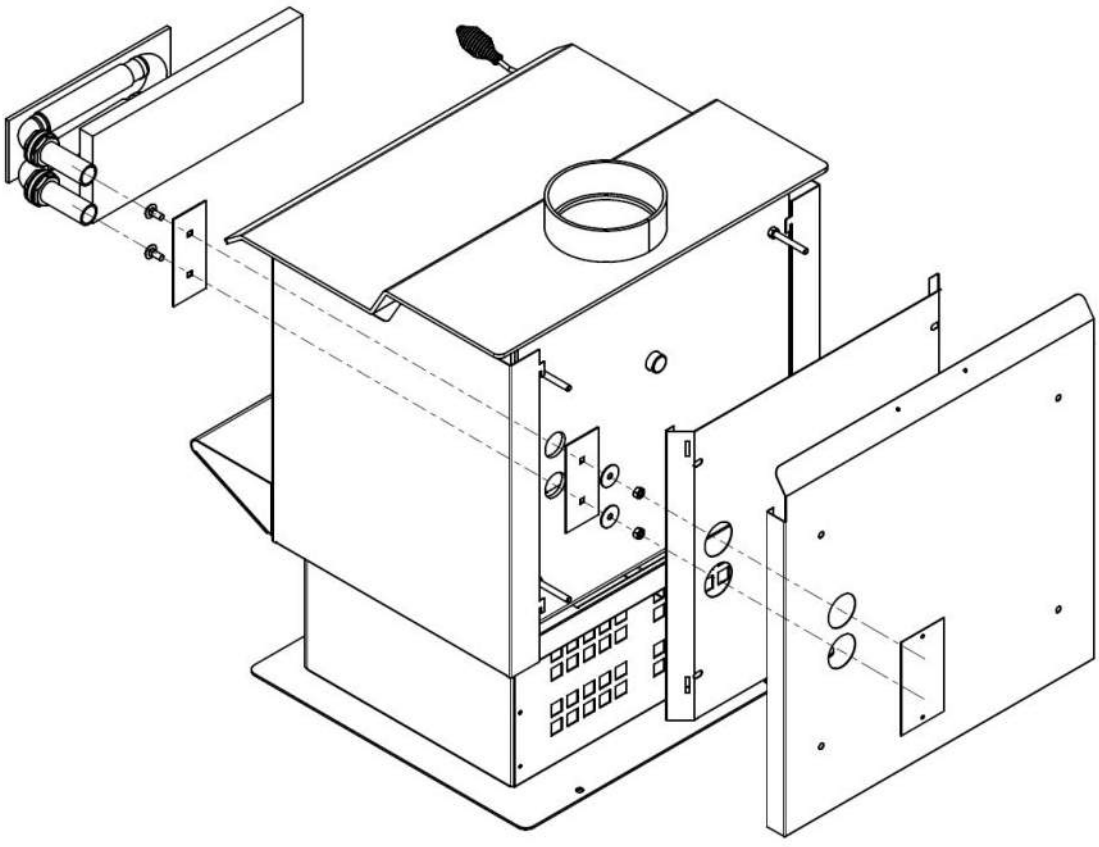
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Fitting the Wetback To The Firebox

Instructions for fitting a <u>loose</u> wetback to the firebox where the fire has been pre-punched with wetback holes.

- Remove knock-outs and cover plates in the rear panels
- Remove top rear firebrick
- Undo coach bolts on firebox plug to expose wetback holes
- Cut rear firebrick with a saw only enough to expose the wetback holes on the inside and to allow for the placement of the wetback in front of the brick
- Remove 1 nut off each wetback tube
- Place wetback into fire with firebrick behind it
- Replace nuts onto the rear of the wetback. Ensure the wetback is level before tightening using a 40mm tube socket

This task should be completed before the fire is positioned in place.



<u>Note</u>: Rear panels do not need to be removed if a tube socket is used for tightening

WETBACK WARNINGS:

- Do not connect to an unvented hot water system.
- **NEVER** burn the appliance without the wetback connected to the water system. This will immediately damage the wetback and void the warranty.
- AS/NZS 2918:2001 states; "all water connections to an appliance shall be in accordance with the appropriate requirements of AS 3500.4.1 or NZS 4603 and the regulatory authority, as appropriate".

