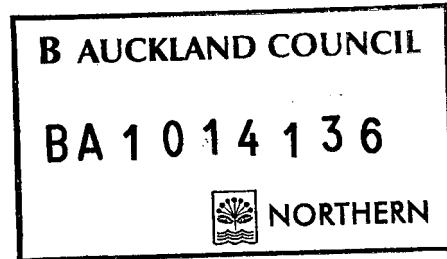


JOB No.: BK 2099



PROPOSED ABLUTION BLOCK
For
SANDSPIT HOLIDAY PARK
at
#1332 SANDSPIT ROAD
SANDSPIT



PRODUCT SPECIFICATIONS

LEGAL DESCRIPTION
Pt Allotment 23
Psh of Mahurangi
4.1480 ha

Product Specification

Auckland & North Harbour



Profile	Material	Thickness	Finish	Coating
Custom Orb ☐ Trimline ☒ Plumbdek ☐ Hi Rib ☐ Euroline ☐	Steel ☐ Aluminium ☐	.40mm ☐ .55mm ☒ .70mm ☐ .90mm ☐	Zincalume ☐ Colorsteel ☒ Plain Mill Severe Marine ☐ *Embossed Severe Marine ☐	Endura ☐ Maxx ☒ ARX* Severe Marine ☐ *(Unpainted Only)
Environment	Mod. Inland ☐	Mod. Marine ☐	Severe Marine ☐	V. Severe Marine ☒
Special Conditions	Geothermal ☐	Corrosive Industrial ☐	Other (Specify)	
Wind Zone	Low ☐	Medium ☐	High ☒	Very High ☐

1. Storage: Stack roofing and accessories on clean, level areas of the site. Cover and protect from damage and weather until ready to fix in place. If wet, separate sheets and allow them to dry.

2. Set Out: Plan layout to ensure true lines and correct relationship to module, grid and roof features. Confirm that roof structure is complete and suitable before commencing the laying of sheets.

3. Underlay: Lay and fix in accordance with Acceptable Solution E2/AS1 and NZS 3604 Section 11.2.2.

4. Prevent Damage: Take care to avoid damaging sheet before and after fixing. Do not mark with graphite pencil, cut only by shear, wear only clean soft-soled shoes and remove metal filings daily. Separate or protect roofing from incompatible or corrosive materials. Foot traffic to take place only along purlin lines, across two crests or in the pan of the profile.

5. Install: Fix roofing complete with matching fasteners and accessories in accordance with NZ Steel "Installer's Guide" NZMRM Code of Practice, and good trade practice.

6. Fixings and Sealants: Use fasteners compatible with the material being fastened and with a durability rating of Minimum

Class #4. Use neutral cure silicon, MS polymer sealant or lap seal tape strictly in accordance with the manufacturer's recommendations. Colour match accessories prior to installation.

7. Flashings: Design and install flashings to hips, ridges and, verges, intersections and penetrations to achieve a weatherproof and attractive appearance in accordance with Steel & Tube Roofing "Design Solutions" and good trade practice.

8. Complete: Ensure the work is complete with all fasteners installed and all flashings completed and finished to ensure roof is completely watertight and will withstand the necessary design loads.

9. Clear: Remove trade debris and unused materials from roof and surrounding areas regularly and at completion. Sweep down the completed roof and flush out spoutings and gutters.

10. Protect: Protect roof from sub-trades following.

11. Installers: A list of Approved Installers for your area is available from your local Steel & Tube Roofing office or at www.stroofing.co.nz.

Fasteners per sheet required supported at 1.200m centres. (Lined buildings)

Profile	Ends	Wind Zone to NZS 3604:1994			
		Low	Medium	High	Very High
Custom Orb .40	5	2	2.5	3	4
Trimline .40	5	2	2	3	4
Plumbdek .40	4	2	2	2.5	4
Trimklad .40	4	3	3	3	3
Hi Rib .48	Clip fasten at each purlin line				

Maximum spans (Metres)

Profile		Custom Orb		Trimline		Plumbdek		Hi Rib
Roof Traffic *	Gauge (mm)	.40	.55	.40	.55	.40	.55	.48
Controlled Traffic	Internal	1.200	1.600	1.700	2.300	1.600	2.400	2.100
	Ends	.800	1.000	1.450	1.700	1.300	1.900	1.700
Heavy Traffic	Internal	N/A	1.000	1.100	1.800	1.100	1.800	2.100
	Ends	N/A	.800	.800	1.400	.800	1.400	1.600

*Controlled Traffic assumes foot placement will be as in paragraph no.4 above. Set purlins out for Heavy Traffic when construction loads are high or regular access to roof is required.

WHANGAREI 9 Southend Avenue, Otaiaka. PO Box 1869, Whangarei. Tel: 09 438 4600 Fax: 09 438 0342	NORTH SHORE 2 Ride Way, North Harbour Industrial Estate, PO Box 100182, North Shore Tel: 09 415 8080 Fax: 09 415 9192	AUCKLAND 14 Kervyn Avenue, East Tamaki. PO Box 58216, Greenmount. Tel: 09 274 4056 Fax: 09 274 8972	HAMILTON 32 Kaimiro Street, Pukete Industrial Estate. PO Box 10458, Te Rapa. Tel: 07 850 9200 Fax: 07 850 9330	TAURANGA 67 Koromiko Street, Tauranga. PO Box 2001, Tauranga. Tel: 07 578 1089 Fax: 07 577 0186	WELLINGTON 201 Gracefield Road, Petone. PO Box 36082, Moera. Tel: 04 568 4359 Fax: 04 568 6770	CHRISTCHURCH 106 Antigua Street, Sydenham. PO Box 7306, Sydenham, Christchurch. Tel: 03 377 0994 Fax: 03 377 2680
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Sales: AK 09 294 4056 NH 09 415 8080 Technical Helpline: 0800 333 247 Website: www.stroofing.co.nz Email: info@stroofing.co.nz

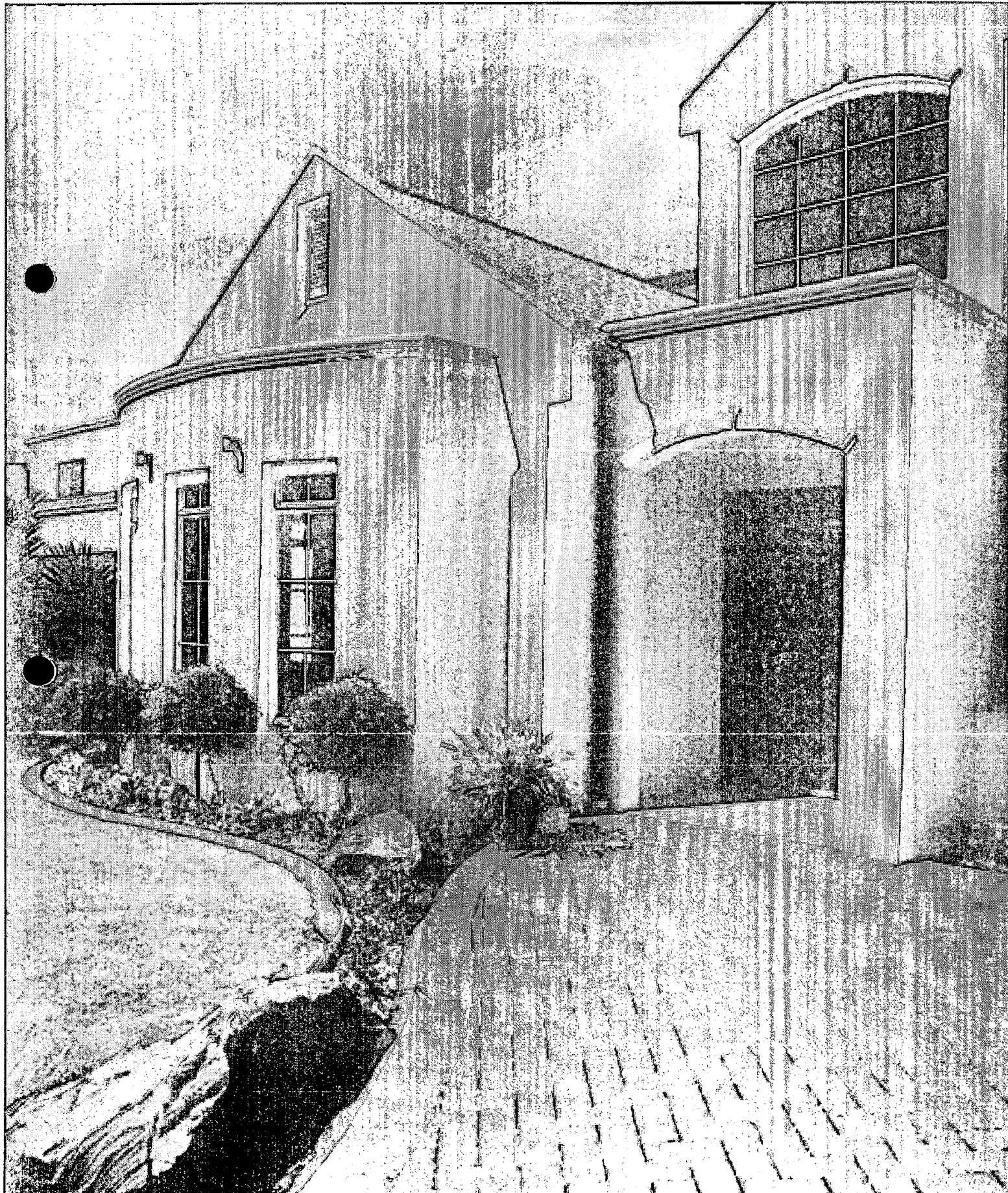


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MASONRY HOMES CONSTRUCTION MANUAL

ON THE WAY TO THE FUTURE
March 2019



CONTENTS

SECTION 1 -

PLANNING AND DESIGN CONSIDERATIONS

1.1 Structural Masonry Homes	2
1.2 Design Considerations and Scope of this Manual	2
1.3 Geotechnical Report	2
1.4 Insulation of Masonry	2
1.5 Engineering	2
1.6 "R" Values	3
1.7 Specification of Firth HotBloc®	3
1.8 Modular Layout	4
1.9 Services	4
1.10 Suspended Concrete Floors	4
1.11 Internal Walls	5
1.12 Openings	5

SECTION 2 -

FOOTINGS AND FOUNDATIONS

2.1 Conventional Footings	6
2.2 RibRaft®	6

SECTION 3 -

WALL INSTALLATION

3.1 Starter Bars	7
3.2 First Course	7
3.3 Running Bond	7
3.4 Tooling of Joints	7
3.5 Washouts/Cleanouts	8
3.6 Bond beams and Lintels	8
3.7 Temporary Bracing	9
3.8 Consideration of Weather	9

SECTION 4 -

BLOCKFILL FOR GROUTING OF MASONRY

4.1 Filling Options	10
4.2 Blockfilling Procedures	10
4.3 Vibration of Blockfill	10
4.4 Filling Under Windows	10

SECTION 5 -

CONTROL JOINTS

5.1 Location of Joints	11
5.2 Reinforcement through Control Joints	11
5.3 Sealing of Control Joint	11

SECTION 6 -

SUSPENDED CONCRETE FLOORS

6.1 Types of Concrete Floors	12
6.2 Flooring Systems	12
6.3 Prestressed Flat Slab Flooring System	12
6.4 Rib and Infill Flooring System	12
6.5 Construction Considerations	12
6.6 Placing the Units	12
6.7 Temporary Propping	13

6.8 Concrete Topping	13
6.9 Topping Reinforcement	13
6.10 Services	14
6.11 Penetrations in the Floor	14
6.12 Balconies	14
6.13 Waterproofing	14

SECTION 7 - SERVICES

7.1 Locations of Services	15
7.2 Electrical	15
7.3 Plumbing	16
7.4 Services on Strapped and Lined Walls	16
7.5 Future Proofing	16

SECTION 8 - STAIRCASES

8.1 Cast-in-situ Staircases	17
8.2 Precast Staircases	17

SECTION 9 - ROOF CONNECTION

9.1 Top Plate	18
9.2 Metal Straps	18

SECTION 10

WINDOW INSTALLATION

Window Installation	18
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SECTION 11

WATER PROOFING/COATING SYSTEMS

11.1 Dry Blockwork	20
11.2 Cleaning Blockwork	20
11.3 Application	20

SECTION 12

EXTERNAL COATING SYSTEMS

12.1 Acrylic Paint	21
12.2 High-build Elastomeric Coatings	21
12.3 Solid Plaster	21
12.4 Modified Plaster	21
12.5 Clear Sealants	21
12.6 Cement Based Paints	21

SECTION 13

INTERNAL COATING SYSTEMS

13.1 Exposed Blockwork	22
13.2 Paint Finish	22
13.3 Strapped and Lined	22
13.4 Plasterboard	22
13.5 Tiling	23
13.6 Plaster Finish	23

SECTION 14

CONSTRUCTION DETAILS

Construction Details	24
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SECTION 1 - PLANNING AND DESIGN CONSIDERATIONS

1.1 Structural Masonry Homes

Masonry homes can be some of the most stunning and comfortable houses on the market, but as with any building they require careful planning before construction begins. While it is possible to alter once construction has started, it usually is more difficult than with traditional timber frame construction.

1.2 Design Considerations & Scope of this Manual

This document is intended as a **guide only** to assist Architects, Designers and Engineers who are appropriately experienced and qualified, in the design of concrete masonry residential buildings.

Architects, Designers, Engineers and Builders should be familiar with and make reference to NZS 4229:1999 "Concrete Masonry Buildings Not Requiring Specific Engineering Design" in conjunction with their use of this Manual. The Architect, Designer and Builder should also be familiar with the principles for dealing with external moisture under Compliance Document E2/AS1 issued by the Department of Building & Housing for timber frame structures. Though this does not apply directly to concrete masonry structures, similar principles are employed. Details for guidance in applying these principles to masonry construction can be found in two publications:

- Concrete Masonry - a guide to weathertight construction, available for free download from the NZ Concrete Masonry Associations website www.nzcma.org.nz
- Weathertight Solutions Volume 4- Masonry, details for junctions and openings in masonry walls. Available from BRANZ.

In all cases the Architect or Designer should provide sufficient detailing within the Plans to be submitted for Building Consent, so that sound structural and weathertight construction details are unambiguous to both Territorial Authorities and the Builder.

This document is also intended as a guide for Builders and Masons constructing structural blockwork for masonry homes. It is to be used in conjunction with NZS 4229:1999 "Concrete Masonry Buildings Not Requiring Specific Engineering Design" and NZS 4210:2001 "Masonry Construction Materials and Workmanship". Persons engaged in the construction of structural masonry homes should ensure that they comply with the requirements of Clause 1.5 "Workmanship" of NZS 4210:2001.

The Builder should ensure that copies of NZS 4229:1999 and NZS 4210:2001 are available for ready reference on site.

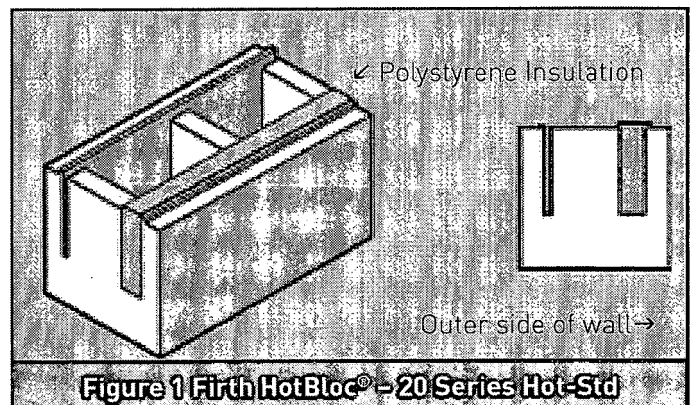
1.3 Geotechnical Report

A geotechnical report on the site is very good insurance for the future and is strongly recommended prior to construction. It would provide information about the site and the support capabilities of the ground.

1.4 Insulation of Masonry

Concrete masonry has inherent thermal storage properties making it the ideal construction material for 'comfort'. However, by itself, it does not have the required insulation to comply with the New Zealand Building Code (Clause H1).

Firth HotBloc®, shown below, being the premium Concrete Masonry Unit (CMU) on the market, provides the simplest means of compliance as the insulation is



built in. It affords the structural strength of standard masonry (see 1.5 Engineering below) as well as providing options to exceed the R-values stipulated in the Building Code for solid construction, refer section 1.6.

Other methods involve adding insulation to the outer surfaces of the wall (where it can be easily damaged) or to the interior of the wall (reducing the thermal storage benefits).

To make the most of the thermal properties of masonry and concrete, contact the Cement and Concrete Association to obtain a copy of their booklet "Designing Comfortable Homes".

1.5 Engineering

NZS 4229:1999 "Concrete Masonry Buildings not Requiring Specific Engineering Design" covers the non-specific design of residential masonry buildings. (This is the masonry equivalent of NZS 3604:1999 "Timber Framed Buildings".) This Standard details the bracing requirements, lintel sizes, footing widths etc. and should cover most simple buildings.

Occasionally there will be areas of the house that fall outside the Standard and a structural engineer will be required. This does not necessarily mean that the entire building must be engineer designed – simply the areas that fall outside the scope of the Standard.

When designing a building in Firth Hotbloc®, it is important to consider the reduction in grout space caused by the presence of the internal polystyrene biscuit. The 20 Series Hotbloc® typically has a 30mm thick polystyrene biscuit, and the 25 Series approximately 80mm thick. When designing using the non specific design Standard NZS4229:1999, both the 20 and 25 Series Hotbloc® should be considered equivalent to a 15 Series block when considering bracing demand, bracing capacity, and reinforcement required.

1.6 “R” Values for Firth HotBloc® in Solid Walls as part of the Building External Envelope

The acceptable solution H1/AS1 of the Building Code clause H1- Energy efficiency, recognizes the benefits of thermal mass for solid masonry construction by allowing lower R-values than for non solid (timber frame) construction.

Schedule Method

Table 2(b) identifies the minimum R-values required if the schedule method is used. When using this table it is important to recognize the limitations to use the tables in particular the area of glazing. The new insulation requirements of H1 became effective from:

- 31st October 2007 for zone 3
- 30th June 2008 for zone 2
- 30th September 2008 for zone 1

Calculation Method

Lower R-values than are tabled in Table 2(b) of H1/AS1, can be, however, any reduction in R-value provided in one element must be compensated by an increase in another element. The process used to demonstrate equivalence is referred to as the “calculation method” and is described in section 3.2 of NZS4218. 20 Series Hotbloc® can only be used under the calculation method.

Post September 2008, the R-values required for masonry walls are:

- R0.8 for zone 1
- R1.0 for zone 2, however this can be reduced to R0.9 if R0.31 glazing is used.
- R1.2 for zone 3, however this can be reduced to R 1.0 if R0.31 glazing is used.

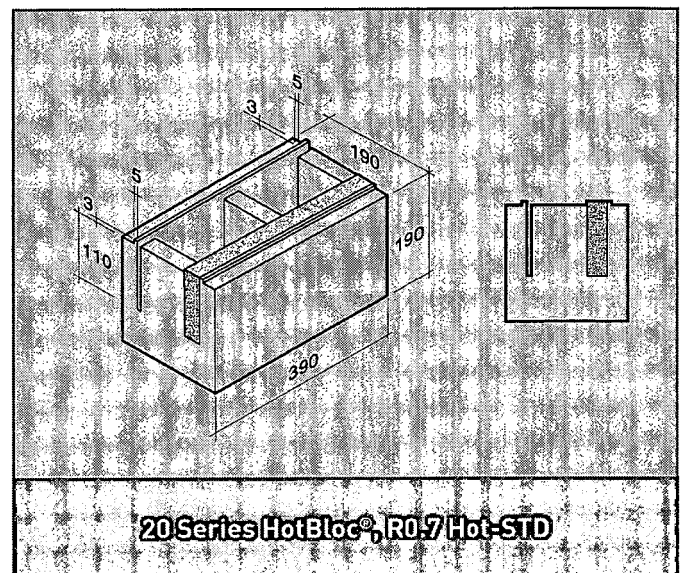
The R-values of various HotBloc® solutions are-

- R0.7 20 series HotBloc®, fully filled,
- R1.16 25 series HotBloc®, fully filled,
- R1.2 25 series HotBloc®, fully filled and interior lined with glue fixed gib board.

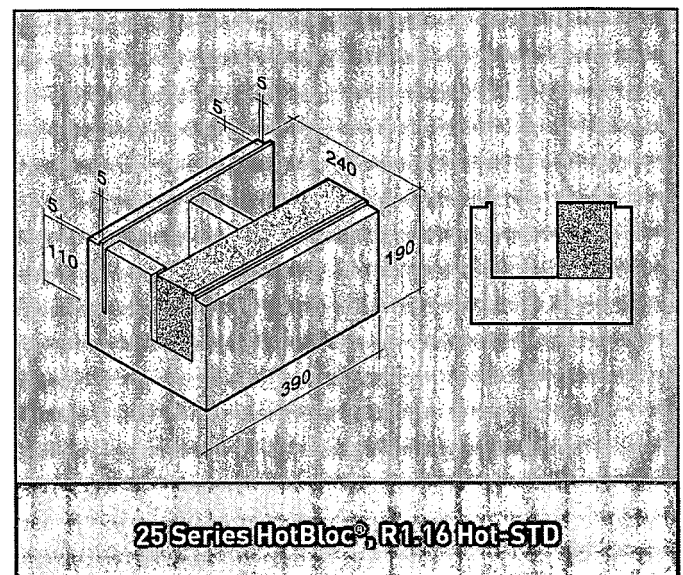
Importantly the R-values are obtained without the use of surface insulation, a unique feature to structural masonry homes built with Firth HotBloc®.