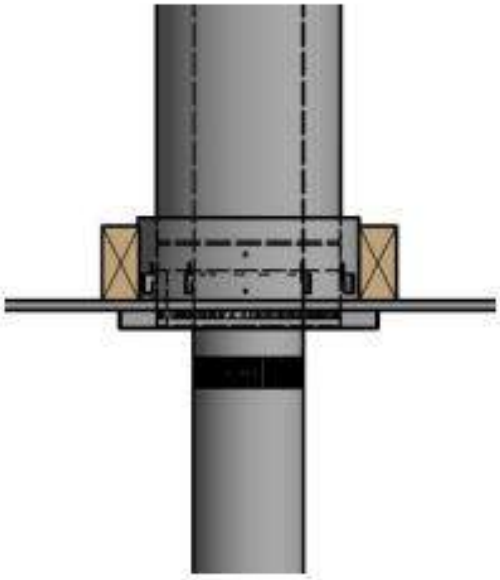
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Issued: August 2020 V3.9

Heatsaver Flue Kit Installation Instructions For Solid Fuel Appliances

HeatSaver
FLUE SYSTEM





The installation of any Woodsman solid fuel burner requires a Building Consent prior to installation commencing. We recommend the installation of a solid fuel burner or flue system be undertaken by the holder of a current SFAIT (Solid Fuel Appliance Technician) qualification issued by the NZHHA (New Zealand Home Heating Association) www.nzhha.co.nz

KEEP THESE INSTRUCTIONS FOR FUTURE REFERENCE

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Installation Instructions

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We recommend this appliance be installed by a trained and NZHHA qualified installer.

Warning: the appliance and flue system shall be installed in accordance with AS/NZS 2918 and the appropriate requirements of relevant building code/codes.

Caution: mixing of appliance or flue system components from different sources or modifying the dimensional specification of components may result in hazardous conditions. Where such action is considered, the manufacturer should be consulted in the first instance.

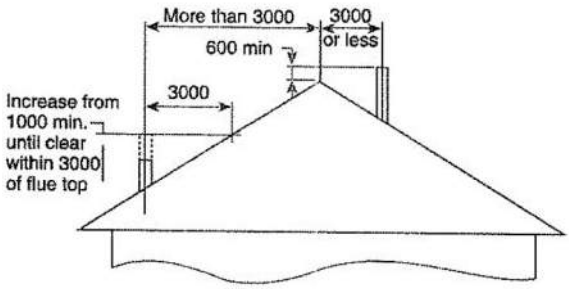
Minimum Flue Height

The top of the flue system should be at least 600mm above the highest point of the roof ridgeline, if the point of intersection of the flue system and the roofline is less than 3 metres from the ridgeline horizontally.

If the point of intersection of the flue system and the roofline is greater than 3 metres horizontally, the top of the flue system shall be at least 1 metre above the point of intersection with the roofline. (refer FIG 3)

FIG 3.

DIMENSIONS IN MILLIMETRES



MINIMUM HEIGHT OF FLUE SYSTEM EXIT

These are considered to be **minimum dimensions,** and depending on local conditions, **taller flue system heights may be required for satisfactory performance. The total flue height should be no less than 4.6m from the level of the hearth.**

Flue Installation Detail

Your Woodsman appliance should be installed with a HeatSaver Flue System.

A HeatSaver Flue System is available from all authorised Woodsman dealers throughout New Zealand.

The HeatSaver Flue System contains a complete installation drawing and correct clearances from the ceiling level up. Minimum clearances from the appliance to nearby combustible surfaces are given in FIGS 2 & 3.

Use of a flue system other than a genuine HeatSaver Flue System may affect the safety of the installation, and may affect your warranty.

Insist on a genuine HeatSaver Flue System.

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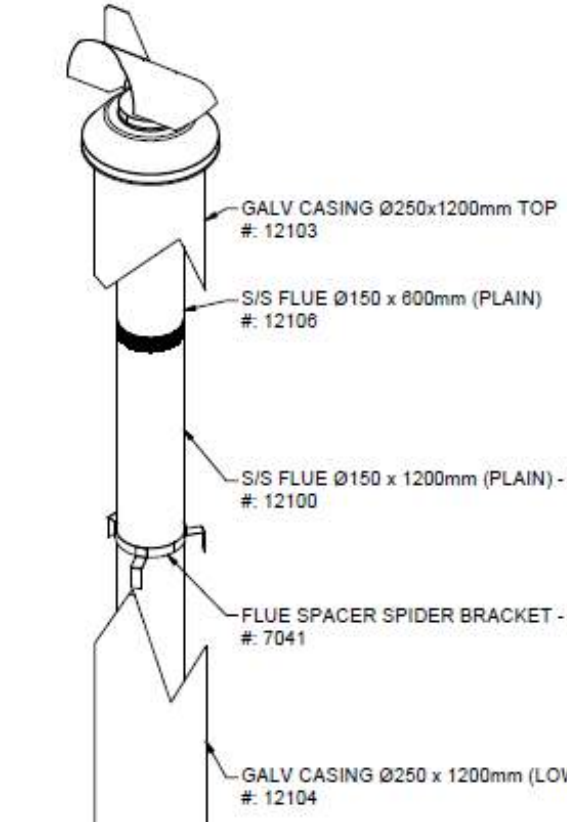
INSTALLATION INSTRUCTIONS