1.7 Specification of Firth HotBloc® in Structural Design to comply with NZS 4229:1999 and NZS 4230:2004

Architects, designers and engineers may design to the requirements of NZS 4229:1999 or NZS 4230:2004 “Design of Reinforced Masonry Structures”, where Firth HotBloc® is substituted for a conventional block within the limitations of clause 1.5.



Structural equivalent = 15 series



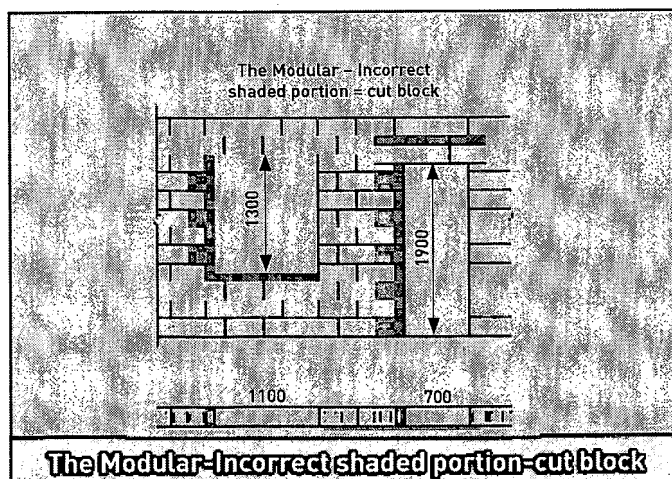
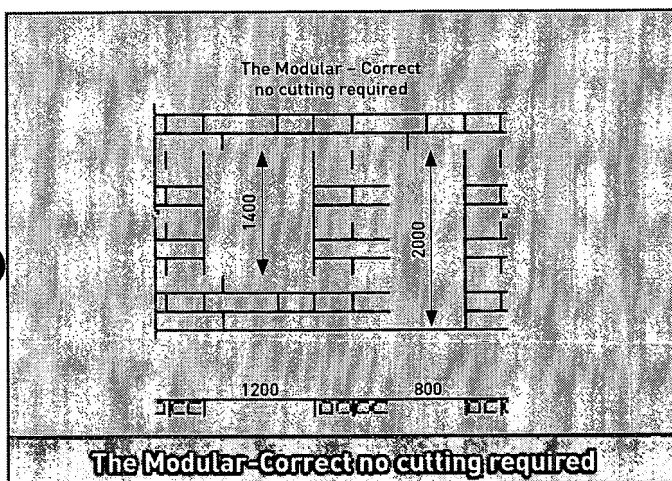
Structural equivalent = 15 series

1.8 Modular Layout

Designing wall dimensions to equal a multiple of the Concrete Masonry Unit (CMU) being used saves time and money by eliminating cutting. It also adds predictability and discipline to both design and construction. As such, dimensioning the design to fit the module is recommended. The critical dimensions are wall height, wall length, opening size and opening position.

The standard CMU is 390mm long, and 190mm high with an allowance for a 10mm mortar joint on each dimension (i.e. 400mm long, and 200mm high). When using a standard HotBloc® a module of 400mm long by 200mm high is normally adopted. Where necessary, a half block (190mm long) will be inserted to meet a specific length requirement. An example would be to make wall lengths 1200mm rather than 1189mm, as would be common in timber frame construction. Off-module dimensions require the blocklayer to cut the blocks, increasing costs. See the diagram below for an explanation of the importance of keeping the design to a modular layout.

Just as important is ensuring that the lintels and bond beams are only 190mm or 390mm deep. This eases construction and therefore keeps costs down.



1.9 Services

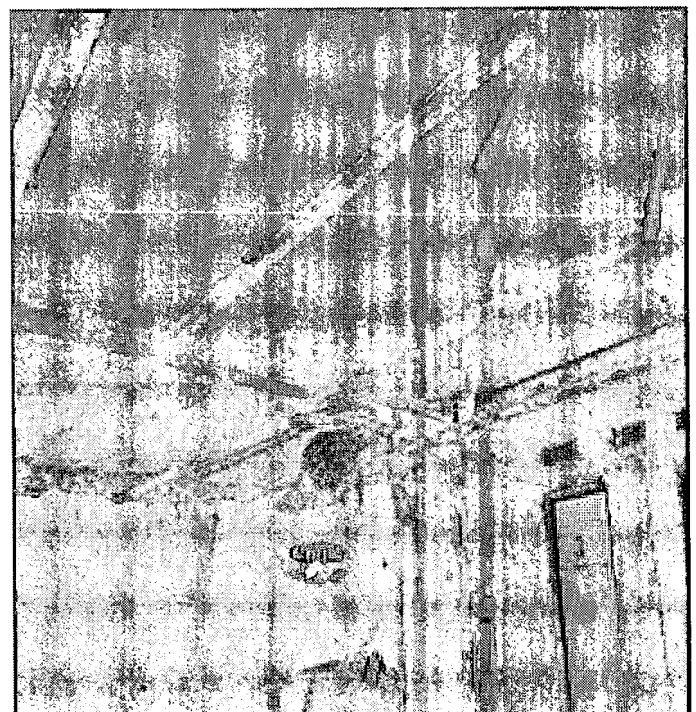
Typically services are placed in ducts in the cores of the masonry blocks. It is very difficult to do this after the walls are filled with blockfill, and as such, the locations for services need to be finalised before construction begins. This rule is relaxed where the masonry walls are to be strapped and lined with GIB® plasterboard as the services can be placed within the resulting cavity at any stage after filling with blockfill.

Another approach for solid filled walls is to leave a vertical core empty in order to place services within the wall. The bracing panels will be affected in this area so this needs to be decided upon before the bracing calculations are completed.

When using a suspended concrete floor in two-storey construction, a false ceiling can be taken advantage of to allow services to be carried within this space. It also makes sense to position the upper service room over the lower one to reduce the distance services are required to travel through the building.

1.10 Suspended Concrete Floors

The most common types of residential suspended concrete flooring systems are suitable up to 8m spans. However, this shouldn't limit the design of the building as there are commercial flooring systems that will easily span 15m or more if necessary. These can be up to 300mm - 400mm thick and typically require an increase in wall reinforcement and footing requirements.



All suspended concrete floor types need to be supported at the ends of the individual spans by a concrete masonry wall. Timber should never be used to support these floors.

1.11 Internal Walls

Masonry homes do not need every internal wall to be masonry. It is common to only use masonry where necessary due to bracing or other structural requirements (such as supporting the concrete midfloor). Options for internal walls are 15 Series Masonry Units or timber partition walls, this choice maybe influenced by the desired finish required.

1.12 Openings

Masonry lintels consist of a reinforcing cage within a masonry shell (usually 190mm or 390mm deep). These can span relatively large distances. For most situations, masonry lintels will suffice and the tables in NZS 4229:1999 detail the reinforcing requirements. However, where the lintel falls outside the scope of that Standard, (i.e. the load acting on the lintel being too great for the particular span), the lintel can be constructed from cast insitu reinforced concrete or with a precast beam such as Interspan. Both of these types will require specific engineering design.

SECTION 2 - FOOTINGS AND FOUNDATIONS

2.1 Conventional footings

Conventional footings consist either of strip (or ring) footings or edge-thickened slab. Strip footings are made up of a small masonry wall (typically one or two courses) supported on a footing strip in an excavated trench. This footing strip can vary in width upward from 300mm depending on the design of the house. Edge thickened slabs combine the footing strip and slab into one without the need for a masonry footing wall. The edges of the concrete floor slab are thickened to support the building walls. Both types of footings require excavation and are therefore weather dependent.

Following completion of the excavation of the footings trench or trenches, the reinforcement steel needs to be placed in accordance with the job drawings. The stirrups are then tied to the main bars. NZS 3604 sets out the minimum cover requirements for steel in various scenarios.

When the concrete is poured for the footings, it is very critical that the concrete is placed in such a manner to avoid segregation (separation) of the concrete or changes to the location of the reinforcement. For construction details refer to Section 14.

2.2 RibRaft®

This system combines the footing and concrete floor into one and is one of New Zealand's most effective residential and light commercial flooring solutions.

The RibRaft® Manual can be obtained from Firth through Firth Information Service on 0800 800 576 or through www.firth.co.nz. This document covers not only the non-

specific design details, but also contains details that will assist a designer in carrying out a specific design of a RibRaft® floor.

A basic overview and step-by-step construction guide is provided in the Firth RibRaft® Flooring Solutions brochure. For an in-depth explanation of the non-specific construction and design issues associated with RibRaft® construction see the RibRaft® Manual.

The RibRaft® system is most economic on flat sites but there is also a range of details available to allow RibRaft® to be used on a sloping site. The use of these alternative details require specific design.

The non-specific design consists of an 85mm thick top slab supported by a grid of ribs normally 100mm wide at a maximum spacing of 1200mm x 1200mm centres. The overall depth is 305mm. Edge beams and ribs under loadbearing walls are 300mm wide to provide for the extra load carried by these members. Construction is directly on levelled ground covered with a DPM (damp proof membrane).

Polystyrene waffle pods 1100mm square and 220mm thick are placed directly on levelled ground. These are arranged in such a way that a reinforced concrete floor slab with a grid of reinforced concrete ribs and edge beams is formed when concrete is placed onto them. Pods may be cut to suit specific layout architecture and also to accommodate services.

SECTION 3 - WALL INSTALLATION

3.1 Starter Bars

Starter bars are the steel reinforcing bars that connect the masonry wall to the floor. The number of bars and their location is defined by the construction drawings or NZS 4229:1999. The starter bars should be central to the grouted cavity. When using HotBloc® consideration must be made of the polystyrene thickness. It is important to confirm that the starter bars are in the correct location before pouring the concrete and then again once the concrete has been placed, but before the concrete sets. This allows any bars that were moved during the concrete placing to be corrected. If the bars are not located accurately then they will not fit correctly into the block cores which then would affect the structural performance of the wall. Unless specifically instructed by the Architect or Engineer, it is not acceptable to crank the bars on site to their correct alignment.

For internal walls, correction of a bar location is a simple process of grinding the bar off flush with the slab then drilling and epoxying a starter bar in the correct location. An engineer should be involved to ensure that the procedure is undertaken correctly.

3.2 First Course

Laying Surface

Surfaces for the blocks to be laid upon must be level, clean but slightly rough. This roughness is necessary to create a good bond between the mortar and base. Usually the finish achieved with a wood float is adequate. It is uncommon but if the floor is finished too smooth, roughness can be achieved with a scabbling gun (a compressed air gun with steel "fingers") to chip the surface of the concrete. Once an adequate surface has been prepared the first course of blocks can be laid. It is common for a bond beam block to be inverted and placed at the site of the starter bars for the first course to allow easy construction of the washouts.

HotBloc®

HotBloc® with its integral insulation is installed virtually the same as a traditional CMU's. The only difference is that the polystyrene biscuit is to be placed towards the outside face of the wall and the position of the starter bars needs to be modified to ensure they are central in the grouted cavity.

Mortar

Laying the first course should be done ensuring all blocks are level. The first course mortar joint maybe up to 20mm to achieve levelling. All subsequent mortar joints shall be

10mm ± 3mm as per NZS 4210:2001.

All mortar either site mixed or premixed must meet a 28 day compressive strength of not less than 12.5MPa.

3.3 Running Bond

The CMU's should be laid in straight uniform courses unless specified in the construction drawings. Running bond is the strongest type of laying configuration. This is where the blocks are offset horizontally by one half block from one course to the next. Other bond patterns are used to achieve particular aesthetics but unless specifically engineered, running bond should be used.

Wall Reinforcement

The reinforcement requirement for the wall is specified in NZS 4229:1999 or by Specific Design and is usually detailed in the construction drawings.

Vertical Reinforcement

The vertical bars need to be tied to the starter bars with at least 600mm lapping.

Note that where Firth HotBloc® is being laid then the vertical reinforcement must be placed central to the remaining grout space (the polystyrene biscuit will take up some space normally filled with grout in a conventional CMU) and not central to the overall block width.

Horizontal Reinforcement

The horizontal steel is placed in a course of knock-in bond beam or depressed web CMU's. To ensure correct placement within the wall cavity, the horizontal steel is then tied to the vertical steel.

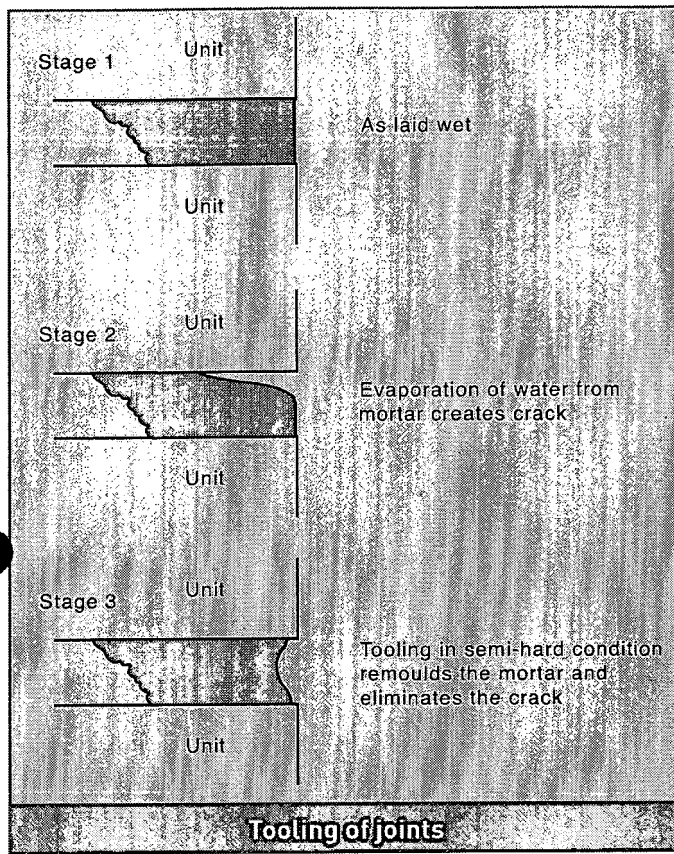
3.4 Tooling of Joints

Another aspect of masonry construction that is commonly overlooked (particularly when a plaster finish is required) is tooling of the mortar joints, this is when a special tool is used to compress mortar into the joint. Tooling is important as it contributes to the structural strength and water resistance properties of the wall.

Tooling to a depth of 6mm is allowable. The reconsolidation of the joint after the initial water loss is seen as being vital. When a plastered finish is to be applied, it is common to strike the mortar joint flush to make a smooth surface for the plasterer. The joint should still be tooled.

Often tooling is carried out too early. The mortar should be "thumb nail hard" before tooling. After tooling and when the mortar is sufficiently set, the work should be lightly brushed down with a soft bristle brush to remove

any particles of mortar sticking to the block face. Rubbing the face of the blockwork with a cut-off piece of masonry will also remove any overhang of mortar.



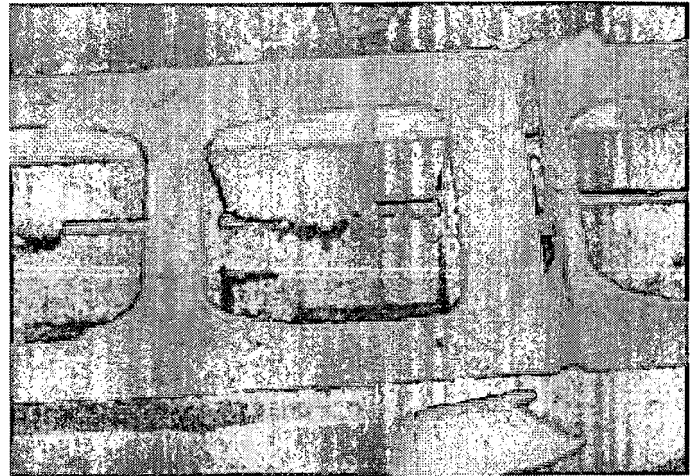
Sometimes tooling of the joints pushes mortar into the block cavity (see picture above, right). This either falls to the bottom or hangs on and causes an intrusion. The intrusions may partially block off the cavity and not allow the blockfill to reach the lower parts of the wall. This is very likely where horizontal steel is placed in the wall. As such the mortar intrusions must be removed while still workable.

Any mortar that has fallen to the bottom of the wall will interfere with the bond between the blockfill and starter bars and the blockfill and the base. For the wall to perform as designed the base must be clean.

3.5 Washouts/Cleanouts

To enable cleaning of all debris from the base of the wall, washouts or cleanouts are used. These are openings or inspection ports at least 100mm height x 75mm width cut into the face of blocks at the base of the vertical reinforcement bars. A common method is to use inverted bond beam blocks at these locations to allow simple removal of the face shell portions. Inspection of the steel and concrete junctions can also be made at these openings to confirm compliance with the relevant requirements.

Once inspections are complete, the washouts should be blocked off with formwork. A common method is to hold



the formwork in place with wire ties around the base of the vertical steel. This will allow the blockfill to finish flush with the outside face of the blocks. It is important to ensure that the formwork is braced adequately to prevent blow out under grout pressure. Often small gaps are left in the formwork at the washouts to allow the blockfill to flow out. These are to confirm that the blockfill has fully filled the wall and are plugged once confirmation has been made.

For exposed blockwork or architectural masonry, however, it is recommended to remove the entire face shell of a block rather than cut a section of the face. Following cleaning out and inspection, the face can then be mortared back in place and braced before blockfilling commences.

3.6 Bond beams and Lintels

Masonry

The two most common bond beams or masonry lintel types are either 190mm or 390mm deep. The 190mm deep version is simply one course of CMU's and most commonly only used as a bond beam below concrete mid-floors. The 390mm deep version is formed using two courses of knock-in bond beam or depressed web CMU's, with the top one inverted to create a larger cavity for the reinforcement steel. The steel is placed in before the top course is laid.

Where non-standard dimensions are required, it is usual to place other courses in between the two standard bond beam courses. This however, does affect the placement of the steel.

Reinforcement

The steel is formed into a cage made up of the top bar(s) and the bottom bar(s) separated by the stirrups (or links). The cage is placed and tied to the vertical steel where appropriate and the top bond beam course is laid.

For non-standard bond beams, the stirrups are tied to the bottom bar(s) and this is placed into the bottom bond

beam course. The intermediate bond beam courses are then laid, threading the stirrups through. Before the top course is laid, the top steel bar(s) are tied to the stirrups.

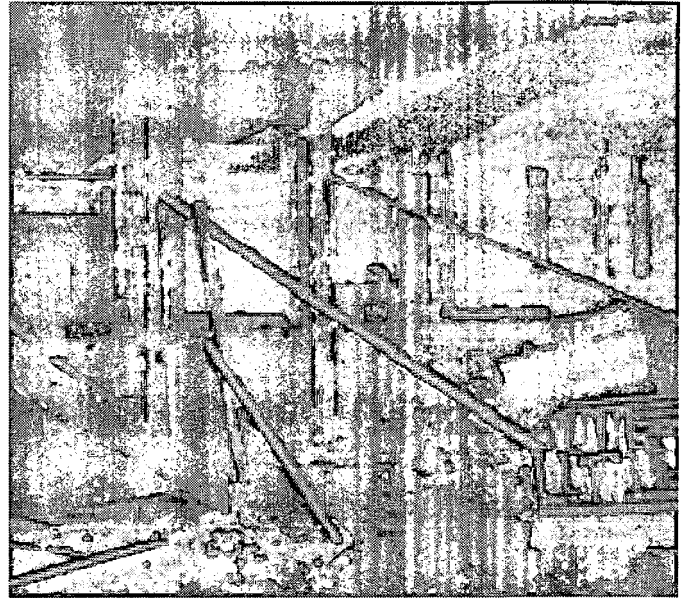
Where the lintel coincides with the bond beam, the two are simply combined. If the longitudinal steel requirement in the lintel exceeds that in the bond beam, then the steel in the bond beam at this location will be that required in the lintel and vice versa (the stirrup requirements are unchanged). In most single storey applications, the bond beam reinforcement exceeds that required in the lintels and the only difference is the spacing of the stirrups over the openings. (However it is crucial to check the job drawings for reinforcement requirements).

Temporary Supports

Often it is necessary to support lintels with timber framing (props) until the blockfill has gained sufficient strength. Refer to the photograph above right.

3.7 Temporary bracing

The need for temporary bracing of the masonry wall during construction is often overlooked (see photograph above). An unfilled wall is very susceptible to failure from strong winds. Typically walls over 1m in height are at



significant risk. It is important to take some measures to brace the wall in order to prevent its premature failure. Typically bracing at 3m centres is recommended in line on both sides of the wall.

Bracing may also be required to ensure that the pressure from the blockfilling operation does not alter the wall positions. This is particularly critical on tall narrow sections of walls. The blockfill procedure creates large hydrostatic pressures and where there is little blockwork to resist, it will force blocks to move, some-times even causing face shells of blocks to be blown out.

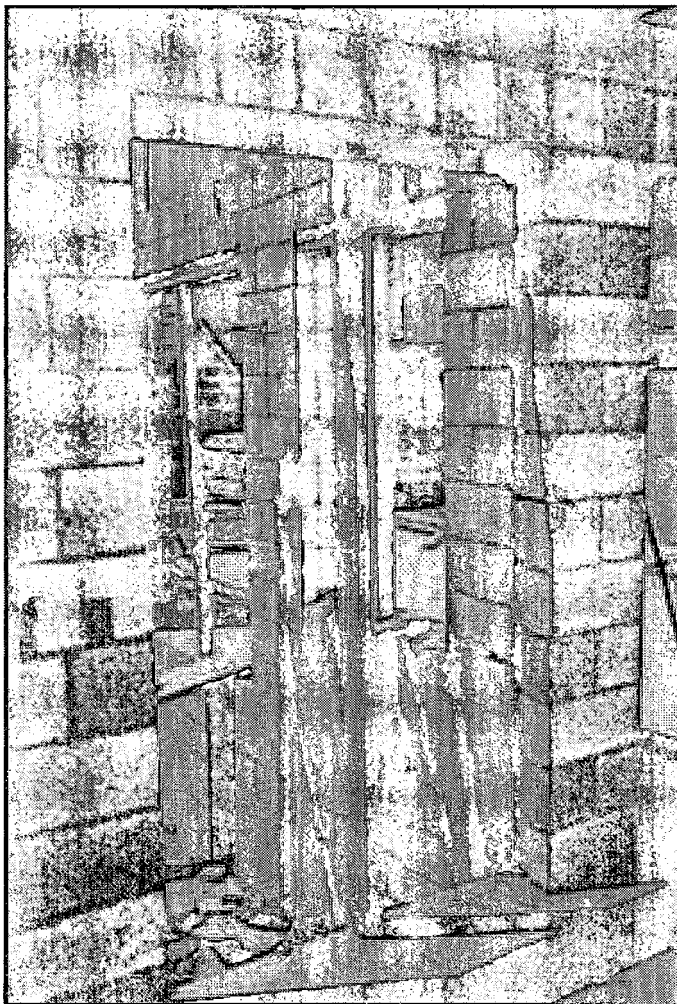
3.8 Consideration of Weather

Generally masonry construction should not be carried out when the air temperature drops below 4°C, unless the following precautions are taken:

- (a) Water used for mixing mortar is heated.
- (b) Masonry is protected for not less than 24 hours after laying by covers, blankets, heated enclosures, or the like to ensure that the mortar can gain sufficient strength without freezing or harmful effect from cold winds.
- (c) No frozen materials nor materials containing ice shall be used.

When the air temperature rises above 27°C or there is a drying wind even when the temperature may be lower, it may be necessary to take some additional precautions:

- (a) Lightly dampening the CMU's before laying.
- (b) Keeping the mortar moist and not spreading it on the wall more than two unit lengths ahead of the units being placed.
- (c) Preventing both the mortar and the grout from drying out so rapidly that it cannot cure properly. This is most important during the first 24 hours.



SECTION 4 - BLOCKFILL FOR GROUTING OF MASONRY

It is vital that a blockfill mix is used and not a standard concrete mix. The blockfill is far more fluid and will flow to all required parts of the wall, whereas the standard concrete mix is comparatively stiff. As the cores of the block are relatively small, the standard concrete mix is prone to blocking the cores and not filling the lower parts of the wall. Watering down of a standard concrete mix should never be done, as it reduces the concrete strength and increases the amount of shrinkage. Firth blockfill is designed to have the required strength and to flow easily into the cores to be filled. Grouting must always be carried out by a competent experienced professional.

4.1 Filling Options

There are two types of grouting that are in common design.

Partial Filling

This is where only the vertical cores containing reinforcement and the bond beam are filled with blockfill. All other cores are left empty. This is common where the weight of the wall is required to be kept to a minimum usually because of earthquake loads. This is the cheaper option in terms of materials as less concrete is used but is more difficult to achieve on site. There are many methods for blocking off the cores that are not to be filled. Two common methods are using the knock-in 'biscuits' from the bond beam units and laying them over the cores or using dampcourse laid across the hollow cores in order to prevent the blockfill entering them.

Solid Filling

This is where the whole wall is filled with blockfill, creating one solid mass. This is used where the design specified for horizontal steel other than in the bond beam (usually at half-height of the wall), or where the simplest construction approach is preferred. The hydrostatic pressures when solid filling a wall can be quite significant, and time should be allowed for the lower half of the wall to solidify slightly before filling the upper part of the wall. In the unlikely event of a fire, a solid filled wall will provide additional protection to the polystyrene in a HotBloc® unit.

4.2 Blockfilling Procedures

Once all the washouts have been blocked off and the required inspections made, the wall can be filled. A common practice is to lightly dampen the block cavities immediately prior to grouting. This is to ensure that the blockfill is not dried out by the blocks "sucking" out the water and therefore reducing its flowing ability. There are three procedures for grouting as detailed in NZS 4210:2001.

4.2.1 High lift grouting with expansive admixture

This allows pours up to 3.6m in height and uses an admixture to provide expansion after placement of the grout and before initial set occurs. The expansion compensates for water loss and plastic settlement. Grout is placed in the cells in a semi continuous operation allowing for consolidation as work proceeds.

4.2.2 The low lift grouting method

This is similar to the high lift with expansive admixture method but allows the blockfill to solidify fully before the next lift is placed. Maximum height of pour is 1.2m per lift. Again the blockfill should be mechanically vibrated into place.

4.2.3 High lift with reduced compaction

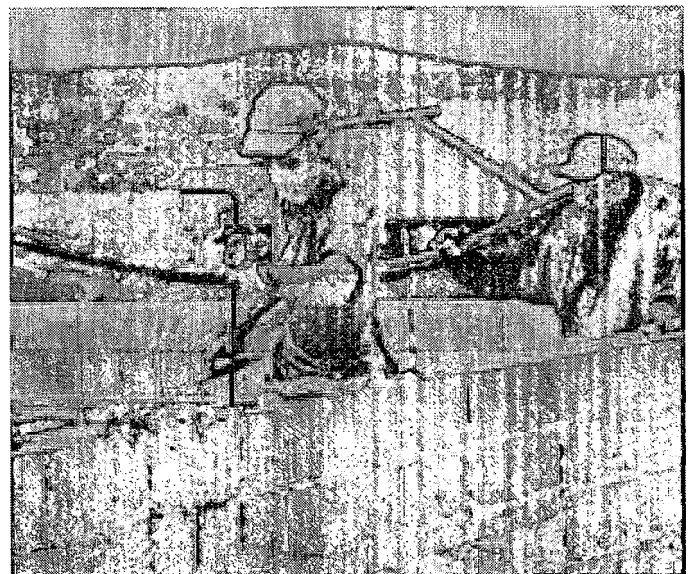
This is grouting the wall to a maximum height of 2.4m in a continuous pour, with thorough mechanical vibration during the pour.

4.3 Vibration of Blockfill

It is strongly recommended that all blockfill be placed in combination with mechanical vibration. Failing this, the walls should at least be rodded with a bar 16mm in diameter or greater to ensure the blockfill has reached all parts of the wall (see photograph below). Where services have been installed in the wall, it is critical to ensure blockfill has made it past these intrusions.

4.4 Filling Under Windows

A simple method for ensuring that the blockfill gets into the required cores under window openings is to leave out one or more sill blocks. The pump operator can then grout from the sill and once complete, the sill blocks can be mortared back into place.



SECTION 5 - CONTROL JOINTS

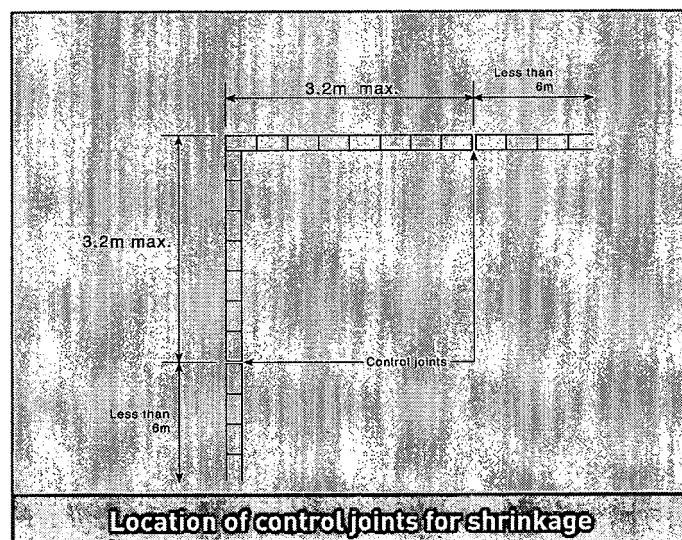
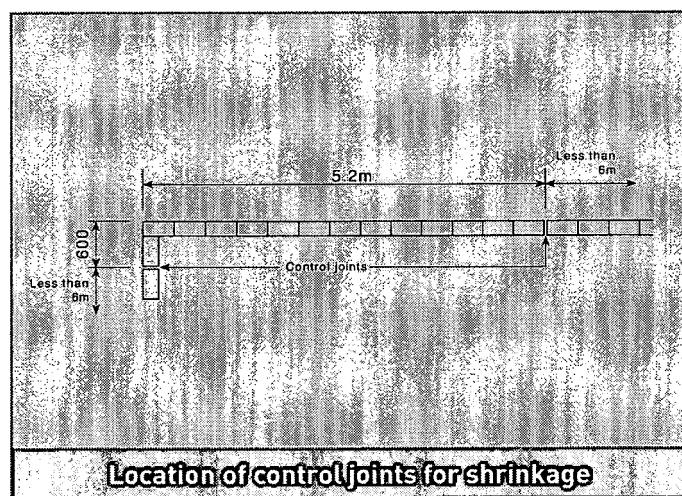
Concrete masonry in common with other building materials, is subject to movements caused by changes in moisture content and temperature. Since masonry will have a high moisture content initially, it loses moisture with time and consequently shrinks. It is usual to include shrinkage control joints in the design of the concrete masonry.

5.1 Location of Joints

The spacing of control joints is specified as a maximum of 6m in NZS 4229:1999 unless specific design for shrinkage has been undertaken. The location of control joints is influenced by:

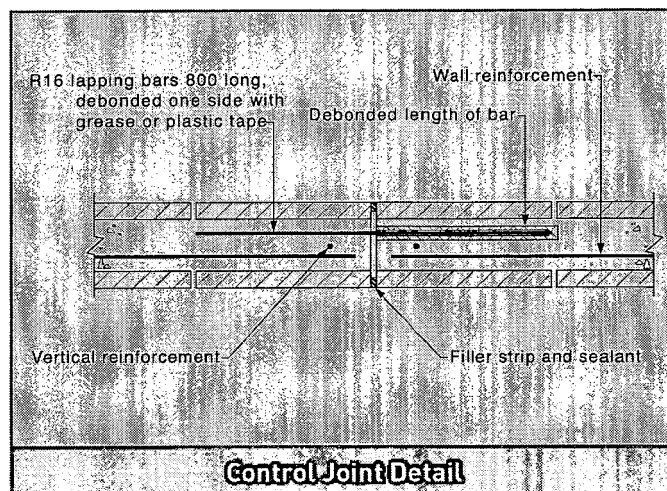
- (a) Major changes in wall height
- (b) Changes in wall thickness
- (c) Wall intersections
- (d) Opening locations.

The diagrams below are taken from NZS 4229:1999



5.2 Reinforcement through Control Joints

Reinforcement in lintels and bond beams shall continue through the control joints but all other horizontal reinforcement shall be discontinuous at the control joints. The detail below is as per NZS 4229:1999. This ensures that any movement in the wall will not be restricted by the reinforcement.



5.3 Sealing of Control Joints

Control joints will always undergo some movement and therefore it is necessary on exterior walls to form a suitable detail to allow for the sealing of the control joint against weather penetration. The weatherproof coating will also need particular care over the control joint to ensure that the expected movement is tolerated.

Note that reputable plaster-coating systems manufacturers will have a proprietary solution for the sealing of control joints. It is important to follow the complete detail of your selected manufacturers plaster and coating system.

SECTION 6 - SUSPENDED CONCRETE FLOORS

Suspended concrete floors differ from timber floors in many ways. They are quieter, stronger, provide greater fire protection, and where large spans are required or where supporting walls are retaining fill, are usually cheaper. Most builders are impressed with the speed of installation of a suspended concrete flooring system.

6.1 Types of Concrete Floors

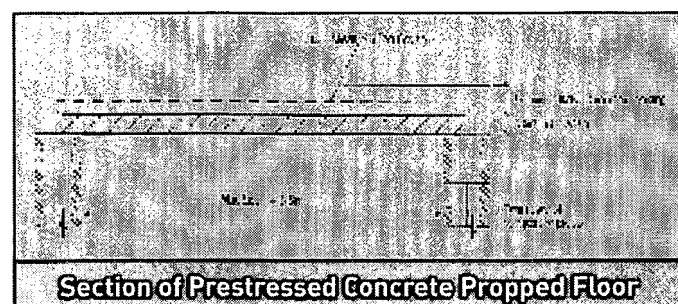
There are two types of suspended concrete floors. One being precast and the other being steel "tray". Both of these are placed on the supporting walls and a topping slab of concrete is then poured. This manual will focus on precast flooring systems, as they are more common. For information on the tray type of system, contact Dimond Industries. The main types of precast flooring systems used in a structural masonry system are Flat Slabs, or Rib and Infill systems. They can accommodate clear spans of up to approximately 8m. Manufacturers can provide an engineering service as part of the supply of these units. If there are any technical questions about these floors, contact your nearest manufacturer or www.precastnz.org.nz

The precast concrete floors are connected to walls by starter bars extending from the wall, and cast into the topping concrete. The flooring units should only be placed after the Blockfill has been poured and allowed to set.

6.2 Flooring Systems

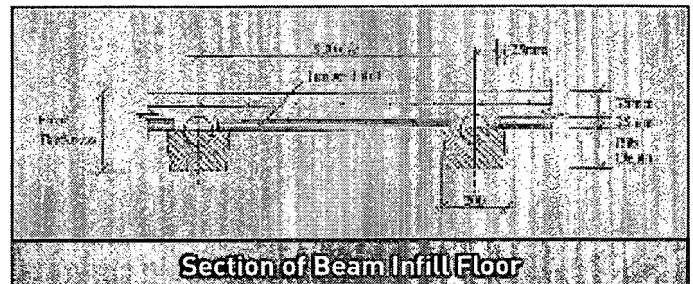
Both these flooring systems below are designed to be composite floors made up of prestressed concrete panels/beams with a concrete topping poured on site. The units are available in lengths to suit the project design and must be placed as per the construction drawings prepared by the supplier. The units are uniquely identified for this purpose.

These systems are also designed to span between supporting walls. As such, the units are deliberately made discontinuous over concrete walls. The topping is continuous across the entire floor. Timber walls should not be load bearing under concrete suspended floors and should never be used to support either of these flooring systems.



6.3 Prestressed Flat Slab Flooring System

Prestressed Flat Slabs come as 240mm or 1200mm wide and 75mm thick (other widths are possible if required). The topping depth varies from 75mm – 130mm. Props as required on the suppliers drawing must be in place before the slabs are placed.



6.4 Rib and Infill Flooring System

The Rib and Infill system comes as a series of beams 200mm wide by 100mm (usually) placed at 800mm centres. Timber planks are placed between the beams to act as permanent formwork for the concrete topping. Props as required on the suppliers drawing must be in place before the 200mm wide ribs are placed.

6.5 Construction Considerations

Concrete floor units are heavy, so suitable lifting equipment will be required, in the form of a crane or a Hiab. Site access is a consideration, the further away from the building the crane has to park, the larger it has to be. However, in most residential situations the sites can be serviced with a Hiab.

6.6 Placing the Units

It is important to place the flooring units as required by the precast manufacturers drawings. Seating on blockwork is important. Too much seating on one end will mean not enough at the other, causing an overload of the supporting walls in compression. A good way to allow easy movement of the units once in place is to use a plastic bearing strip. This allows the units to be located accurately before the topping is poured, as the units can be shifted on the plastic instead of damaging the blockwork and/or units themselves. Once the topping is poured everything is locked in place.



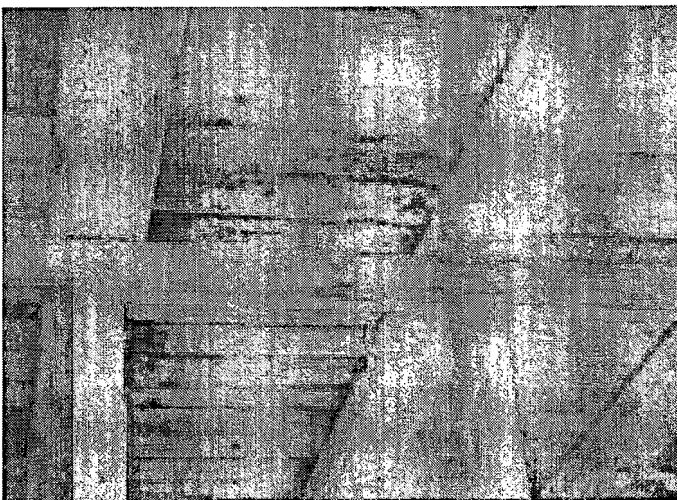


It is important to locate the units next to each other in the manner detailed in the construction drawings. Flat Slabs should be butted hard against each other so there is no gap between units. This will minimise concrete leakage when the topping is poured. Rib units have a small amount of tolerance because of the timber infill planks. However, these timber planks require close alignment to minimise concrete leakage.

6.7 Temporary Propping

Before erecting, props must be installed at the positions and precamber levels as shown in the manufacturers drawings. The props must be levelled to an accuracy of $\pm 3\text{mm}$, must be adequate to safely carry the construction loads with out settlement and must be well braced in each direction. The photograph below shows timber props. These must be designed with suitable top and bottom bearing plates and bracing.

The props may be removed once the concrete topping has reached a compressive strength of 15MPa. This is usually around two weeks. An initial settlement may occur once the props are removed. The amount of initial and long term settlement depends on the overall depth and span of the floor system. The manufacturer can advise what this long term deflection can be.



6.8 Concrete Topping

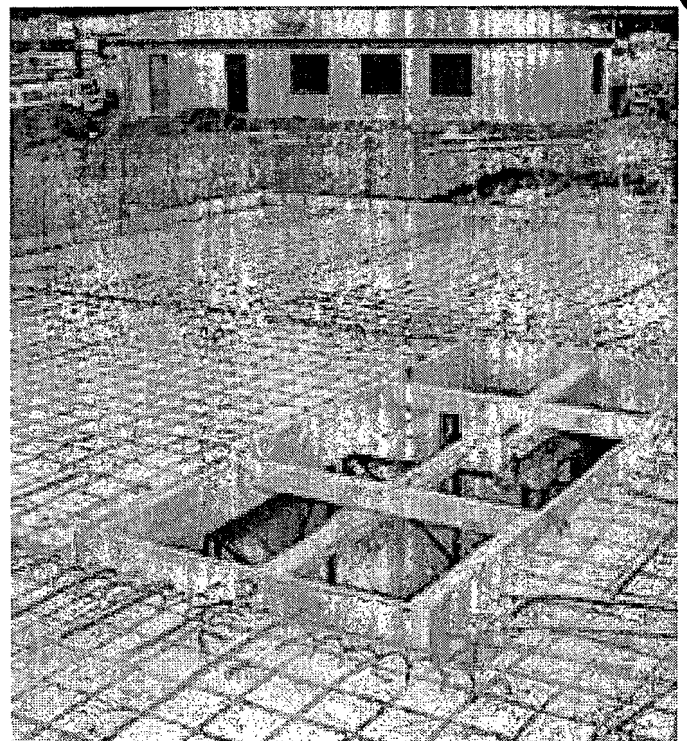
These flooring systems derive a large portion of their spanning capabilities from the concrete topping. This topping varies in thickness from 70mm to 130mm. Until this topping has gained sufficient strength (14 – 28 days after pouring) some propping will be necessary. Refer to the construction drawings prepared by the precast manufacturer, for the location of the propping.

The perimeter boxing can be placed once the units are located accurately. This can be set to a height so that it can be used as screed railing. It is essential to cure the topping correctly to ensure it reaches the required strength. Insufficient curing of the floor may result in greater deflections than designed for.

6.9 Topping Reinforcement

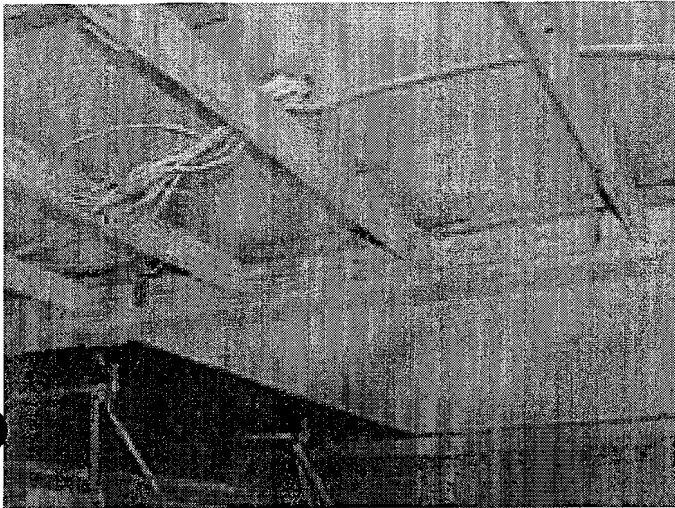
The flooring units are cast with pretensioning reinforcing strands. The reinforcement requirements in the topping will be detailed on the precast manufacturers drawings, as will any extra bars for cantilevered balconies etc. It is important that the reinforcement mesh is supported on mesh chairs to ensure correct location within the topping. Any supplementary reinforcement should be tied to the mesh either under or on top, depending on the thickness of the topping.