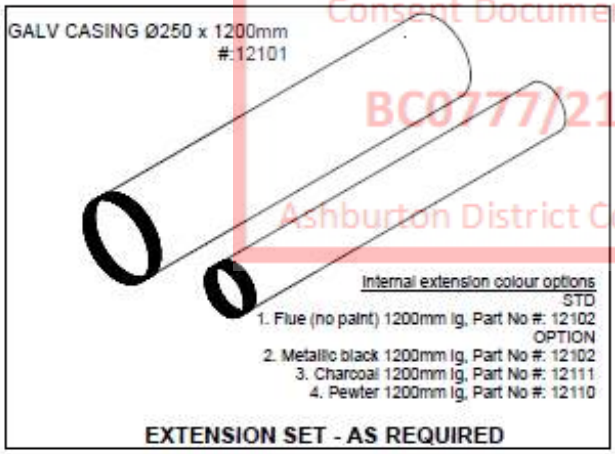
- This HeatSaver flue system is tested and certified to AS/NZS 2918:2001 Appendix F, which means it is approved for use on all solid fuel appliances with a flue diameter of 150mm.
- A copy of the Laboratory Test Certificate for this HeatSaver Flue System is included as part of these Installation Instructions, (refer to paperwork with flue kit).
- Installation of any solid fuel appliance should only be carried out by suitably trained and qualified personnel.
- Position the stove to the desired position, always ensuring that the manufacturer's minimum clearances to combustibles are complied with.
- Check that there are no roofline ridges or valleys in the way, or if they cannot be avoided, that the installer knows how to weatherproof the penetration and reinstate the full strength of the structure.
- At the ceiling level, construct a square frame of 300mm x 300mm internal dimensions and cut away the ceiling materials from the inside of this frame.
- Lower the 300mm flue pipe casing into this frame and nail in place when the bottom edge is 25mm below the ceiling level and the 8 nail holes provided are touching the timber frame. Ensure that the spacer brackets are at the top of the casing as shown in the diagram.
- Check all 4 locating brackets are correctly fitted into the 300 X 150mm short casing and lower the 250mm diameter lower casing into place. The swage will naturally settle onto the 4 brackets supporting the casing.
- Make roof penetration, assemble and fit required flue length and install with upper casing. Secure all joins with at least 3 stainless steel rivets or self tapping screws.
- Frame and brace upper installation as required and flash the roof to shield penetration.
- Fit ceiling plate to ceiling.
- When trimming the stainless steel flue length, remember to allow for expansion when flue is hot.
- Fix HeatSaver Columbia Cowl in place using 3 screws.
- Secure the flue to the fire, drill through flue neck on fire and secure with 2 to 3 s/s screws or rivets.
- All flue joints should be sealed using a flue cement.
- Ensure a 25mm clearance from the 250mm diameter casing to any combustible material.

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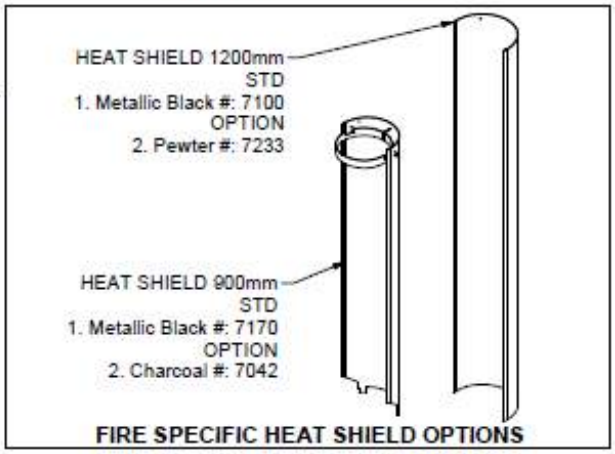
HEAT SAVER II FLUE KIT

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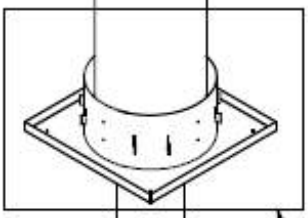