The reinforcement from the lower storey wall needs to be tied into the topping. For walls that are supporting units on both sides, the starter bars should bend alternate directions. Refer to the photograph below.



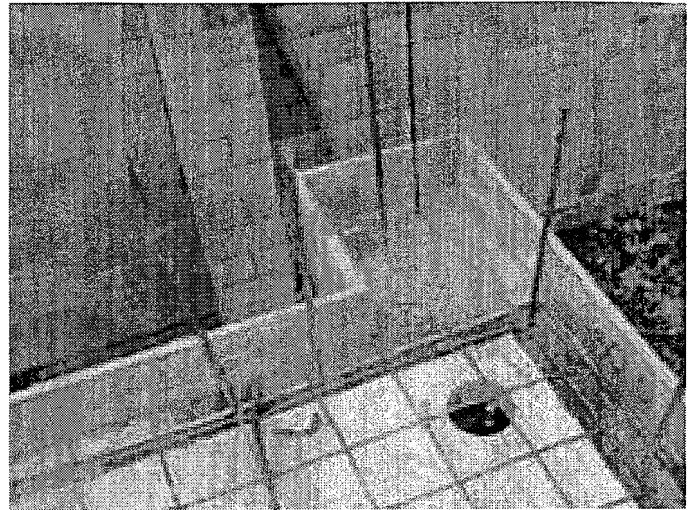
6.10 Services

It is possible to place services in the topping. Usually this is limited to 40mm diameter waste pipes. A thicker topping to accommodate the pipes will normally be used (up to 20mm thicker).



6.11 Penetrations in the Floor

When penetrations are required in the floor due to services, the precast manufacturer must be informed before the units are made, this ensures that the pretensioning strands are unaffected. It is not recommended that the units are cut on site unless specifically instructed by the precast manufacturer.



6.12 Balconies

It is beyond the scope of this document to provide detailing for balconies.

Balconies are to be specifically designed by the precast floor manufacture and engineer.

6.13 Waterproofing

Any suspended floor exposed to the weather will require waterproofing on the surface to prevent penetration of moisture to a habitable room or garage below. Refer to the manufacturer for details.

Installation of services into a masonry home is a simple exercise. Exactly the same planning is required as for a conventional timber frame building. Changes are difficult to achieve after the grouting of masonry walls.

SECTION 7 - SERVICES

7.1 Locations of Services

Methods of installing plumbing and electrical lines depend on whether they are run through, within or alongside the concrete masonry wall. Penetrations are necessary primarily to allow services to pass directly through the wall. Lines that run parallel to the wall can reside either within the masonry cores themselves or in the cavity created if the wall is to be strapped and lined. Any openings required in the face shell shall be formed with drills and saws. The use of hammers can crack adjacent block faces and/or disturb mortar joints, both of which can then leak.

Penetrations

Holes penetrating straight through a concrete masonry wall can be created as the wall is assembled or after assembly. During construction holes are left in the designated locations by cutting sections of the blocks before they are laid. An alternative is to drill through the wall after wall assembly. The advantage of this is that the blocklaying is uninterrupted and allows for delays in deciding precise locations for the penetrations. With either method, it is important to avoid the masonry webs and to seal around the holes before blockfilling.

Services within Masonry Cores

If the interior of the wall is to be plastered or left exposed, the services must be placed within the cores of the wall. Provision must be made for the services as the masonry is installed. Either the blocklayer or the service installer will make cut-outs in the block face shells where the electrical flush boxes and other service mounts will be fixed. After the wall is completed, the electrician will pull

wires, install boxes and other fixtures. In partially filled masonry, good planning will see the services installed in a hollow core of the block wall.

7.2 Electrical

The location of all electrical fittings needs to be confirmed prior to grouting. Electrical cable is usually run through PVC conduit that has been placed inside the block wall prior to grouting. It is not good practice to place more than one conduit within a single vertical core that is to be filled with grout.

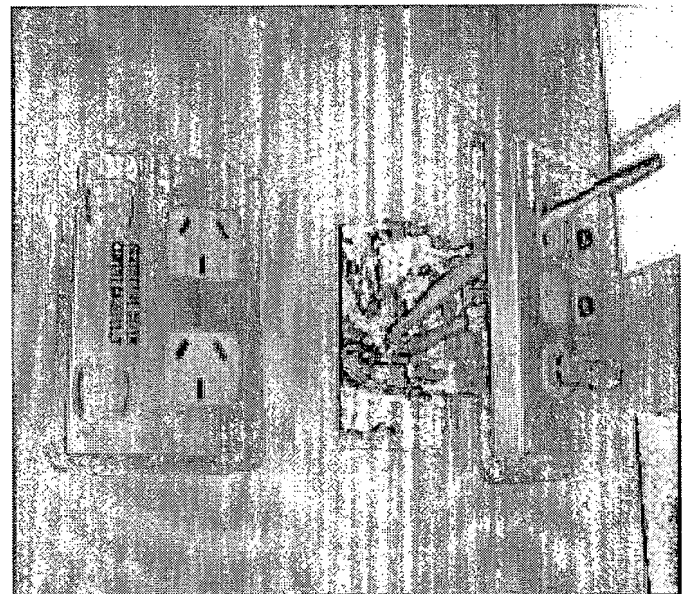
The length of conduit and the number of bends should be kept to a minimum so as to not affect the installation of the cables within the conduit. With long, twisting conduits the friction can make it difficult to pull the wires/cables through.

The locations of the flush boxes should be marked out on the masonry wall prior to grouting. Then the face shell of the masonry block is cut out or drilled out and the conduit is placed within the core of the masonry wall extending out the wall at the location of the flush box. The hole is then sealed around the conduit and the wall is then grouted. Once the wall is grouted, the face of the masonry unit can be cut for the installation of the flush box.

In this photograph, the flush box is visible in the finished wall. Switchplate fixing is identical to that on a timber frame wall.

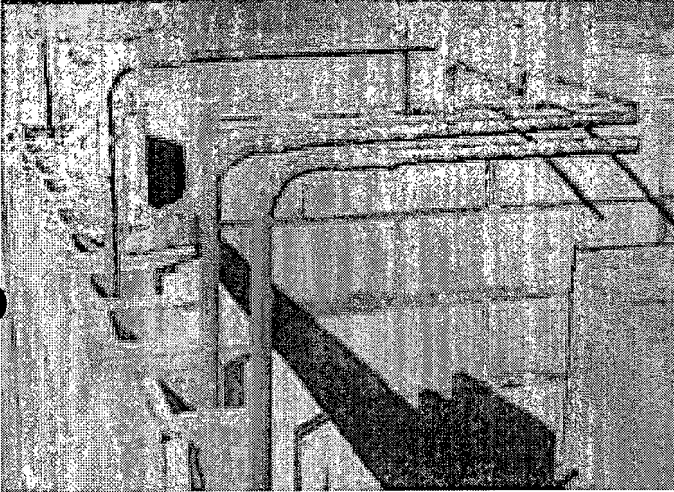
7.3 Plumbing

Consideration needs to be given to upstairs bathroom facilities and their location relative to external walls.



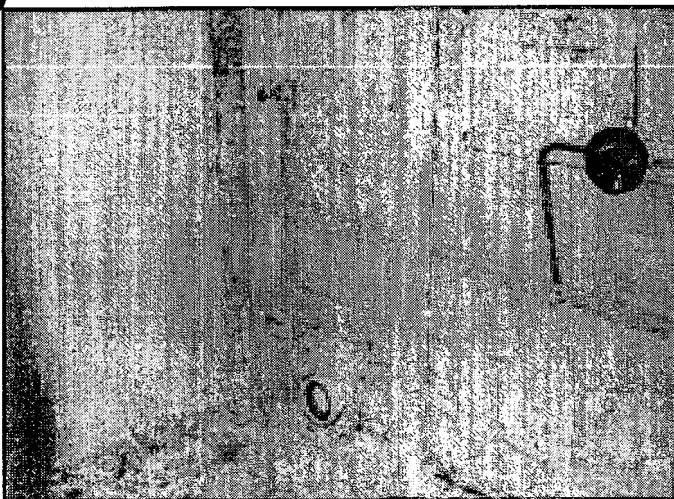
Where necessary it is possible to leave a core of the masonry blocks empty during pouring so that the waste pipes can be run inside the blockwork. This gives excellent noise dampening properties. This needs to be coordinated with the Architect or Engineer to ensure that the structural performance of the wall is unaffected.

For upstairs bathrooms and toilets located away from external walls, plumbing needs to be routed to these



walls. With a Prestressed Flat Slab floor the pipes can be placed within a false ceiling as it is not practical to run the large diameter toilet waste pipes in the concrete floor. Rib and Infill floors can have an advantage in this situation, as the beams create a natural 100mm deep space when using a plasterboard ceiling. The pipes must run parallel to the Rib Infill beams, as it is not possible to core through a beam without compromising strength.

7.4 Services on Strapped and Lined Walls



When the wall is to be strapped and lined, the services can simply be placed in the cavity between the masonry and the lining. This is very similar to that in traditional timber frame construction.

7.5 Future Proofing

Data cabling offers many advantages over conventional electrical cabling. With this type of system, the entire houses lights, curtains, alarm systems, and heating can be controlled from one point.

Installation of data cables is very similar to electrical cables but there are a few minor points to consider:

- Where any data cables run parallel to electrical cables, maintain at least 300mm separation. This is to stop any electromagnetic interference of the transmission of data as with any type of construction.
- When data and electrical cables have to cross, make sure they are at right angles to each other.

In some situations, data cabling can reduce the number of wires required to manage the houses electrical systems. Traditional cabling requires an individual wire for each electrical item to be controlled. With data cabling, a single control panel is capable of controlling the entire house.

SECTION 9 - ROOF CONNECTION

The two most popular methods of roof connection are by top plate and metal strap. Either one can be used in almost any circumstance. The top plate requires more material, but leaves greater flexibility for the roof members to be placed. It also leaves a nailing surface along the top of the wall, which is useful if a trim is to be installed. Metal straps can provide a stronger connection and for high-wind areas are often compulsory. They also leave the concrete masonry surface uninterrupted to the roofline (good for plastering).

9.1 Top Plate

This is the most common approach where a wooden plate is installed along the top of the wall and the roofing members attach to it conventionally. Anchor bolts hold

the plate in place. These bolts are suspended in the bond beam prior to the wall being filled and upon grouting they lock into place. The top plates are drilled and screwed into place. As with any timber/masonry connection, the top plate needs to be protected from moisture by DPC or similar.

9.2 Metal straps

Metal straps or hurricane straps can also connect the wall to the roofing members. The straps are positioned in the blockfill at the design locations of the roofing members. The roof is built on top of the wall with each strap nailed to its representative member.

SECTION 10 - WINDOW INSTALLATION

In general the most critical aspect of masonry construction is the installation of windows. If a house is going to leak, it is most likely to be caused by inadequate sealing around window frames. Masonry homes are just as prone to leaking around windows as any other home if incorrect installation techniques are used.

The Architect or Designer should carefully select a sealing and coating system from a reputable manufacturer. The directions of that manufacturer should be carefully followed, at all times.

The four "D's" for weather tightness design are, deflection, drainage, drying and durability. Penetrations through masonry walls may employ the D's by-

1. 'deflection' are building elements that shelter the wall or divert water away from critical junctions such as eaves, drip moulds and sealants.
2. drainage is achieved by ensuring that any water that gets in is drained back out generally through an unsealed joint along the bottom.
3. The unsealed bottom edge allows some circulation of air to aid drying.
4. Air seals installed around the inside edges of the openings restrict the passage of air through joints and prevent water being carried to the interior.

Details which employ these principles are summarized in two publications-

- Concrete Masonry- a guide to weathertight construction, available for free download from the NZ Concrete Masonry Associations website www.nzcma.org.nz
- Weathertight Solutions Volume 4- Masonry, details for junctions and openings in masonry walls. Available from BRANZ."

An illustration of a typical construction sequence is as follows.

Flush any block joints around the window opening with mortar. This removes any recesses in the surface that would require excess sealant to be applied.



Apply a waterproofing membrane around head, jamb, and sill. This waterproofing membrane should cover the entire thickness of the wall and be extended a minimum of 50mm on the exterior face around the penetration.



Fit joinery leaving a 5mm gap between the window frame and masonry rebate.



Ensure that the window frame is located accurately and square in the opening. This will ensure a uniform gap around the frame for further application of sealant.



A: Once the window is fixed and square install backing rod and foam airseal to the interior of the joinery.



B: apply a flexible seal to the gap between the top and sides of window frame and masonry wall. Do not seal along the bottom of the window frame.



With the paint system, it is very important that the paint coat is applied over the flexible sealant up to the joinery. This provides one extra defence against moisture ingress. The Architect or Designer should fully detail the weatherproofing procedures for window openings.

Ensure that all paint, sealants and coatings are compatible. The use of one selected, reputable manufacturer's products and system is strongly recommended.

SECTION 11 - WATERPROOFING/COATING SYSTEMS

External waterproofing systems are one of the most critical aspects of the construction and also have a large visual impact. Coating of a masonry home is a simple process but there are a few areas that need special attention before applying the coating.

11.1 Dry Blockwork

Before coating, the blockwork must be dry. AS/NZS 2311:2000 provides a guideline for recommended drying times for recently constructed masonry. The recommended times are 8 weeks for solid-filled construction and 4 weeks for partial-filled construction.

Wet concrete masonry units shrink when drying. This movement is minute but is still significant if a brittle coating (such as plaster) is applied to wet blocks. Cracking is likely to occur in the plaster due to the block movement.

The following conditions have the most influence on shrinking:

- Masonry units stored on site and not covered are laid wet.
- Significant rainfall occurring during blocklaying (especially during winter).
- Insufficient time to allow drying prior to applying the coating.

Once sufficient drying has occurred the exterior coating should be applied as soon as practical to prevent further moisture entering the masonry.

11.2 Cleaning Blockwork

Ensure the blockwork is clean and free from surplus mortar/grout. All mortar joints should be free from dags and blocks should have smooth clean surfaces. A common practice is to brush the surface of the wall down with a wire brush or rub a piece of masonry on it to clean the wall.

11.3 Application

It is strongly recommended that an accredited applicator of the coating chosen for the job is hired. They have the "know how" and can deal with problems, if they arise, better than anyone. The accredited applicator normally has the manufacturer's guarantee as support should anything go wrong.

It is vitally important to follow the coating manufacturers' application instructions. Incorrect application may lead to the coating not providing the waterproofing expected. In multicoated systems, do not change from one brand to another from one layer to the next. Each manufacturer will have ensured that reaction occurs with the mixing of their products. This cannot always be guaranteed when products from different manufacturers are mixed.

Firth does not claim to be the expert in the application of coatings on masonry. It is strongly recommended that the manufacturer of the preferred coating(s) be consulted for advice in this area.

SECTION 12 - EXTERNAL COATING SYSTEMS

12.1 Acrylic Paint

Good quality acrylic paint acts as a moisture barrier but not a vapour barrier. This allows the blocks to breathe removing any trapped water vapour while at the same time stopping moisture from rain from entering the blocks. Paint like this has no rendering ability so it is usually applied over a skim coat of sand-cement plaster but can be applied directly to blockwork if that look is desired. If this type of coating is to be used, it is recommended that three coats be applied, or in accordance with the manufacturers specification.

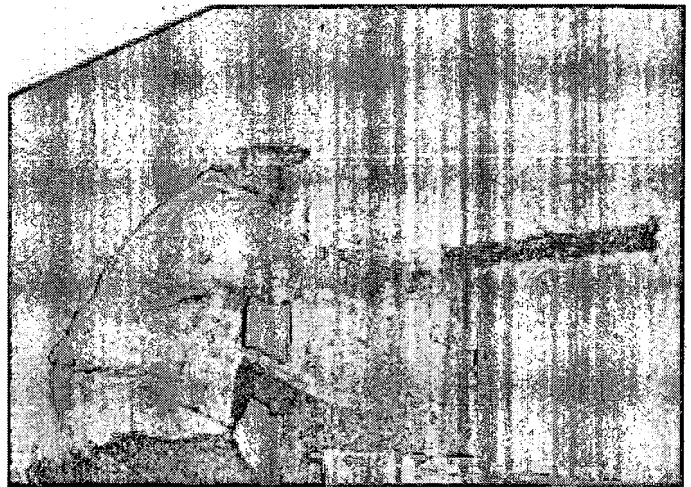
12.2 High-build Elastomeric Coatings

High-build elastomeric coatings are similar to a very thick acrylic paint. Using the latest paint and polymer technology they offer a coating system that can have a variety of looks, ranging from conventional paint look to a textured plaster finish. These are recommended as a coating system for masonry, as they have a great amount of flexibility and can cope with small amounts of movement that may occur.

12.3 Solid Plaster

Sand-cement plaster is the traditional method of coating masonry and it is usually coated with one of the above treatments for waterproofing.

The first treatment for the dry masonry surface is the application of a "scratch or "splatter" coat. This is a sand-cement slurry that is splattered onto the wall, creating a rougher surface for the main plaster coat to bond to. The plaster needs to adhere to the wall or there is potential for what is called 'drummy plaster' to occur. This is a condition where the plaster coat has not broken but has de-bonded from the masonry and when tapped it makes a slight hollow sound. After this preparation coat, it is common for two or three coats of plaster to be trowelled on. It is even possible to spray the plaster on which



speeds up the process. The top coat of the plaster can be coloured to match the paint just like an undercoat.

There is a wide range of surface finishes available. This can range from an undulating finish (achieving a rough "country" look) to straight plaster finishes (the smoothest type of finish available). The undulating plaster is usually the most cost effective, as it requires less labour to create. Other thinner coating systems cannot achieve this undulating appearance.

12.4 Modified Plaster

These are typically acrylic-based proprietary coating systems developed for use on masonry structures. They are designed to provide a substantial look while offering protection from ingress of moisture. They are applied in a similar manner to solid plaster, but refer to the relevant manufacturer for their recommendations.

12.5 Clear Sealants

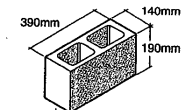
Other types of coatings basically rely on their inherent thickness and elasticity to provide long term protection. But thick coatings are easily seen, defeating the purpose of using a clear sealant – that uncoated look. Refer to the clear sealant manufacturer for suitability, application and maintenance information.

12.6 Cement Based Paints

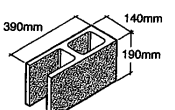
It is not recommended to use cement-based paints directly on blockwork. These paints are very brittle and once wall movement occurs, cracking of the coating is almost inevitable.



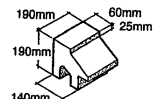
15 Series



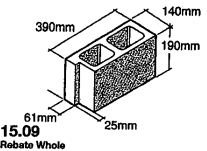
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Plain Ends Standard



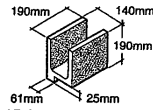
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Open End



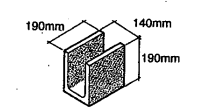
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Sill (projecting)



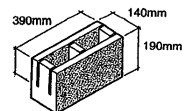
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Rebata Whole



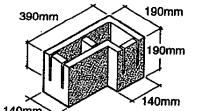
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Rebata Lintel



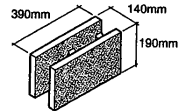
15.12
Lintel and Half End-closer



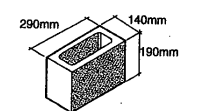
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Knock-In Bond Beam



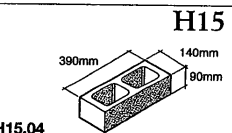
15.15
Right Hand Corner Bond Beam
(left hand also available)



15.16
Open End Bond Beam

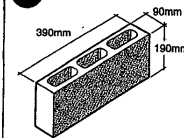


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Three Quarter

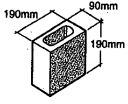


H15.04
Plain Ends Standard

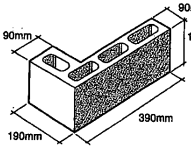
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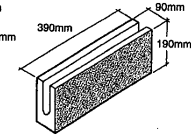
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Standard Whole
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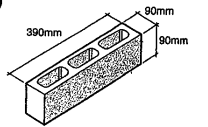
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Half



10.03
Corner

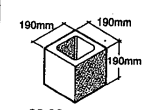


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Channel Bond Beam

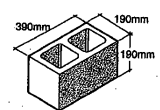


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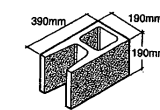
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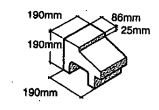
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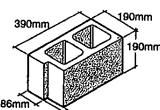
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Plain Ends



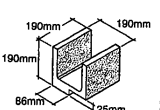
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Open End



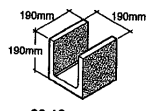
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Sill (projecting)



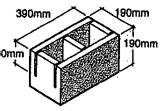
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Rebata Whole



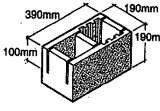
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Rebated Lintel



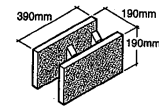
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Lintel and Half End-Closer



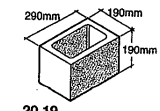
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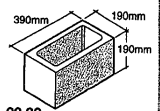
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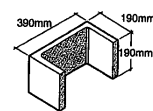
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Open End Bond Beam
Depressed Web



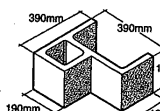
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Three Quarter



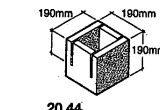
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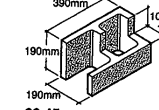
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Pilaster 'C' Type



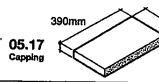
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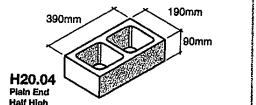
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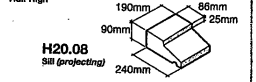
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Header



05.17
Capping

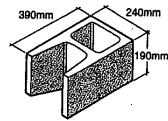


H20.04
Plain End Half High

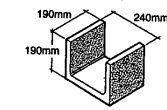


H20.08
Sill (projecting)

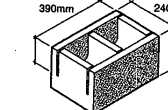
25 Series



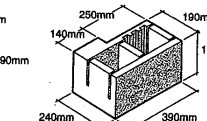
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Open End and Corner



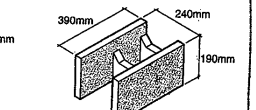
25.12
Lintel and Half-end Closer



25.14
Knock-In Bond Beam



25.15
Right Hand Corner Bond Beam
(left hand also available)



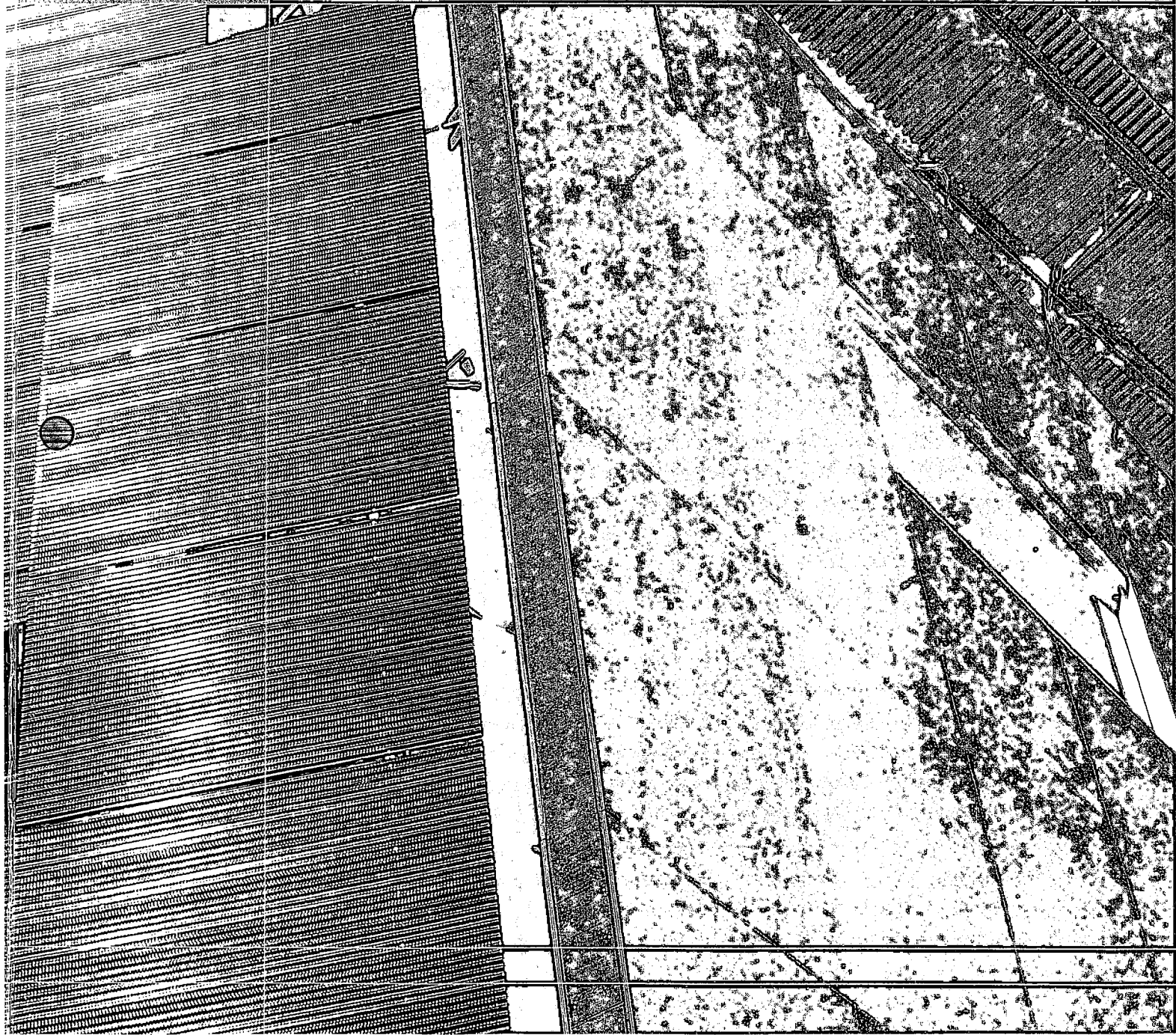
25.16
Open End Bond Beam
Depressed Web



Specifying

CLADDINGS

Profiled metal, fibre cement, plywood and timber weatherboard



TIMBER WEATHERBOARD CLADDING

5.1 Manufacture

Timber weatherboards, fixed to framing, have been used for centuries as effective cladding. They can be fixed vertically or horizontally depending on the board profile, but diagonally fixed weatherboards are not recommended. Experience indicates that horizontally fixed weatherboards, especially bevelbacked profile weatherboards, offer the most effective weather resistance.

Good weatherboards are generally:

- no wider than 200 mm, to reduce the risk of cupping and splitting (quarter-sawn boards resist cupping best)
- have sufficient thickness to accommodate weathergrooves (more than 19 mm)
- are fixed with adequate overlaps to prevent water penetration.

Timber weatherboards are generally available in pre-run profiles (but may be run to special profiles specified by designers). Timber used is generally radiata pine, douglas fir, macrocarpa, beech species, or imported western red cedar or redwood. Other timbers (grown locally or imported) are used in New Zealand, though less commonly. Selection depends on:

- durability
- availability
- environment, exposure, wind zone, corrosion zone
- grade
- profile
- appearance/colour
- surface finish
- applied finishes.

Care is required with weatherboard selection, because if either pre-run or designed profiles do not comply with the dimensions and profiles in NZBC E2/AS1, or materials are not those specified in NZS 3602, then data to prove weathertightness of the profiles and durability of material may be required.

5.2 General information

Refer to Section 1 of this specification guide.

5.3 Documents

NZS 3602	Timber and wood based products for use in building
NZS 3604	Timber framed buildings

NZS 3617 Profiles of weatherboards, fascia boards and flooring

BRANZ Bulletins

BRANZ Weathertight Solutions Volume One: Horizontal Weatherboards

Various manufacturers' and suppliers' trade literature.

5.4 Durability

Traditional use of timber weatherboards shows they can easily last the life of a building — well beyond the 15 years' minimum durability required by the NZBC if they are properly maintained. Their service life will depend on the type of timber used, preservative treatment, method of fixing, applied finishes, environmental conditions and degree of maintenance.

To enhance durability:

- keep vegetation well clear
- keep boards more than 175 mm clear of natural ground, more than 100 mm clear of paved ground, and more than 50 mm clear of waterproof deck surfaces
- use light-coloured paints
- avoid dark stains and paints on north and west facing walls (heat gain causes undue board movement).

5.5 Materials

The following table gives the timber species, grade and preservative treatments for commonly available timber weatherboards.

End sealing is used to preserve the integrity of the face coating by preventing moisture from soaking into the end grain and wetting the substrate. It is not intended to prolong durability of the substrate itself. It is also recommended that the end grain of weatherboards that are left natural should also be sealed to minimise water absorption that would cause unsightly water staining.

Cut ends of weatherboards may require end coating with preservative to preserve the integrity of the treatment. This is a separate matter from end sealing for painting and will depend on the preservative chemicals specified. For advice on preservative treatment of cut ends, refer to manufacturers' literature.

5.5.1 Timber trim

Timber trim that forms part of the cladding system, including fascias, cover boards, barge boards and scribes must have the same grade, treatment and coating protection as described for weatherboards.

Table 5.1 Commonly used timber weatherboards

Species	Grade	Treatment	Minimum finish required
Pinus radiata	Dressing*	H3.1 H3.2	Painted (3 coats)** Unpainted***
Cypress species Macrocarpa Lawson's cypress, etc.	Dressing heart*		
Larch	Dressing heart*		NZS 3602:2003 requires paint protection (3 coats)**
Western red cedar	Dressing heart*	CCA treated material available	
Redwood	Dressing heart*		
Plywood	To AS/NZS 2269	H3	

* See NZS 3631 for grading requirements.

** Prime all faces, including cut-ends, before fixing. Apply a minimum of two further coats of exterior grade paint to all exposed surfaces in accordance with AS 3730.

*** While H3.2 pinus radiata can be left uncoated, painting is recommended.

5.6 Wall underlays

Refer to the Section 1.5, Wall underlays, for a specification of the wall underlays to be used behind weatherboard claddings, fixed both directly to framing and over cavities.

5.7 Weatherboard profiles

Typical profiles include the following:

5.7.1 Horizontal

- bevelback
- rebated bevelback
- rusticated
- splay cut (skew cut).

5.7.2 Vertical

- board and batten
- shiplap.

NZBC E2/AS1, Table 3, outlines the conditions under which different types of weatherboard claddings may be used, e.g. shiplap profile weatherboards may only be used in situations of lowest risk.

NZBC E2/AS1 includes bevelback, rusticated, shiplap and board and batten (with prescribed dimensions) as profiles for Acceptable Solution E2/AS1. Other weatherboard profiles should conform to the critical dimensioning of Acceptable Solution profiles for requirements of weathertightness. Otherwise, separate verification of weathertightness may be required. Table 5.2 sets out critical dimensions for weatherboards.

Notes

1. Weatherboards should be installed in the longest lengths practicable. Vertical boards should be installed in single lengths from top to bottom of the wall panel.
2. Vertical weatherboards are not suitable for installation over cavities (because of the need for horizontal battens restricting the cavity). For this reason, their use is restricted to low and medium-risk applications in E2/AS1.

Weatherboard profiles are specifically intended for either horizontal or vertical application. An example of this is shiplap profile, which is intended for vertical application only and should not be fixed horizontally.

Table 5.2 Critical dimensions (minimum) for timber weatherboards

	Thickness	Rebate/overlap dimension	Weathergrooves
Horizontal profiles			
Bevelback	19 mm (10 mm thin end)	32 mm overlap	Yes**
Rebated bevel back	19 mm (10 mm thin end)	25 mm overlap plus 2 mm tolerance	Yes**
Rusticated	19 mm	25 mm overlap plus 2 mm tolerance	Yes**
Splay cut*	19 mm (9 mm thin end)	32 mm overlap	Yes**
Vertical profiles			
Board and batten	19 mm	30 mm overlap	Yes**
Shiplap	19 mm	25 mm overlap plus 2 mm tolerance	Yes**

* Profile not specifically included in E2/AS1, but can be produced to thin and thick edge dimensions as for bevelback profile.

** Refer to Detail 5.6 for size and position of primary weathergrooves.

5.8 Flashings, sealants and seals

All flashings and weathering details must be shown on the drawings and dimensioned for overlaps with claddings. Ensure that flashing materials are compatible with other cladding materials and window or door frames.

5.8.1 Metal flashings

For metal flashings use either:

- formable grade, 0.55 BMT for all steel base metal flashings, Z450 galvanising for unpainted flashings, Z275 galvanising for factory painted flashings
- stainless steel, 0.45 mm min. 304 or 316 grade
- uncoated aluminium flashings, use 0.9mm, 5052 or 5552 alloy (H16 temper recommended); for factory-coated aluminium flashings, use grade 3000 or 5000.

Weatherboards that are left uncoated, especially H3.2 treated radiata pine, cedar and redwood species may cause early failure of galvanised (less than Z275 coating) zinc/aluminium and aluminium flashings. Pre-painted flashings will delay deterioration. Alternatively use a plastic or stainless steel flashing manufactured for the purpose.

Do not use steel sheet with less than Z400 galvanised coating or unpainted zinc/aluminium flashings in concealed locations.

Other metals for consideration, though less often used, include copper, lead and zinc. Careful consideration must be made before introducing copper to a cladding system because of compatibility issues with zinc or zinc-coated metals and the risk of copper staining. Refer to NZS 3604, Table 4.5.

5.8.2 Synthetic rubber flashings

Use:

- single-ply membrane from butyl or EPDM, 1.5 mm thick.

5.8.3 Sealants and seals

Sealants and seals should not be relied on for primary weather protection. They are useful in assisting with weathering at joints and laps along with primary flashings and overlaps. Where they are included, use:

- a properly designed sealant joint with backing rod and thickness of sealant approximately 2:1 width to depth, with no dimension less than 6 mm
- sealant selection depending on the role required of the sealant. For most caulking applications, acrylic latex or modified silicon sealants to ISO 11600 will be suitable; for sealants requiring greater movement ranges or bonding to the weatherboard, refer to manufacturer's

recommendations, especially for bonding to resinous timbers such as cedar, redwood and some New Zealand native species

- closed cell self-adhesive tape (select size for maximum 10 percent compression to finish dimension).

Materials for sealants and seals to be either:

- silicon or polyurethane sealants recommended by the manufacturer for use with the timber species
- closed cell, 3 mm x 16 mm (or other size specified), self-adhesive tape.

Sealant joints for penetrations through weatherboard claddings must be properly designed to accommodate movement and weather resistance.

5.8.4 Painting/staining

Before fixing the weatherboards, apply sealer to:

- cut edges
- edges exposed to the weather, including on the reverse sides of timber, 150 mm up from the bottom of the exposed edge.

Sealers should be:

- a finish matching that is applied to the board surface when clear finishing or staining
- priming paint, compatible with paint finishes
- applied in two coats.

5.9 Compatibility with other materials

Timber is relatively inert, except some resinous species and those treated with copper-bearing and solvent-based preservatives. H3.2 treated timber, cedar and redwood weatherboards should not be used in direct contact with (or give water run-off onto):

- uncoated galvanised steel
- uncoated zinc/aluminium-coated steel
- zinc.

Pre-painting metal surfaces should provide adequate protection but will depend on good maintenance of the coating. Refer to NZS 3604, Table 4.6, for a more complete list of compatibility of materials.

5.10 Site handling

The care afforded to weatherboards and materials in general, at delivery and during construction, will reflect the quality of finished construction.

Damaged boards must not be used. To help ensure that materials remain undamaged, check that they are:

- ordered for delivery at the time they are required
- delivered as new and are undamaged
- stored out of the weather
- protected from physical damage, contact with other materials and construction processes (such as cement splashing)
- stored on a level, firm base on packers (remove strapping and turn top board face down for protection as required), lay fillets between each layer of boards
- not dragged across one another or other materials.

5.11 Cladding installation tips

To help achieve best results:

- ensure the timber framing tolerances do not exceed those outlined in NZS 3604, Table 2.1, governing support of timber board claddings
- check that boards are dry (less than 18 percent moisture content)
- reject boards that are cupped or bowed and, where possible, select quarter-sawn boards for use on north and west faces
- boards that are to be paint or stain finished must be primed or have one coat of stain, including backs of boards before fixing
- prime or stain all cut-end cuts as work proceeds, two coats recommended
- fix with one nail per board at fixing points to allow for board movement
- splay cut-end joints of horizontal weatherboards over framing (vertical weatherboards boards must be a full storey height)
- carefully determine the set-out before commencing so that board laps occur at the required positions (if any)
- as work proceeds, check that boards are at a constant height on all walls, are fixed true to horizontal/vertical and that boards have constant lap/exposed face dimensions
- pre-drill for all fixings where splitting is likely, especially near the ends of boards
- install back flashings, before installing weatherboards — soakers can be installed progressively with weatherboards
- where paint finishes are required, apply final coats soon after all installation is completed (priming left exposed for more than one month should be re-primed)
- install 12 mm polystyrene strips (or equivalent) as thermal breaks when direct-fixing to steel framing.

5.12 Fixings

Recommended fixing types for exposure zones in accordance with NZS 3604, Table 5.2.

Table 5.3 Material selection guide for nails and screw fixings for weatherboards

	Zone 1 and sea spray zone to NZS 3604	Zones 2 and 3 to NZS 3604	Zone 4 (geothermal) and corrosive industrial zones
Hot-dip galvanised*	Fixings for plywood and timber battens to be punched, stopped and paint finished with cladding	Fixings may be left exposed**	
Silicon bronze and stainless steel	Suitable for zones 1 (including sea spray zone), 2, 3, and 4		

* Zinc-plated fixings are not suitable for cladding fixings in any exposure zone.

** Not suitable for use in association with cedar, redwood or copper-treated timber trim where timber is left unpainted.

Table 5.4 Nail fixings for timber weatherboards (sizes in mm)

	Nail positions	Nail size*
Bevelback	one nail within 10 mm above lap line at each stud	75 x 3.15 mm
Rebated bevelback	one nail within 10 mm above lap line at each stud	75 x 3.15 mm (unpunched) 60 x 2.8 mm (punched)
Rusticated	one nail within 10 mm above lap line at each stud	60 x 2.8 mm
Splay (skew) cut	one nail within 10 mm above lap line at each stud	75 x 3.15 mm
Board and batten	one nail each in centre of boards and battens and at 480 crs. max.	60 x 2.8 mm for boards 75 x 3.15 mm for battens
Ship lap	one nail within 10 mm of side of lap and at 480 crs. max.	60 x 2.8 mm

* Nails should be jolt heads or rose heads. Because gun-applied nails or staples are unlikely to have sufficient galvanised coatings and tend to 'bruise' surface finishes, they are unlikely to be suitable for attaching finished claddings. Annular grooved shanks are recommended for silicon bronze and stainless steel fixings.

5.12.1 Nails and screws

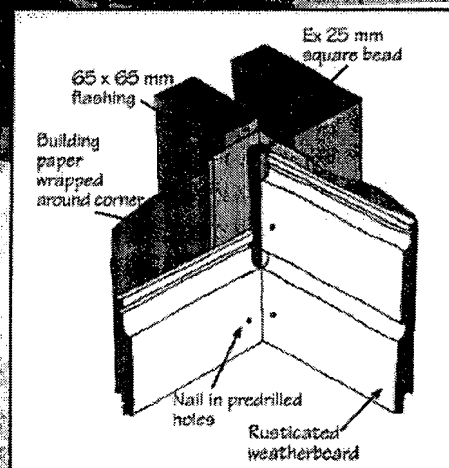
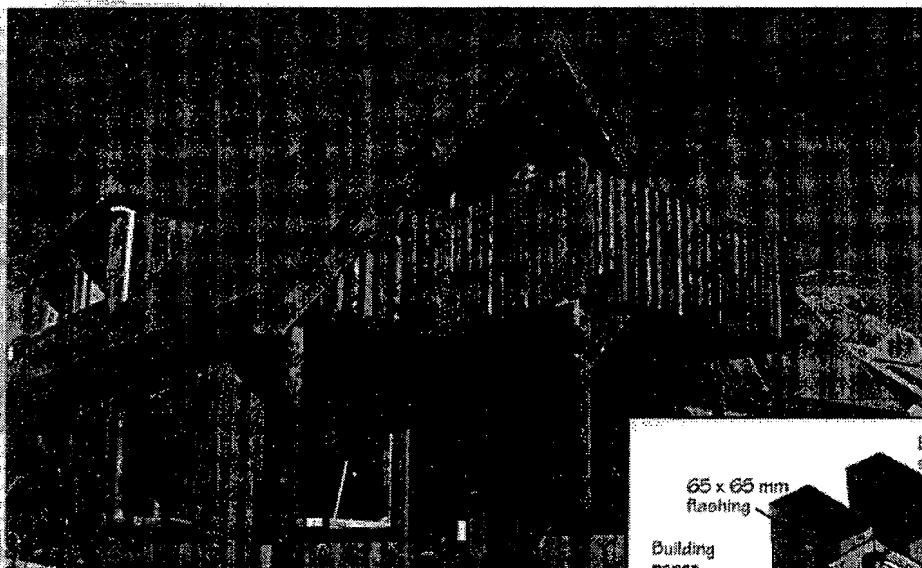
Use nail sizes and positions as outlined in the following table.

Note: E2/AS1 requires fixings to penetrate through cavity battens into framing. For 20 mm drained cavities, increase the length of fixings by 20 mm. An alternative is to structurally fix the battens, allowing normal sized cladding fixings to be used — refer to Clause 1.5.2.3.

5.13 Maintenance

Refer to Section 1.6, Maintenance, for a specification of the maintenance recommended for weatherboard claddings to preserve weathertightness and ensure continuing good appearance.