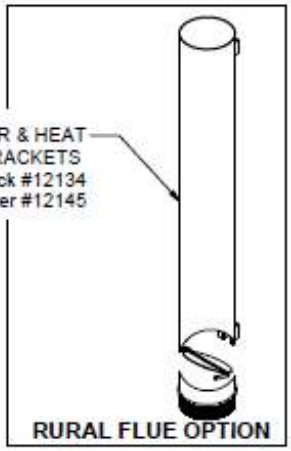
EXTENSION SET - AS REQUIRED



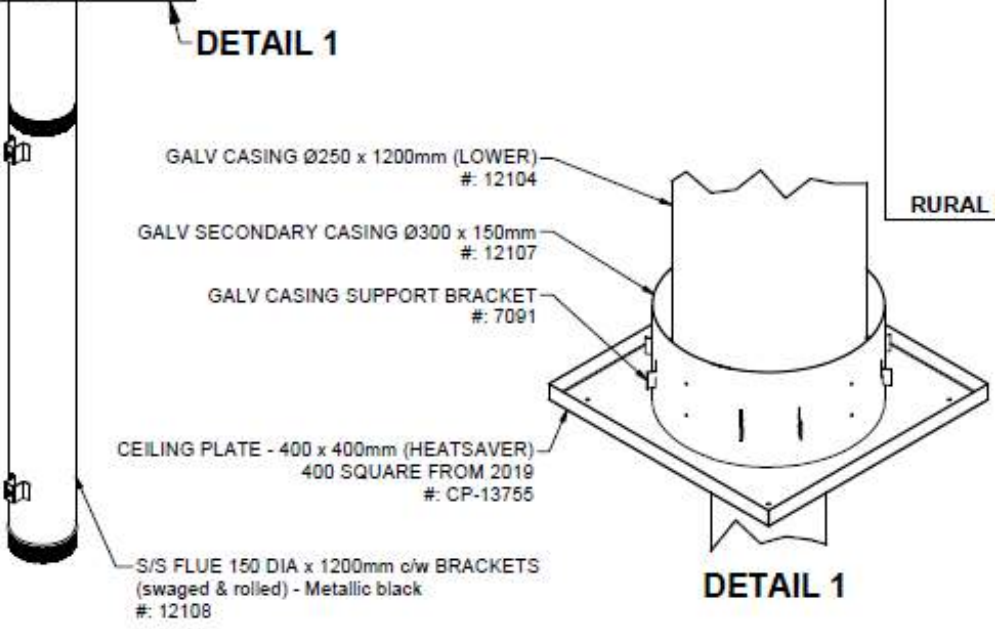
FIRE SPECIFIC HEAT SHIELD OPTIONS



DETAIL 1



RURAL FLUE OPTION

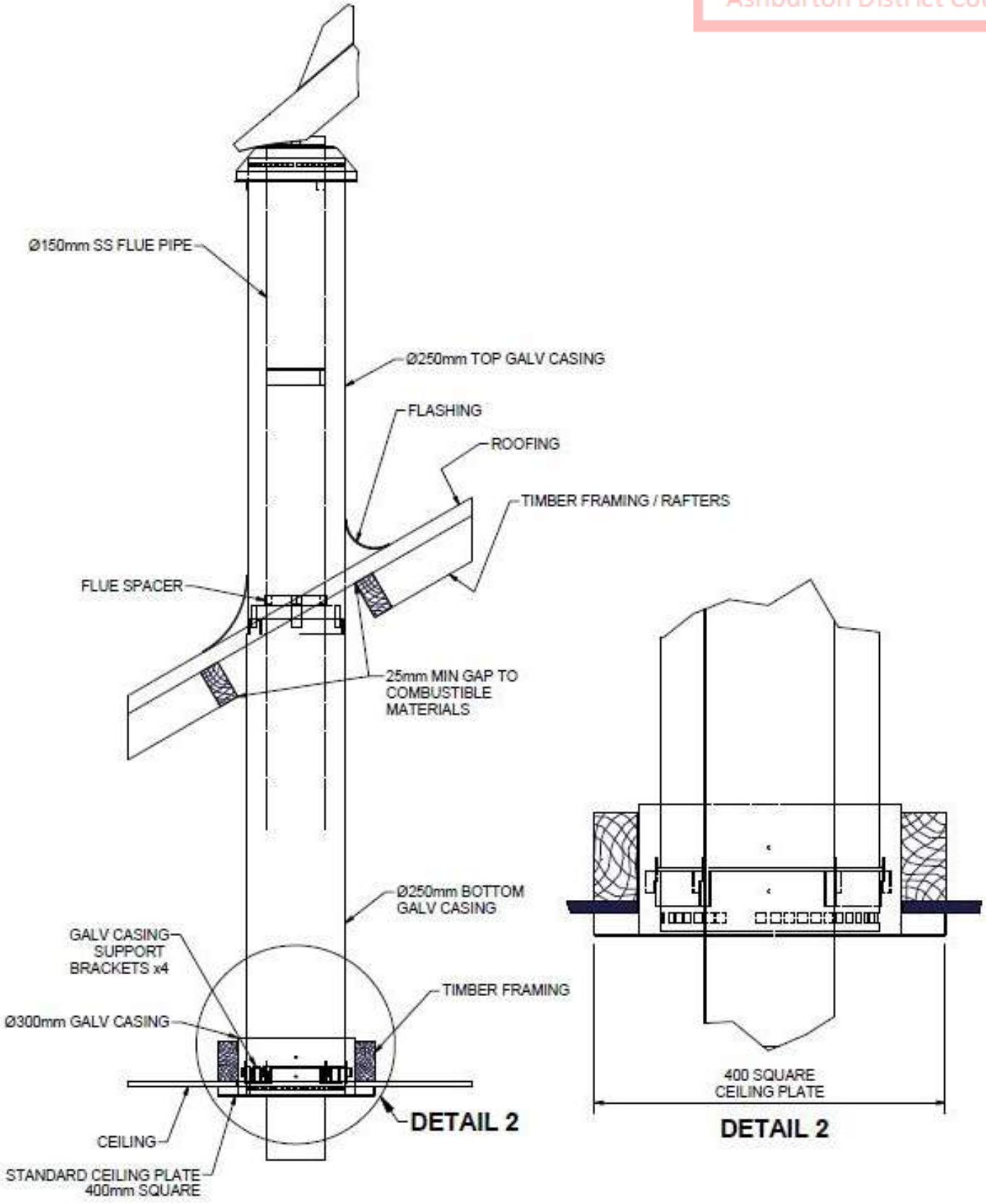


DETAIL 1