Good Timber Cladding Practice



5.14.3 BRANZ recommends

To reduce air leakage and weather penetration around openings in the cladding (Figures 16 and 17):

- seal the gap between the wall framing and window or door, reveals with a bead of polyurethane foam, compressible foam strips or batten rods before installing interior linings; and

- fold a 300 mm-wide strip of durable, flexible flashing material, such as polythene or butyl rubber, around the ends of the weatherboards, to contain air and water leakage that might penetrate behind scribes, or plugs in rusticated profiles.

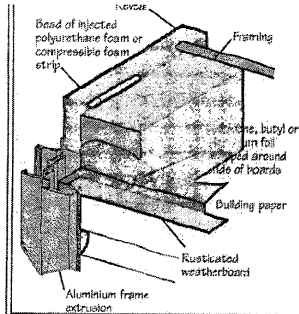


Figure 16. Sealing against leakage.

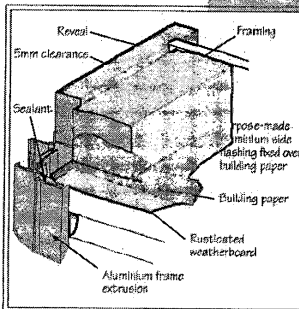


Figure 17. Alternative method of sealing against leakage.

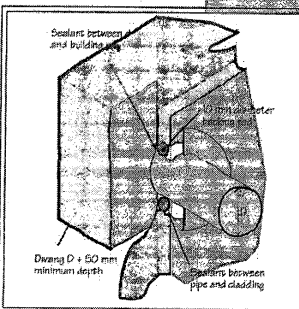


Figure 18. Weatherproofing for service penetration.

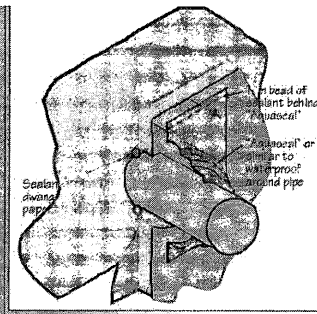


Figure 19. Proprietary seal at service penetration.

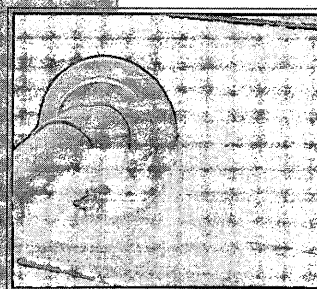


Photo 33. Flange protecting sealant around waste pipe.

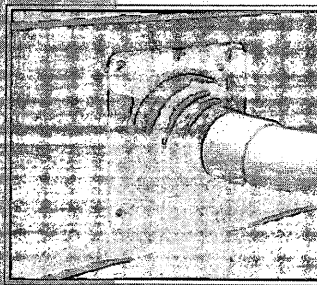


Photo 34. "Aqualseal" around waste pipe.

- seal the joint barrier with adhesive tape or sealant around the penetration before installing the cladding. This requires sound planning and co-ordination of sub-trades.

- (c) drill a hole in the cladding approximately 15 mm greater than the outside diameter of the pipe or cable.

- (d) centrally position the pipe or cable in the over-size hole, apply a suitable primer (as recommended by the sealant manufacturer) to both timber and pipe or cable, then apply the sealant, which must be forced against a backing or batten rod to achieve the best result.

- (e) protect the sealant from sunlight by covering it with a close-fitting flange around the pipe or cable. An alternative to a rigid flange is a domed rubber fitting (like the one with the "Aqualseal" trade name) which is fixed with nails or screws against the cladding and fits tightly around the pipe. This product is suitable for wires and pipes from 3 to 63 mm diameter (Photo 34 and Figure 19).

- (f) choose a meter box which has a flange which can be nailed to the face of the wall framing and behind the cladding to serve as an effective flashing. If a flanged box is not available, a less satisfactory but adequate method, if done properly, is shown in Figure 20.

5.15 Surface Treatments and Coatings

5.15.1 Surface treatments of timber claddings are used for decoration, protection of the timber from the weather, and to assist with waterproofing the cladding as a whole. The treatment options are:

- no treatment - leaving timber to weather naturally
- water-repellent treatment - coating with a colourless liquid product
- staining - applying either a penetrating or film-forming semi-transparent coating (available in a range of colours)
- paint systems - applying, as a minimum, a 3-coat fully pigmented paint system (some weatherboard suppliers recommend site application of 3 coats over factory-primed boards).

5.15.2 Applied coatings can:

- improve durability of the timber by reducing ultraviolet light attack on the wood fibres, and by excluding moisture
- improve stability of the timber which would otherwise move excessively from cycles of moisture absorption and drying out
- assist weather exclusion by filling small gaps between boards, scribes and plugs, and shedding water quickly from the smooth surface

5.14.4 BRANZ recommends

For weatherproofing service penetrations in timber claddings:

- (a) pass pipe or wiring penetrations through a neat fitting hole in a cladding (nog) on its side, or other timber (at least 50 mm wider than the pipe or wire diameter), fixed to the framing (Figure 18).

5.5.1 Wind barriers (also called cladding underlay) are an important essential second defence against leaks, even in areas of low or moderate wind exposure. It is almost impossible to construct a cladding, having many joints, which is entirely without some minor gaps such as at board laps and joinery junctions. Because the pressure inside the building is less than the external pressure from the wind, rain will enter those small openings and pass to the interior if there is no barrier to prevent that air and water leakage.

5.5.2 The wind barrier material, while resisting wind, must not however be so impervious that it prevents unwanted internal moisture (including that from damp timber framing) dispersing to the outside in the form of water vapour. An impervious barrier directly behind the cladding will cause water vapour to condense on the interior side of the barrier (Photo 10), resulting in dampness, possible decay of framing timbers and mould formation on the interior linings. It is also desirable that the wind barrier is able to temporarily hold moisture, from either inside or outside, which later evaporates as air temperatures increase. However, some wind barrier materials do not have the ability to hold moisture but are recommended in very high wind zones because of their superior bursting strength.

5.5.3 In summary, a wind barrier may be either flexible or rigid and should:

- stop inward air leaks
- contain occasional minor water leaks
- preferably contain temporary condensation
- have the same durability as the cladding.

An effective wind barrier also improves the thermal performance of the building envelope.

5.5.4 BRANZ recommends

- (a) That a wind barrier be installed behind all timber claddings, and that the barrier be:
 - breather-type building paper complying with NZS 2295; or
 - synthetic breather-type building membrane; or
 - rigid sheet plywood, fibre-cement board, bitumen-coated insulating board or polyethylene sheet;
- (b) that rigid sheet wind barriers (Photo 11) be used behind vertical and diagonal boarding in high and very high wind zones;
- (c) that breather-type membranes have:
 - a surface absorbency of no less than 100 g/m² (materials complying with NZS 2295 meet this requirement); and

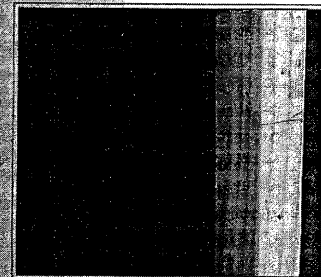


Photo 10. Condensation on polythene wind barrier.

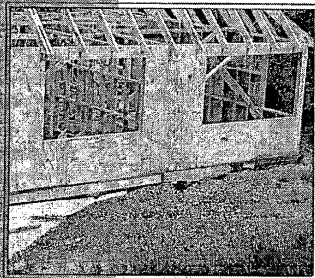


Photo 11. Plywood sheet wind barrier.

- a vapour transmission resistance of no more than 7 MN s/g (no penetration seconds per gram) measured using ASTM E96 procedure B or B1, and
- in high and very high wind zones, a bursting strength, when wet, of no less than 500 kN/m² when tested in accordance with BS 3137.

5.6 Wind Barrier Installation

5.6.1 All wind barriers must be installed to prevent wind-driven moisture passing through joints in the barrier, and to ensure that any free moisture drains to the outside. For example, the barrier must overlap any lower flashing, such as a head flashing above an opening. As explained above, at very exposed sites it is necessary to tape or otherwise seal joints and penetrations in the wind barrier, and to form airtight seals between the wall framing and the frames of doors and windows (see comment following Paragraph 5.3.3).

5.6.2 BRANZ recommends

- (a) That all wind barriers:
 - extend from approximately 20 mm below the lowest framing member (bearer or wall plate) to the upper side of the top plate (ie. above eaves level)
 - be fixed to plates, bearers and studs;
- (b) that flexible wind barriers (Photo 12):
 - be installed horizontally
 - be lapped no less than 75 mm at joints, with the direction of lap ensuring that water is shed to the outer face of the barrier;
 - have vertical joints formed over studs;
- (c) that rigid sheet wind barriers (Photo 13):
 - be fixed vertically over the framing with all joints made over framing members
 - be installed with a 3 mm gap between sheets except that polystyrene sheets must be butted
 - be fixed with galvanneal flathead nails having a length of at least three times the sheet thickness and no less than 30 mm
 - be installed in accordance with the sheet manufacturer's instructions (where available). Some manufacturers require protective strips of building paper or polythene over sheet joints.

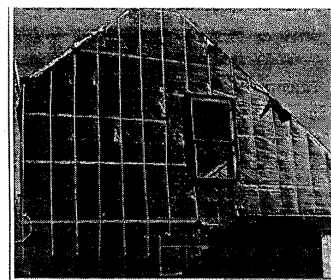


Photo 12. Flexible (building paper) wind barrier.

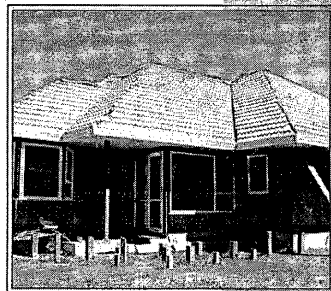


Photo 13. Rigid sheet wind barrier of bitumen-coated insulating board.

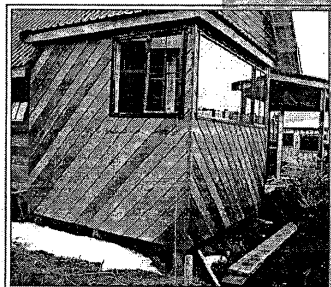


Photo 14. Diagonal rusticated boards.

Figure 22. Clearance above apron flashing.

Figure 23. Head flashing above aluminium window frame.

Figure 29. Relative positioning of flashings.

Figure 24. Head flashing above timber window frame.

Figure 25. Sill flashing for aluminium window frames.

Figure 30. Sill flashing for timber window frame

Figure 26. Drip edge on vertical cladding.

Figure 31: Side flashing and grooved facing.

(d) that sill flashings (Figures 25 and 30):

- be located behind the side flashing.
- be set into a 10 mm saw cut (kerf) in the side of the adjacent studs (if the sill flashing does not slope to the outside it must be folded up at the ends to form a tray).
- discharge water to the outside of the cladding.

(e) that, where necessary, double studs be used to prevent nails penetrating flashings when fixing claddings at corners or the edge of openings.

6.6 Exposed Sites

6.6.1 On sites in high or very high wind zones additional precautions are essential, as water can be driven through small gaps which would not otherwise cause problems on sheltered sites.

6.6.2 BRANZ recommend

That in high or very high wind zones side flashings be installed at windows and doors, and at corner boxes, in the following manner:

(a) for aluminum framed joinery, use a folded aluminum J-flashing that fits around the ends of the weatherboards (Figure 17).

(b) for timber joinery with rusticated weatherboards, form a groove 6 x 6 mm in the back of the facing, 20 mm out from the joinery frame (Figure 31). For bevel back or skew cut weatherboards scribes must be used.

(c) alternatively, for timber or aluminium joinery, insert a strip of material (such as aluminium foil or polythene) 300 mm wide, over the wind barrier at the sides of openings, then fold it around the board ends and terminate it on the face of the cladding under the joinery fixings (Figure 16). For bevel back or skew cut weatherboards scribes must be used.

(d) regardless of the type of flashing used, seal the space between wall framing and joinery with a bead of polyurethane foam, or compressible foam strip, from the inside before installing the linings (note that excessive polyurethane foam can distort the joinery unit);

(e) a similar approach be used to prevent water entry at corner boxes where these are installed.

6.7.1 A good weatherboard job displays a consistent exposed board width over the whole wall, and time taken in careful set-out before fixing boards in place will avoid the need to make awkward adjustments later.

6.7.2 BRANZ recommends

The following method of setting out bevel back or other overlapping, non-rebated horizontal weatherboards:

(a) locate the lowest board to provide a 50 mm overlap below the wall plate or batten and tack in place;

(b) measure the wall height from the underside of the eaves to the bottom of the lowest board using a storey rod (a storey rod is usually a timber batten 50 x25 mm, having a length of no less than the full height of the cladding, and used to accurately set out the bottom edge of each board);

(c) from that measurement deduct the depth of the eaves moulding to give wall height "H" (Figure 32);

(d) determine the maximum board exposure by deducting the minimum required lap from the board width. This is measurement "a";

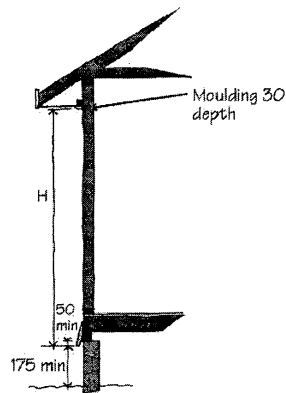
(e) divide "H" by "a" to determine the number of boards required to cover the full height. If H/a results in a number which would give one board less exposure than the others, either:

- lower the bottom board to give an overlap to wall plate or batten of 50 mm maximum, or
- reduce "a" to give a smaller, but even exposure to all boards over the full height;

(f) mark the storey rod from the bottom with saw cuts (kerfs) distance "a" apart and use this as the master rod for making any others required for the setting-out;

(g) starting from the bottom board, use the marked rods to locate the bottom of the next board and at this point locate a nail at each end of the wall;

(h) using a string line between the nails, locate intermediate nails on which to rest the next board to be fixed.



Note: NZS 3604 does not show overlap of lower board

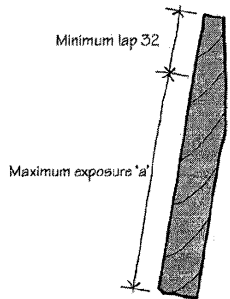


Figure 32. Weatherboard set-out.

Comment: While this is not the only way to set out weatherboards, by using a storey rod instead of just taking a measurement at each board, the chances of a gap or uneven exposure at the top due to minor errors or board distortion is avoided.

6.8 Nail Fixing of Weatherboards

6.8.1 Because remedial work to fix leaks is difficult once the cladding is fixed, it is essential to eliminate possible points of water entry at the time of weatherboard installation. Because timber expands and contracts with changes in moisture content, correct nailing practice is necessary to accommodate this amount of moisture movement without the boards splitting and providing a leakage path through the cladding.

6.8.2 BRANZ recommends

(a) A preliminary inspection of the wind barrier (building paper) and any installed flashings prior to fixing the cladding, and the repair of any damage to ensure that no external moisture can reach the building framing (note that the wind barrier material must start 40 mm below the lowest framing timber and extend to the top of the top plate);

(b) that the number of nails per horizontal board be limited to one only at each stud. This allows the board to move in response to moisture changes without splitting. Similarly, with vertical boards, other than board-on-board profiles, only one nail must be used across the width of the board at each fixing location. Fixings must be located vertically no more than 480 mm apart;

(c) that nails in horizontal and shiplap boards be located beyond the lap by no more than 10 mm (i.e. 35 mm from the edge of the board) and be sloped slightly uphill to avoid water tracking along the nails and into the timber (nailing must not be through the lap as this will restrict board shrinkage and could cause the board to split);

(d) that, for board-on-board profiles, the nailing pattern be as shown in Figure 6. In this case the cover board must be fixed with two nails to ensure it is securely held at the laps. The cover board must be no wider than 150 mm and the nails must be no more than 65 mm apart. (The other boards, fixed against the framing, must still be fixed with only a single nail through the centre of the board at

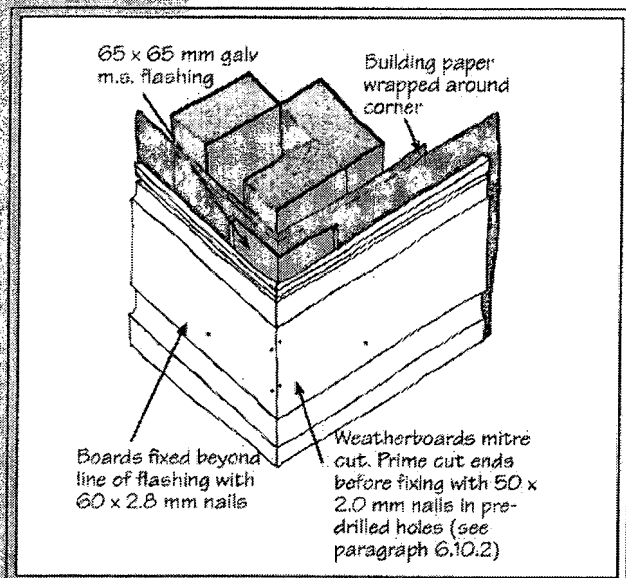


Figure 36. Mitred external corner.

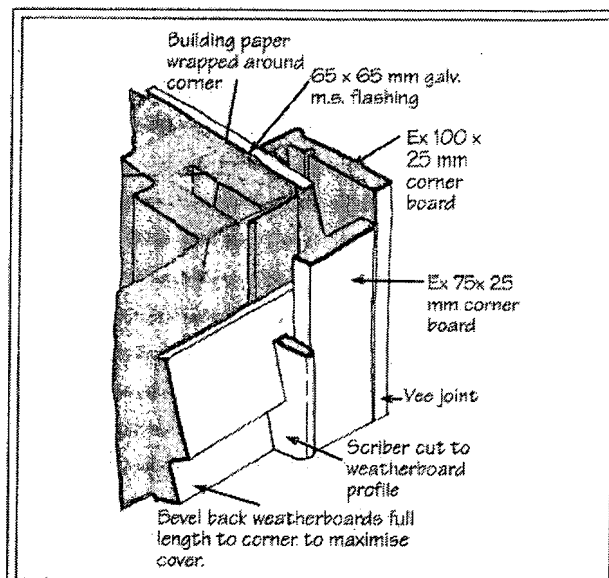


Figure 37. Boxed external corner with bevel back boards.

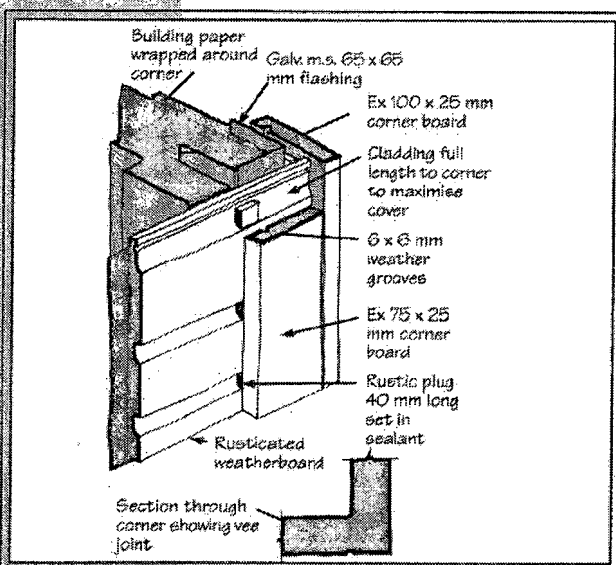


Figure 38. Boxed external corner with rusticated boards.

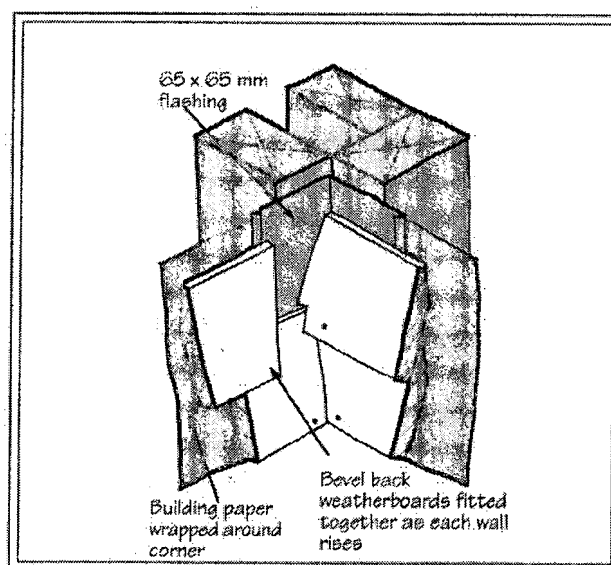


Figure 39. Scribed internal corner.

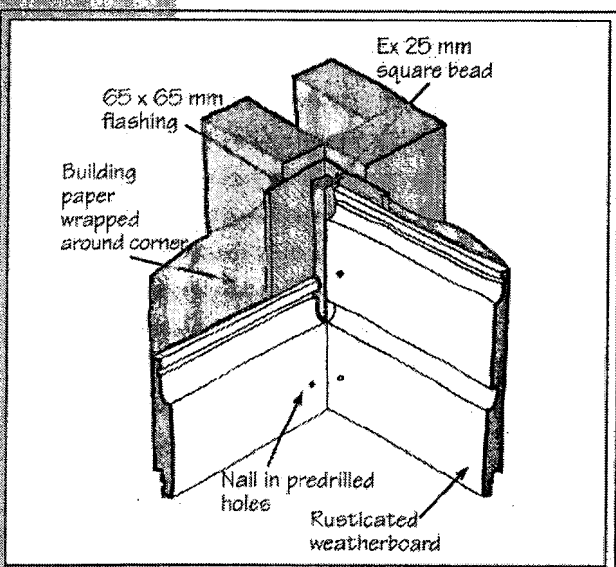


Figure 40. Internal corner with boards butted to corner stop.

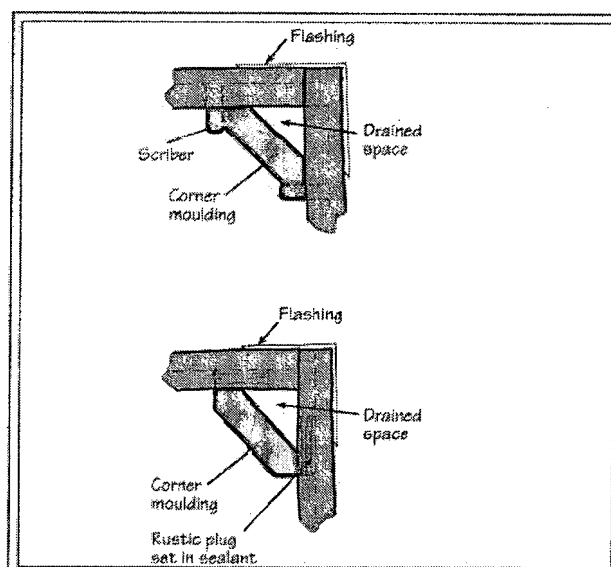


Figure 41. Internal corner with corner moulds.

Product: Resco Series 7000	Product Code: S-7000
Approved Publication Date: October 2010	

Series 7000 cubicle system

The Series 7000 stands out with its bold lines and strong design. An extremely sturdy product designed for high volume traffic and continued public use. All Resco systems only use Compact Laminate, ensuring your cubicles are built to last in these wet and often high abuse areas.

Recommended for

Public toilets
Schools
Sport & Recreational areas
Shopping Centres
Prisons and correctional facilities
Youth centres
Community Clubs
Camping & Caravan sites
Offices
Hotel complexes

Features

Specific qualities of the Series 7000

- Impervious panels, provides solutions for both toilet and shower situations
- Wide range of colours and finishes
- Strong and durable – Resco's most robust cubicle system
- Easy to clean and low maintenance
- 13 mm prefinished Compact Laminate panels
- Available as toilet and shower cubicles
- Die cast indicator bolt and coat hook/doorstop
- Tailored to withstand intensive use
- Door strikers lined to soften the closing doors
- Aluminium self closing or self opening hinges

Standard materials and manufacture

- 13 mm Compact Laminate panels
- Made-to-fit customised extrusions
- Die cast indicator bolt, finished in satin chrome
- Die cast coat hook/doorstop in satin chrome
- 120 mm wide oval head rail, supported by rebated 75 mm tubular aluminium stiles either side of the doors
- Stainless steel self opening gravity hinges

Edge treatment

- No edging is required as Compact Laminate is a finished product, a simple furniture oil enhances the black edge

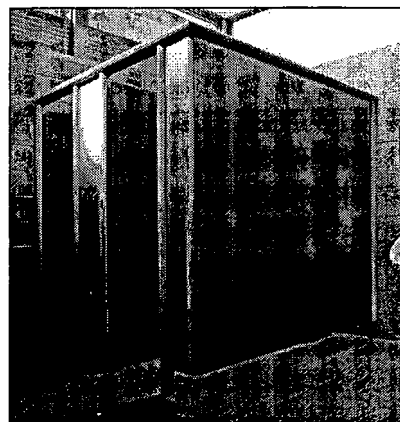
Options

- Shower seats and brackets
- Privacy and modesty screens to match your colours
- Sliding doors for 'accessible' cubicles
- Aluminium hinges with nylon bushes and s/s pins finished in silver satin
- Different configurations are available, including return-cubicles

Colours

Panel Colours

The Series 7000 is available in the Maica Compact Laminate stock colour range and the Laminex Compact Laminate range.



The Maica Accent colour range is also available on a 12-week lead time.

Aluminium Colours

The Series 7000 extrusions are available in any of the Duralloy powder coating colour range from Dulux.

See the Web site or call for samples.

See over page for typical system layout and sizing

Series7000
Advanced cubicle systems

Dimensions

As cubicles are tailored to your measurements, depths and widths can be varied to suit most requirements, incorporating 'accessible' cubicles where required. The Series 7000 standard dimensions are:

- Height 2010 mm with 160 mm clearance
- Depth 1600 mm - 1800 mm (1900 mm for accessible)
- Standard cubicle doors 610 mm (opening 585 mm)
- Accessible cubicle doors 810 mm (opening 785 mm)
- Sliding doors are also available

Durability and maintenance

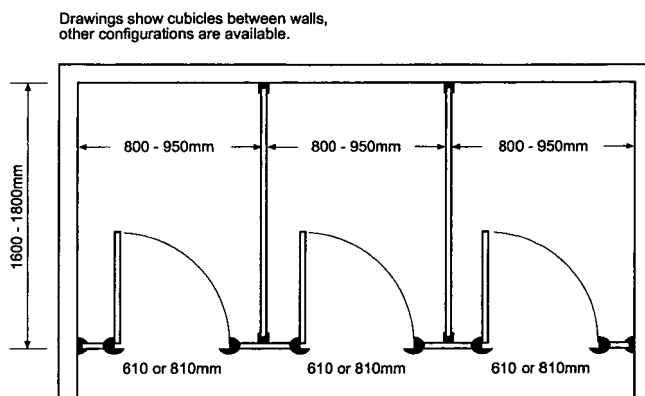
- Compact Laminate panels means an extended product life
- Being a tough durable product it is perfect for high traffic locations and because it is impervious to water it is ideal in wet areas
- With robust aluminium extrusions the Series 7000 is built-for-purpose
- Easily cleaned with mild detergent
- **10-year guarantee** on panel integrity and **2-years** on hardware



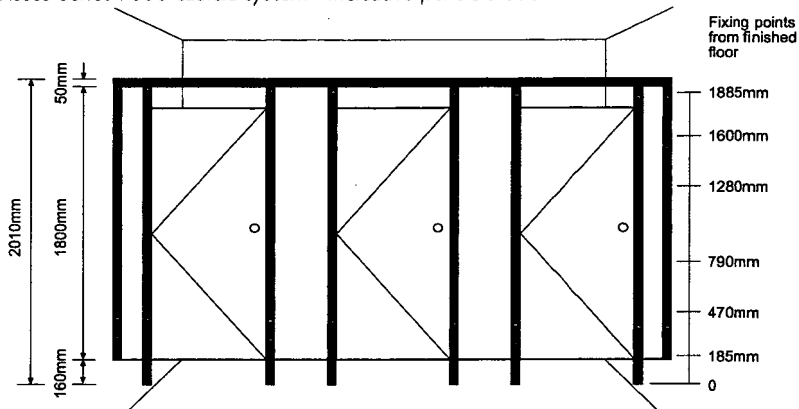
Installation

Resco has an installation service available. Or customers can install themselves as Resco cubicles come as a kitset delivered to site, which includes installation manuals and hardware.

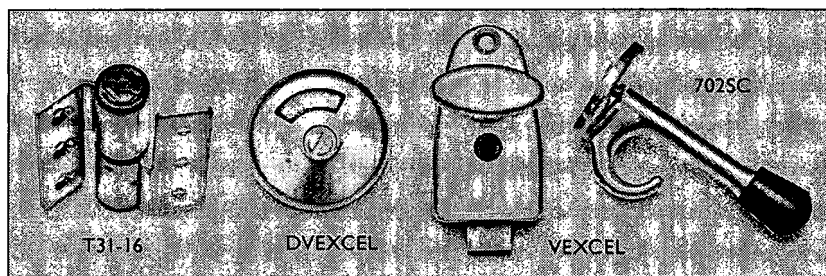
Resco Series 7000 cubicle system - Indicative floor plan



Resco Series 7000 cubicle system - Indicative front elevation



Drawings show cubicles between walls, other configurations are available.



Contact

For pricing, email your plans or drawings to:

info@resco.co.nz
or fax **07 850 1026**.

Call Resco on **0800 800 950** for their full range or visit the Web site **www.resco.co.nz** and click on **Series 7000**.

**For 'Accessible' layout, click on Disability Needs on the homepage.*

RESCO

Resco Ltd
23a The Boulevard
Te Rapa Park
Hamilton 3200

This information may change without notice.

Series7000

Advanced cubicle systems

Product: Resco Multicom	Product Code: M-Com
Approved Publication Date: October 2010	

Multicom® Wall Panelling

Resco's Multicom® wall panelling system is a cost-effective, high-impact resistant one-panel system. Panels are compact laminate and are blind fixed with no need for a conventional impact resistant backing sheet.

All Resco systems only use Compact Laminate, ensuring your cubicles are built to last in these wet and often high abuse areas.

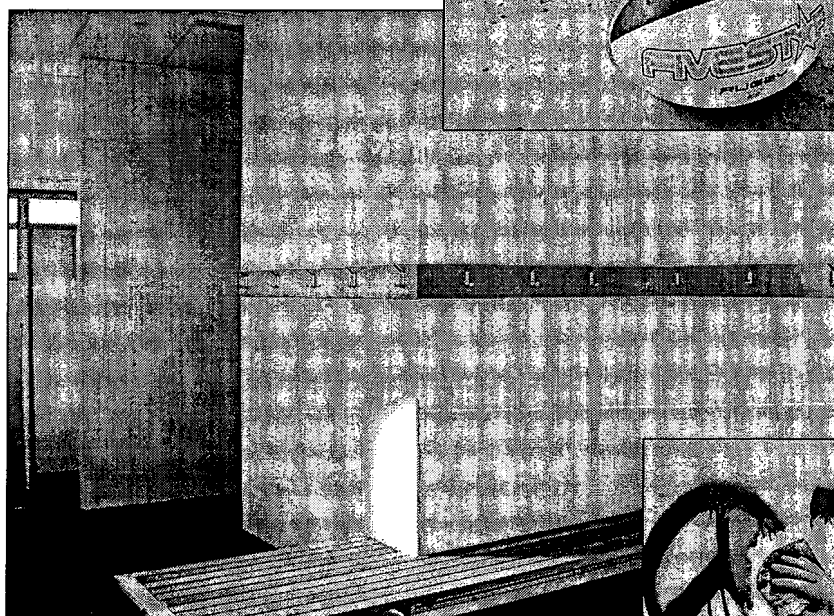
Recommended for

Ablution blocks
Shower
Toilet blocks
Commercial kitchens
Operating theatres
Retired / Elderly
residential facilities
Changing rooms
Gyms
Prisons
High abuse residential housing

Features

Specific qualities of Multicom®

- Wide range of colours and finishes
- Strong and durable – 'built-for-purpose'
- Easy to clean and low maintenance
- 6 mm prefinished Compact Laminate panels
- Impervious panels, provides solutions for wet areas
- Compact laminate is high impact resistance, which means it is ideal for changing rooms and public areas
- Customised aluminium jointers with built in expansion slots
- Blind fixed for a cleaner look
- The large sheet-size minimises number of jointers



Colours

Panel Colours

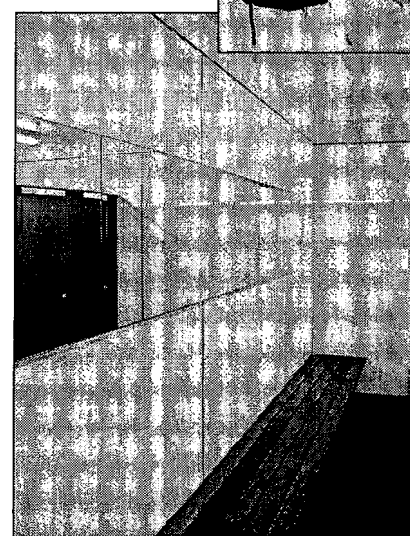
Multicom® is available in the Maica Compact Laminate stock colour range.

The Maica Accent colour range is also available on a 12-week lead time.

Aluminium Colours

Multicom® extrusions are available in any of the Duralloy powder coating colour range from Dulux.

See the Web site or call for samples.



See over page for typical wall panelling layout and sizing options.

MultiCom®
Advanced wall panelling

Standard setup

- 6 mm Compact Laminate panels with a sheet size of 2440 mm x 1840 mm are attached to wall using customised aluminium jointers with built-in expansion slots
- Can be installed direct onto framing or if a flat surface use 18 mm x 40 mm H3.1 battens at 600 centres.
- Carry out the installation according to 'Resco's Installation Instructions'
- The panels can be cut with a skill saw using fine-tooth tungsten tipped blade

Durability and maintenance

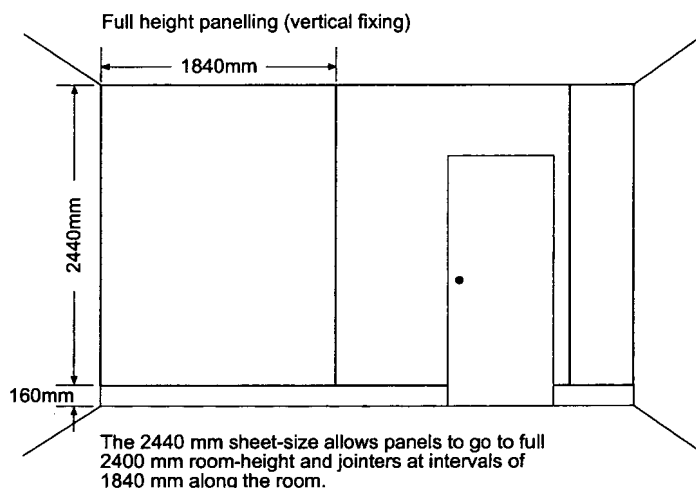
- Compact Laminate panels means an extended product life
- Being a tough durable product it is perfect for high traffic locations and because it is impervious to water it is ideal in wet areas
- Easily cleaned with mild detergent. Strong Graffiti resistance
- 10-year guarantee on panel integrity



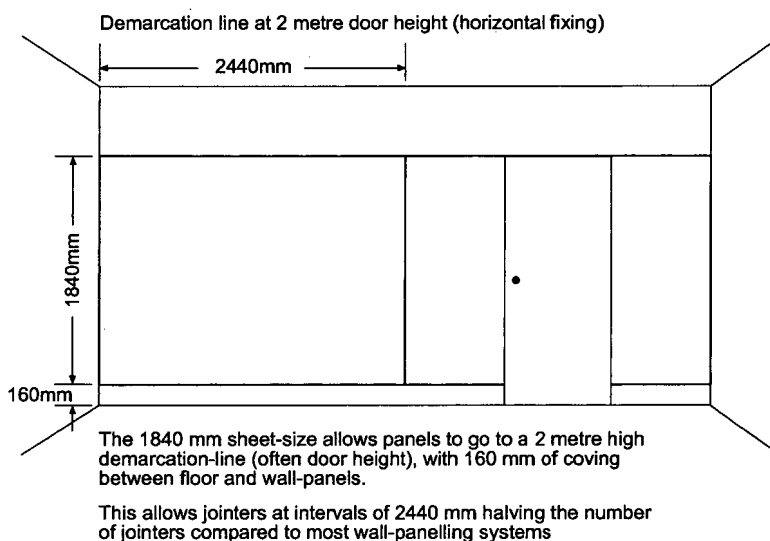
Installation

Multicom® is supplied as a complete system including materials required and installation instructions.

Resco Multicom Wall Panelling - Panel configuration options (vertical)



Resco Multicom Wall Panelling - Panel configuration options (horizontal)



Contact

For pricing, email your plans or drawings to:

info@resco.co.nz
or fax **07 850 1026**.

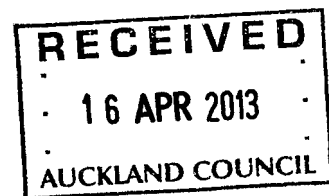
Call Resco on **0800 800 950** for their full range or visit the Web site **www.resco.co.nz** and click on **Multicom**.

RESCO

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23a The Boulevard
Te Rapa Park
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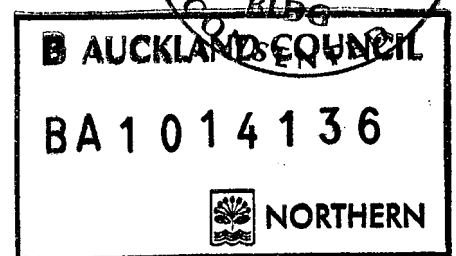
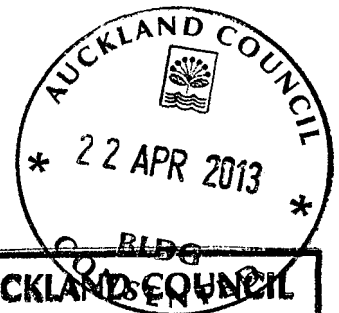
MultiCom®
Advanced wall panelling



PRODUCT SPECIFICATION

Surface-mounted sanitary napkin disposal, Bobrick ConturaSeries® Model B-270.

Surface-mounted sanitary napkin disposal shall be constructed of 22-gauge (0.8mm), type 304 stainless steel with satin finish. Front of sanitary napkin disposal shall have same degree of arc and match other Bobrick ConturaSeries® accessories in the washroom. Radius on corners and edges of sanitary napkin disposal shall be complementary and match other Bobrick ConturaSeries® washroom accessories. One-piece, drawn cover shall be equipped with a full-length stainless steel piano hinge.





Technical Data

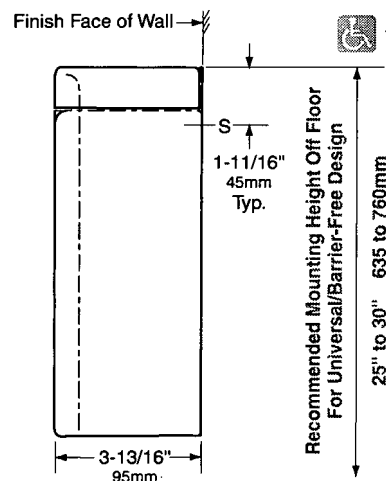
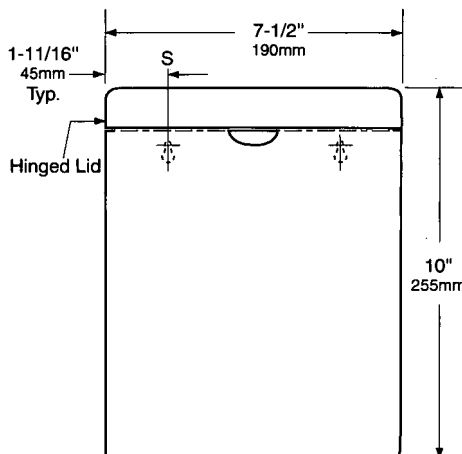
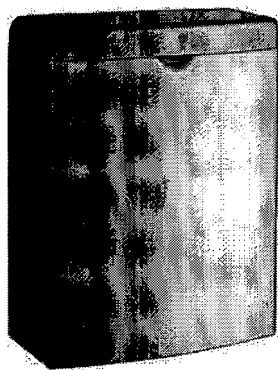
ConturaSeries® SURFACE-MOUNTED SANITARY NAPKIN DISPOSAL

RECEIVED

16 APR 2013

AUCKLAND COUNCIL

B-270



MATERIALS:

Container — 18-8 S, type-304, 22-gauge (0.8mm) stainless steel. All-welded construction. Exposed surfaces have satin finish. Integral finger depression for opening cover. Front of container has same degree of arc as front of cover and other Bobrick ConturaSeries washroom accessories. Radius on side edges of container match corners and edges of cover and other ConturaSeries accessories.

Cover — 18-8 S, type-304, 22-gauge (0.8mm) stainless steel with satin finish. Drawn, one-piece, seamless construction. Front of cover has same degree of arc as front of container and other Bobrick Contura Series washroom accessories. Radius on corners and edges of cover match side edges of container and other Contura Series accessories. Secured to container with a full-length stainless steel piano-hinge.

OPERATION:

Cover flips up for disposal of sanitary napkins and for servicing container. Disposable paper liners for the container are available as an optional accessory: order Bobrick Part No. 270-12.

INSTALLATION:

For partitions with particle-board or other solid core, secure with two #8 x 3/4" (4.2 x 19mm) sheet-metal screws (not furnished) at all points indicated by an S, or provide through-bolts, nuts, and washers.

For hollow-core metal partitions, provide solid backing into which sheet-metal screws can be secured. If two units are installed back-to-back, then provide threaded sleeves and machine screws for the full thickness of partition.

For masonry walls, provide fiber plugs or expansion shields for use with sheet-metal screws, or provide 3/16" (5mm) toggle bolts or expansion bolts.

For plaster or dry wall construction, provide concealed backing to comply with local building codes, then secure unit with sheet-metal screws.

SPECIFICATION:

Surface-mounted sanitary napkin disposal shall be type-304 stainless steel with all-welded construction; exposed surfaces shall have satin finish. Front of sanitary napkin disposal shall have same degree of arc and match other Bobrick ConturaSeries accessories in the washroom. Radius on corners and edges of sanitary napkin disposal shall complement other Bobrick ConturaSeries washroom accessories. Cover shall be drawn, one-piece, seamless construction and secured to container with a full-length stainless steel piano-hinge. Container shall have integral finger depression for opening cover.