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Standard Ceiling

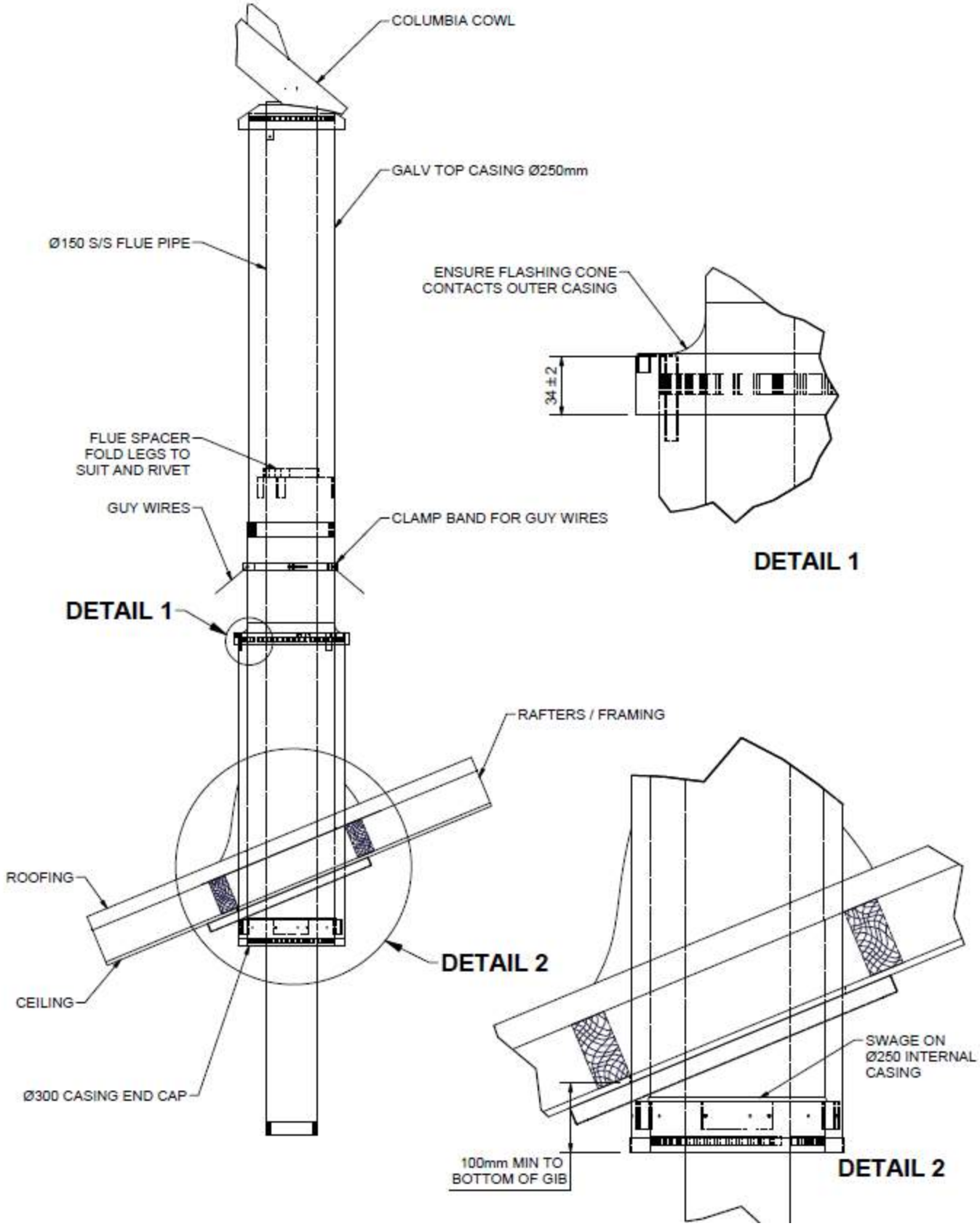


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HeatSaver Flue Kit Installation With Sloping Ceiling Kit

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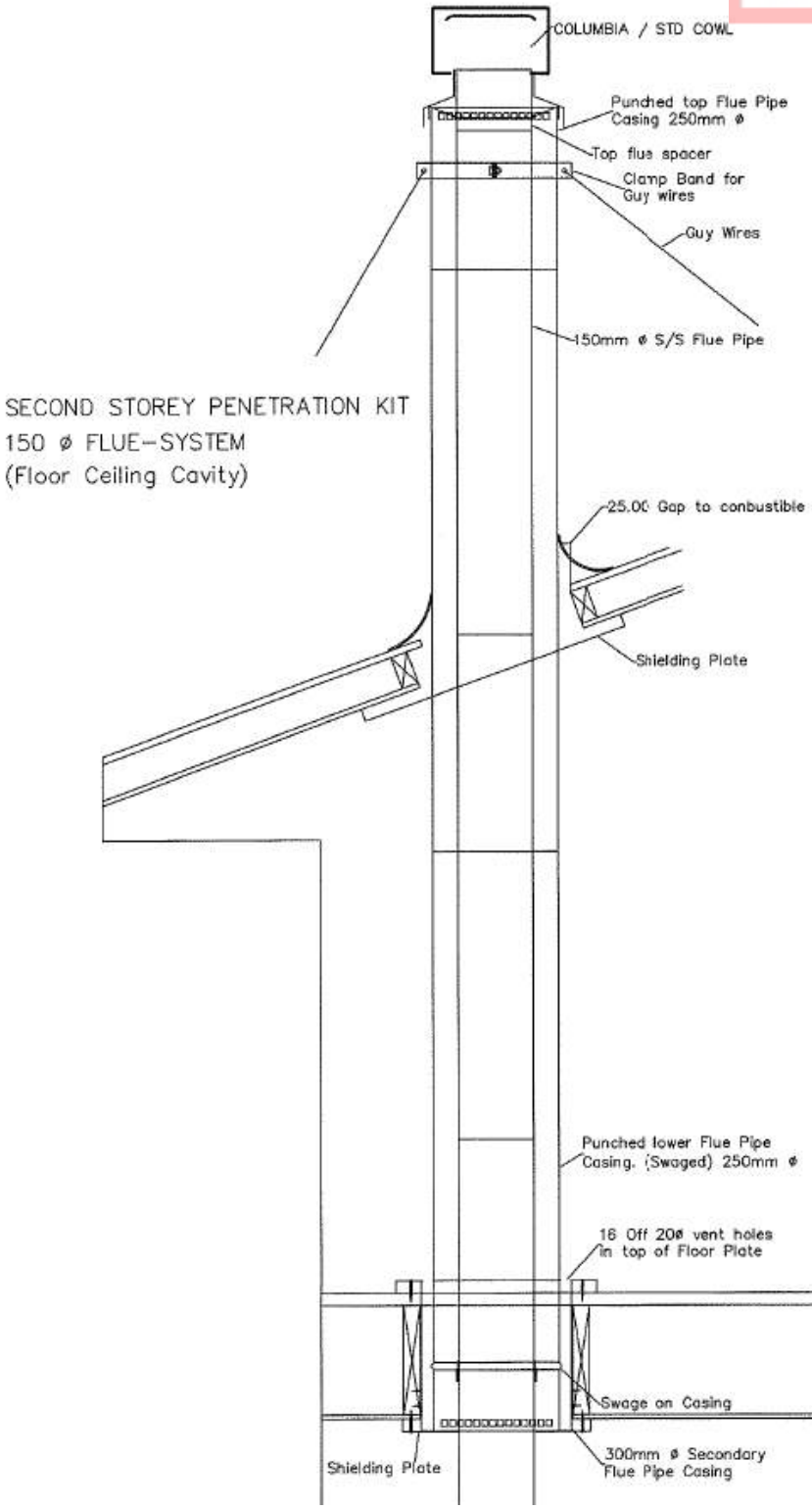
No Cavity (Requires Sloping Ceiling Kit)



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HeatSaver Flue Kit Installation
Two Story Penetration Kit

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IMPORTANT
All Flue Joints Are Required To Be Sealed Using Flue Cement

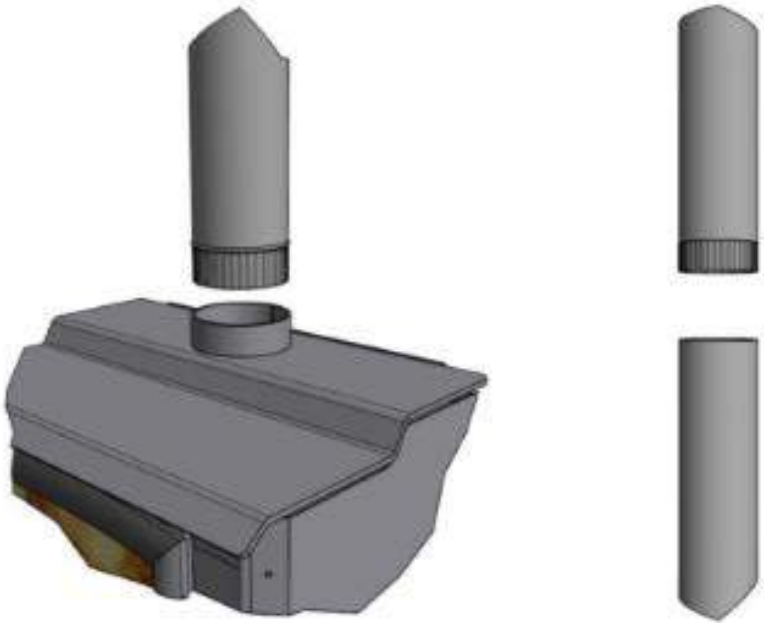
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It is extremely important that ALL flue joins are sealed at the time of installation using flue cement or a suitable exhaust cement.
Woodsman fires are designed and tested with all flue joins sealed.