Surface-Mounted Sanitary Napkin Disposal shall be Model B-270 of Bobrick Washroom Equipment, Inc., Clifton Park, New York; Jackson, Tennessee; Los Angeles, California; Bobrick Washroom Equipment Company, Scarborough, Ontario; Bobrick Washroom Equipment Pty. Ltd., Australia; and Bobrick Washroom Equipment Limited, United Kingdom.

RECEIVED

16 APR 2013

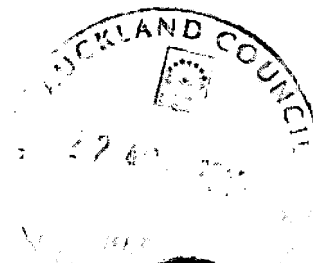
AUCKLAND COUNCIL

Steri

AUCKLAND COUNCIL

BA 1014136

NORTHEN



System Tested and Certified by NSF International
against NSF/ANSI Standard 55 for Disinfection
Performance, Class A.

MODELS: SPV-200, SPV-410,
SPV-600, SPV-740, SPV-950

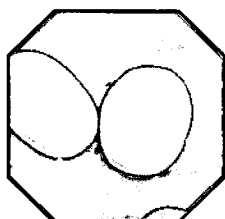
your water

Sterilight®

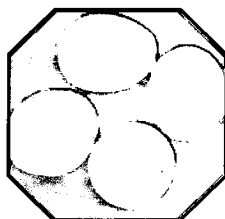
PLATINUM

Sterilight® Platinum will ensure the safety of your water...

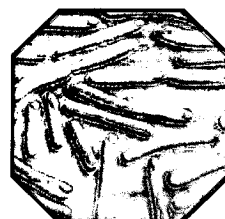
Sterilight's PLATINUM UV disinfection systems offer simple, safe and effective disinfection. If water-borne pathogens, including bacteria, virus, protozoa and others are a concern, Sterilight PLATINUM UV is the answer!



Giardia lamblia



Cryptosporidium



E. coli

Disinfection using ultraviolet (UV) light is fast becoming the ecological choice in disinfection techniques. UV effectively destroys microbial contaminants without adding anything to the water. Unlike chlorine where there is the possibility of potentially harmful by-products created during its disinfection process, UV creates no residual disinfection by-products. The process is quickly completed within the confines of the reactor. Unlike chlorine and ozone treatments, no external tanks are required and no hazardous chemicals need to be handled.

Sterilight's PLATINUM UV systems incorporate a unique stainless steel reactor design based on advanced computational fluid dynamic (CFD) modeling. These new reactors create an

extremely efficient fluid flow path, ensuring that ultraviolet light is effectively

delivered to any micro-

biological organism

residing in the

water. As the

organisms pass

through the

reactor, a power-

ful high-output

UV lamp irradiates

the organism with a

lethal dose of germicid-

al UV light, rupturing

its DNA

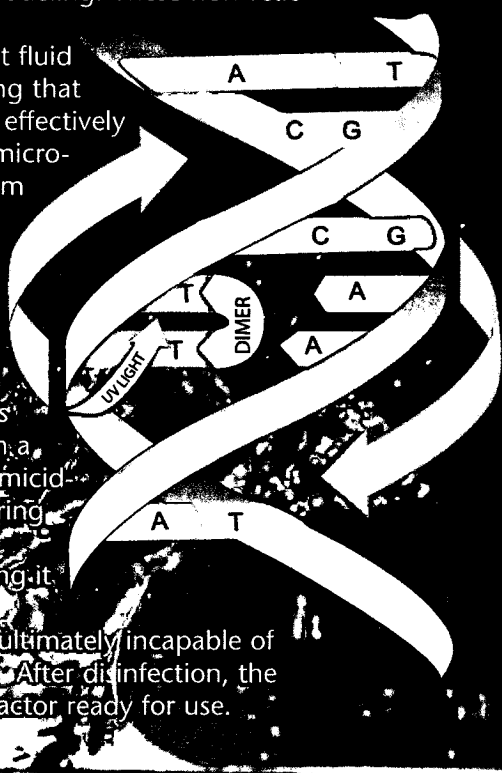
(or RNA), rendering it

incapable of

reproducing and ultimately incapable of

causing infection. After disinfection, the

water exits the reactor ready for use.



Looking for a system that provides more information than just when it is time to change your lamp? Look no further than Sterilight's new

PLATINUM ICE CONTROLLER. This

revolutionary device includes a small touch panel switch providing a graphical representa-

tion of a variety of system functions. Depress switch to obtain UV output represented in %

UV intensity output". Depress switch two times

to obtain remaining lamp life and depress

three times to show total controller run-

ningtime.

UV disinfection systems are used around the

world treating water, air and other viscous flu-

ids. Applications are broad and ever expand-

ing. They include residential, commercial,

institutional and now municipal applications.

Sterilight systems have been installed and

operating around the world since 1986.

Sterilight has become a world leader in the

design and manufacture of UV disinfection sys-

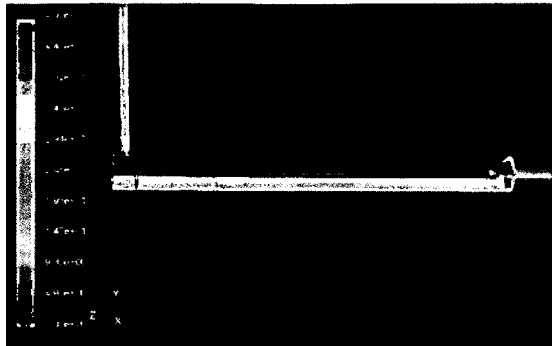
tems and continues to make many advance-

ments within the industry.

Reactor

Sterilight's new PLATINUM reactors were designed using advanced computational fluid dynamics (CFD) to optimize the fluid flow path, ensuring that ultraviolet light is more efficiently delivered to any microbiological organism residing in the water.

This achievement represents a marked improvement over traditional designs, which tend to suffer from reduced overall efficiency due to non-uniform dose distribution within the reactor.

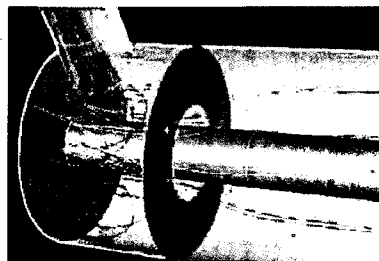


This new Sterilight reactor starts with an axial flow inlet that directs the fastest flowing fluid to the region of highest intensity close to the UV lamp. Just prior to the outlet, the Sterilight PLATINUM design incorporates a unique flow distributor which again forces the water into close proximity to the lamp. This represents a marked improve-

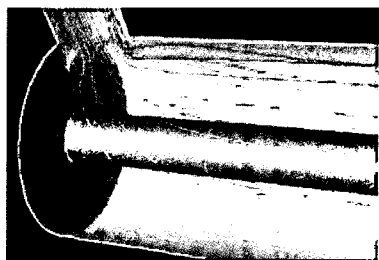
Sterilight

PLATINUM

ment over other products which allow a portion of the water to take a "fast-track" short-circuit path along the reactor wall near the outlet port, with the result that some microorganisms receive less than optimal germicidal dose.



This CFD image shows water track path lines as they approach and go through the Platinum reactor's unique flow distributor prior to exiting the reactor. This flow distributor ensures that the water follows the most optimum path in this region, enabling more effective delivery of germicidal UV energy to any microorganism in this zone.

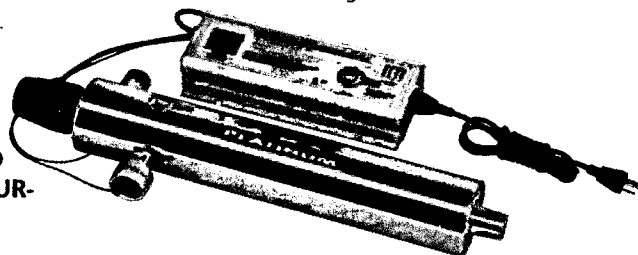


Other systems, as shown at left without the Sterilight flow distributor, allow a portion of the water to take a "fast-track" short-circuit path (dark blue lines) along the reactor wall near the outlet port. This short-circuit path is flowing faster as it approaches the outlet, and even exits the reactor early before traveling the full lamp length! Coupled with the fact that the UV intensity is lower near the reactor wall, microorganisms following this short-circuit path will receive lower germicidal dose.

Controller

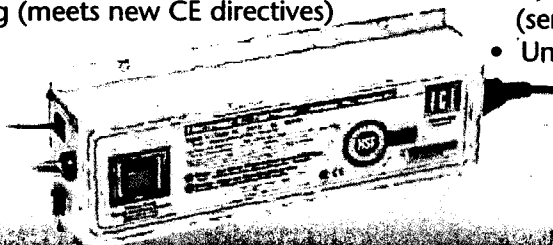
PLATINUM
ICE
CONTROLLER

IF YOU ARE LOOKING FOR THE MOST ADVANCED UV CONTROLLER ON THE MARKET....LOOK NO FURTHER THAN STERILIGHT'S NEW PLATINUM ICE CONTROLLER.



This patented controller features an integral Smart Switch™, which provides a graphical interface and selection switch all in one compact unit. The PLATINUM ICE controller provides features typically found only on commercial systems costing thousands of dollars more. The new PLATINUM ICE provides:

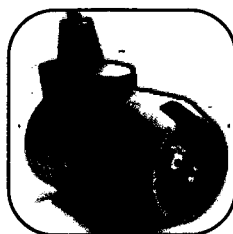
- 100-250 VAC universal operation
- Visual UV intensity readings (reads in % UV intensity output)
- Visual elapsed time meter (counts down remaining days between lamp changes and provides for total running time of the controller)
- Constant current output over entire input line voltage
- Active power factor correction
- EMI/RFI filtering (meets new CE directives)
- One controller to drive all lamps
- Isolated power source for alarm system
- True lamp current detection
- Full diagnostic check on start-up
- Separate fuse protection for controller circuit
- Dry contacts (for solenoid, lamps, audible alarms, etc.)
- RJ-11 communication port (sensor output and future RF remote alarm package)
- Universal IEC power input connector



Safety-Loc™

Connector

Once again, Sterilight offers an industry first: an interlock switch moulded into the new **Safety-Loc™** lamp connector. The interlock switch prevents lamp operation in the event that the lamp is not fully inserted into the reactor chamber. This new design

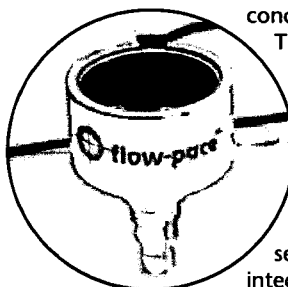


offers the user quick and simple removal of the lamp connector by hand without any special tools or assistance. This connector is keyed to the reactor chamber, allowing for the correct lamp orientation within the reactor and thereby eliminating potentially false sensor readings. The Safety-Loc™ connector is keyed to the Sterilume™ lamps, ensuring the integrity of the manufacturer's lamp/controller design selection.



UV Sensor

Sterilight's new **Flow-Pace™** UV sensor is a discrete 254nm sensor which incorporates the latest in UV detection components for stable, long-life reliability. In addition, the UV sensor is capable of detecting a low-flow condition with a novel design technique.



The processing electronics are all enclosed in a compact, watertight enclosure. This patent pending design, when coupled with the new Platinum ICE controller, allows for 2-stage flow pacing that automatically adjusts lamp power to the water flow. This unique design incorporates the sensor and calibration electronics in an integral unit, thus eliminating the two separate components used in competitive units. This "flow-pacing" results in lower power consumption, reduced operational costs and ultimately less heat transfer into the water!

Lamps Sterilume™

Sterilight's Sterilume™-HO ultraviolet disinfection lamps use new low-pressure high-output lamp technology. These lamps incorporate an advanced proprietary lamp coating, offering consistent UV output over the life of the lamp. These lamps offer superior cold water starting conditions, ideal for those cold weather climates. High-output lamps offer more UV output than traditional designs, therefore more compact systems can be designed to deliver even higher UV fluence (dose). Sterilight offers a full one year warranty on their Sterilume™-HO lamps!



Sizing

The UV fluence (dose) delivered by a given reactor is dependent on many factors, including water quality and flow rate. Actual delivered fluence is flow dependent. As fluence is a product of UV intensity and residence time within the reactor, changes in the flow rates through a reactor will change the delivered fluence. NSF/ANSI Standard 55 requires that the UV system deliver a minimum UV fluence of **40 mJ/cm²** at the alarm set-point. The accompanying graph shows how the delivered fluence will be affected at varying UV transmittance levels. It should be noted that as the NSF/ANSI certified systems contain a flow restrictor to limit the maximum flow at the certified level. Therefore at maximum flow, the systems are capable of delivering much higher fluences at higher levels of water quality. As an example, if your water has UVT of 95%, the delivered fluence of the system will be in excess of 95 mJ/cm². Conversely, systems that flow less than the "validated" flow will result in an increased fluence.

Fluence
(Dose)



UV intensity x time
 $\mu\text{W}/\text{cm}^2 \times \text{sec}$
 mJ/cm^2

Note: $1\text{mJ}/\text{cm}^2 = 10\text{mJ}/\text{m}^2 = 1000\mu\text{Wsec}/\text{cm}^2$

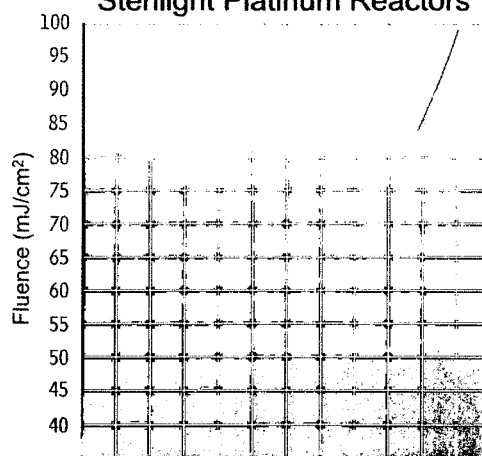
As a note, microorganisms require varying UV fluence levels for destruction. Some of the common organisms and their corresponding fluence level are shown below.

MICROORGANISM	FLUENCE (DOSE)
<i>E. coli</i> ¹	6.6 mJ/cm²
<i>Cryptosporidium parvum</i> ¹	<10 mJ/cm²
<i>Giardia lamblia</i> ¹	<10 mJ/cm²
Hepatitis Virus¹	8 mJ/cm²
Influenza Virus¹	6.6 mJ/cm²
<i>Shigella dysenteriae</i> ¹	4.2 mJ/cm²
<i>Legionella pneumophila</i> ¹	3.8 mJ/cm²
<i>Salmonella paratyphi</i> ¹	6.1 mJ/cm²

1. 2-log reduction

2. 4-log reduction

Sterilight Platinum Reactors



Product Specifications

Models		SPV-200	SPV-410	SPV-600	SPV-740	SPV-950
Flow Rate						
40 ml/cm ²		2.6 gpm (9.9 lpm) (0.5 m ³ /hr.)	5.9 gpm (22.6 lpm) (1.3 m ³ /hr.)	8.6 gpm (32.7 lpm) (1.9 m ³ /hr.)	11.2 gpm (42.4 lpm) (2.5 m ³ /hr.)	14.9 gpm (56.6 lpm) (3.4 m ³ /hr.)
UV Intensity Monitor		yes	yes	yes	yes	yes
Flow Pacing		yes	yes	yes	yes	yes
Elapsed Time Meter	Countdown	yes	yes	yes	yes	yes
	Total Hours	yes	yes	yes	yes	yes
Flow Restrictor		yes	yes	yes	yes	yes
Dry Contacts		yes	yes	yes	yes	yes
Safety Interlock		yes	yes	yes	yes	yes
Lamp Replacement Reminder		yes	yes	yes	yes	yes
Diagnostic Check		yes	yes	yes	yes	yes
Communication Port		yes	yes	yes	yes	yes
Reactor Chamber Material		316 L SS	316 L SS	316 L SS	316 L SS	316 L SS
Electropolished & Passivated		yes	yes	yes	yes	yes
Electrical	Volts	90-265V./50-60Hz.	90-265V./50-60Hz.	90-265V./50-60Hz.	90-265V./50-60Hz.	90-265V./50-60Hz.
	Power Consumption	35 W	52 W	73 W	88 W	110 W
	Lamp Watts	30 W	45 W	65 W	80 W	100 W
Maximum Operating Pressure		8.62 bar (125 psi)	8.62 bar (125 psi)	8.62 bar (125 psi)	8.62 bar (125 psi)	8.62 bar (125 psi)
Minimum Operating Pressure		1bar (14.5 psi)	1bar (14.5 psi)	1bar (14.5 psi)	1bar (14.5 psi)	1bar (14.5 psi)
Pressure Drop at Rated Flow		0.3 bar (4psi) at 50% rated flow				
Ambient Water Temperature		2-40°C (36-104°F)	2-40°C (36-104°F)	2-40°C (36-104°F)	2-40°C (36-104°F)	2-40°C (36-104°F)
Maximum Ambient Temperature		50°C (122°F)	50°C (122°F)	50°C (122°F)	50°C (122°F)	50°C (122°F)
Dimensions	Reactor	17.8" x 3.5" (452 x 89 mm)	26.4" x 3.5" (670 x 89 mm)	33.9" x 3.5" (860 x 89 mm)	39.4" x 3.5" (1000 x 89 mm)	47.6" x 3.5" (1210 x 89 mm)
	Controller	10.75" x 4.5" x 2" (254 x 114 x 53 mm)	10.75" x 4.5" x 2" (254 x 114 x 53 mm)	10.75" x 4.5" x 2" (254 x 114 x 53 mm)	10.75" x 4.5" x 2" (254 x 114 x 53 mm)	10.75" x 4.5" x 2" (254 x 114 x 53 mm)
Shipping Weight		12 lbs (5.4 kg)	15 lbs (6.8 kg)	18 lbs (8.2 kg)	19 lbs (8.6 kg)	21 lbs (9.5 kg)
Inlet/Outlet Port Size		1/2" MNPT	Combo 3/4" FNPT/ 1" MNPT	Combo 3/4" FNPT/ 1" MNPT	Combo 3/4" FNPT/ 1" MNPT	Combo 3/4" FNPT/ 1" MNPT
NSF/ANSI Standard 55 Class A Validation		yes	yes	yes	yes	yes
Other Certifications		 	 	 	 	 

1. Flow rates stated as determined by NSF/ANSI Standard 55 testing.

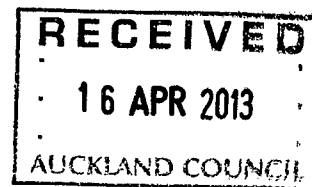
NOTE: UVT at 75% stated at 20°C please consult factory for other water temperatures

Water Quality Guidelines

- Iron: < 0.3 ppm (0.3 mg/L)
- Hardness: < 7gpg (120 mg/L)
- Turbidity: < 1 NTU
- Manganese: < 0.05 ppm (0.05 mg/L)
- Tannins: < 0.1 ppm (0.1 mg/L)
- UV Transmittance: > 75% (UVT at 75% stated at 20°C please consult factory for other water temperatures or if UVT level is <75%)



A TROJAN TECHNOLOGIES COMPANY



VIQUA - a Trojan Technologies Company is proud to be an NSF certified manufacturer. NSF International's Standards are voluntary consensus standards, "developed with the active participation of public health and other regulatory officials, users, and industry".

NSF certification assures regulators and consumers that a credible, objective, independent third party has verified product compliance with specific standards.

VIQUA is located in Guelph, Ontario, Canada, which is physically situated 40 miles to the west of Toronto in the heart of Southwestern Ontario's manufacturing district. A modern facility houses all manufacturing, distribution, sales and marketing operations. VIQUA's total focus is in the water treatment industry and has been manufacturing UV systems under the Sterilight and other brand names since 1989. VIQUA's corporate commitment is to provide quality water treatment products and exceptional service, all at the most economical prices!

General Installation and Operating Requirements

- Lamps must be replaced after 9,000 hours (approximately 1 (one) year) of continuous service.
- Quartz sleeves and UV sensor window will require periodic cleaning. Please refer to Owner's Manual for cleaning details and frequency.
- Proper maintenance of any pre-treatment equipment is essential to the proper functioning of a UV system. Please refer to Owner's Manual for greater detail.
- Replacement parts and service are available through Authorized Representatives around the world. Please contact VIQUA for further information.



System Tested and Certified by NSF International against NSF/ANSI Standard 55 for Disinfection Performance, Class A.

This class A system conforms to NSF/ANSI 55 for the disinfection of micro-biologically contaminated water that meets all other public health standards. The system is not intended to convert wastewater or raw sewage to drinking water. The system is intended to be installed on visually clear water.

NSF/ANSI 55 defines wastewater to include human and/or animal body waste, toilet paper, and any other material intended to be deposited in a receptacle designed to receive urine and/or feces (blackwaste); and other waste materials deposited in plumbing fixtures (greywaste).

If this system is used for the treatment of untreated surface waters or ground water under the direct influence of surface water, a device found to be in conformance for cyst reduction under the appropriate NSF/ANSI Standard shall be installed upstream of the system.



Sterilight systems carry a 7 year warranty on the stainless steel reactor chamber, a 1 year warranty on UV lamps and monitor probes, and a 5 year pro-rated warranty on all other components.

For further information contact:

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