If flue joins are not sealed properly, it can lead to performance issues with the fire such as;

- Lower heat output of the fire, due to decreased performance
- Blocked flue
- Smoke coming out the door when open, due to decreased suction
- Hard to light

The formation of soot and creosote will not seal the flues, especially on the lower lengths, as the high temperatures inhibit its formation.



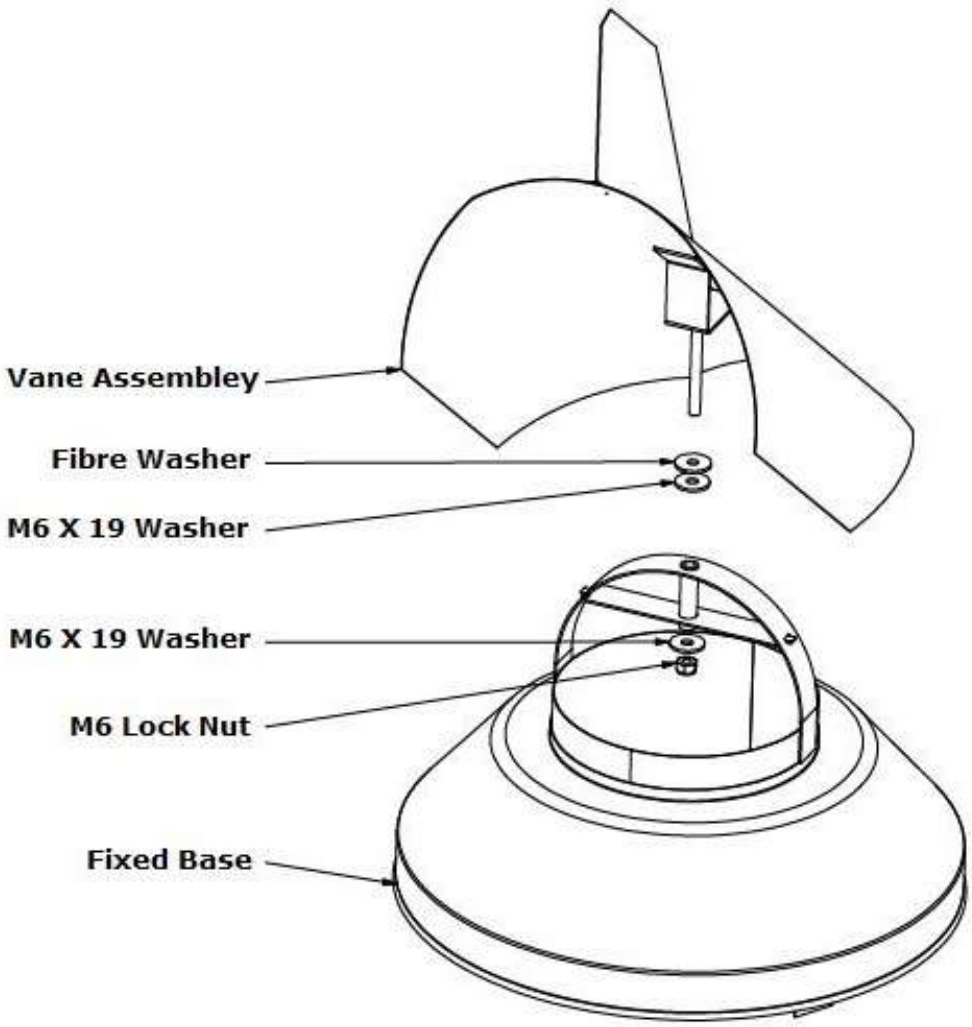
Note:
Any issues that arise as a result of the flues not being sealed, are not covered by the warranty and are not the responsibility of the manufacturer. It is the installer's responsibility that this is done at the time of installation.

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Columbia Cowl

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Your Columbia Cowl should be assembled as below. Please note the position of the fibre washer. Tighten the lock nut up so that there is the minimum amount of vertical play (around 1mm), but the cowl still rotates freely.



Maintenance

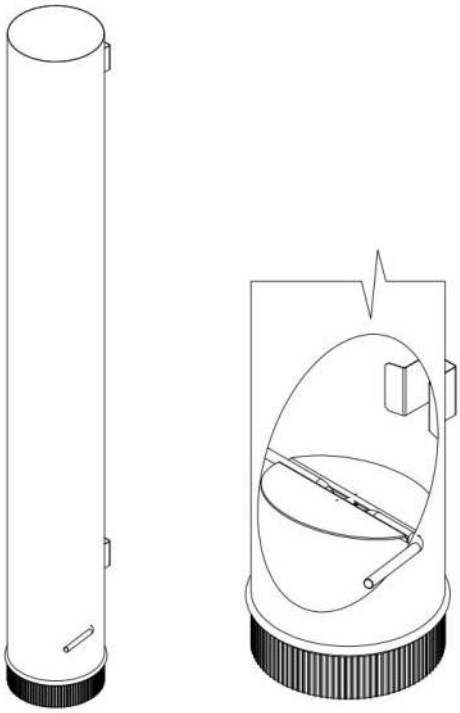
Your Columbia Cowl should have routine maintenance carried out yearly. Disassemble the cowl and clean away any built up soot or creosote. Check the fibre washer for wear and replace if necessary. Apply fresh high temperature grease to the shaft and reassemble.

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Rural Flue Option

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If you are on a property of 2 Ha or more or local regulations permit, you have the choice of installing the Rural Option for the Standard heat Saver Flue system. This is simply the standard Heat Saver Flue system with the optional piece of 150 X 1200 mm stainless flue length with butterfly damper supplied as standard. This piece is fitted directly into the spigot of the fire in place of the standard flue pipe. The factory shield is fitted as normal.
Alternatively you can purchase the optional piece of 150 X 1200 mm stainless flue length with butterfly damper fitted separately, and fit it to an existing Woodsman Wood Burner if local regulations permit.



Rural Flue Damper operating suggestions:

1) Your Woodsman fire must always be started with the flue damper fully open.
2) Once the fire has been burning for some time, and the home has been fully warmed, the damper may be used for long holding operation. This is useful for leaving the home for a few hours or overnight burning.
3) Turn the handle so that it sits 45 degrees to the top of the fire for a slow burn and turn to vertical (open) for maximum performance and heat output. It is not recommended to close the damper past 45 degrees particularly in a newer air tight home.
4) To ensure efficient burning it is advised to leave the damper open for 10mins after each new load of wood is added.

Caution:

1) Always ensure the damper is open before opening the fire door.
2) Using the fire with the damper turned down too often, will cause the flue system to block quickly and will require cleaning regularly.
3) When the fire is operating, the damper handle should never be touched with bare hands as it will be very hot. Use an oven mitt or tool.
4) Operating the flue damper before the fire is not fully warmed up will prevent the fire from reaching correct operating temperature resulting in low heat output and possibly other performance issues.

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Fitting Factory Flue Shields

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Your HeatSaver Flue System comes standard with a factory flue shield of one of 2 types;

900mm high, contains 1x painted metal strap. This is used for the Woodsman ECR, Blaze, Boston, Manhattan, RMF and Milford.
1200mm high, this is suitable for the Woodsman Brunner, Tasman, Aspen, Tarras, Serene, ECR NoVo. Strongman and other branded fires which can use the 1200 high single heat shields.

Fitting the 900mm High Flue Shield

1) The heat shield has 2 'tabs' at the bottom which corresponds to 2 slots on the fire behind the flue neck. Insert the tabs.
2) Take the metal strap and fold the two ends around the flue until they meet at the back of the flue at about the height of the top of the heat shield.
3) Hold both ends together and push the tabs through the single slot at the back of the heat shield and fold out the tabs to secure in place.

Fitting the 1200mm High Flue Shield

Your lower length of painted flue already has 2 location brackets attached.
1) Ensure these brackets are facing towards the back wall and centralized.
2) Secure the flue shield in place with screws.



1200mm Flue Shield



900mm Flue Shield

__IMPORTANT__ - Flue shields should be no further than 10mm off the top of the firebox

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Accreditation Laboratory Registration Number 395

This laboratory is accredited by International Accreditation New Zealand (IANZ). The tests reported herein have been performed in accordance with the terms of our accreditation. This accreditation does not extend to any opinions or any interpretations of test results contained in this report.

IANZ has a Mutual Recognition Arrangement (MRA) with the National Association of Testing Authorities (NATA), Australia, such that both organizations recognize accreditations by IANZ and NATA as being equivalent. Users of test reports are recommended to accept test reports in the name of either accrediting body.

Compliance Certificate

Appliance: HeatSaver 150 mm Diameter Flue Kit

Test Standard: AS/NZS2918:2001 Appendix F

Full Report: 02/749R

(The full report contains the information on the test methods, details of the appliance tested and the results of the test)

This report:

Prepared by: W. S. Webley W S Webley

Approved by: W. S. Webley W S Webley

Release Date: 2/3/09

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