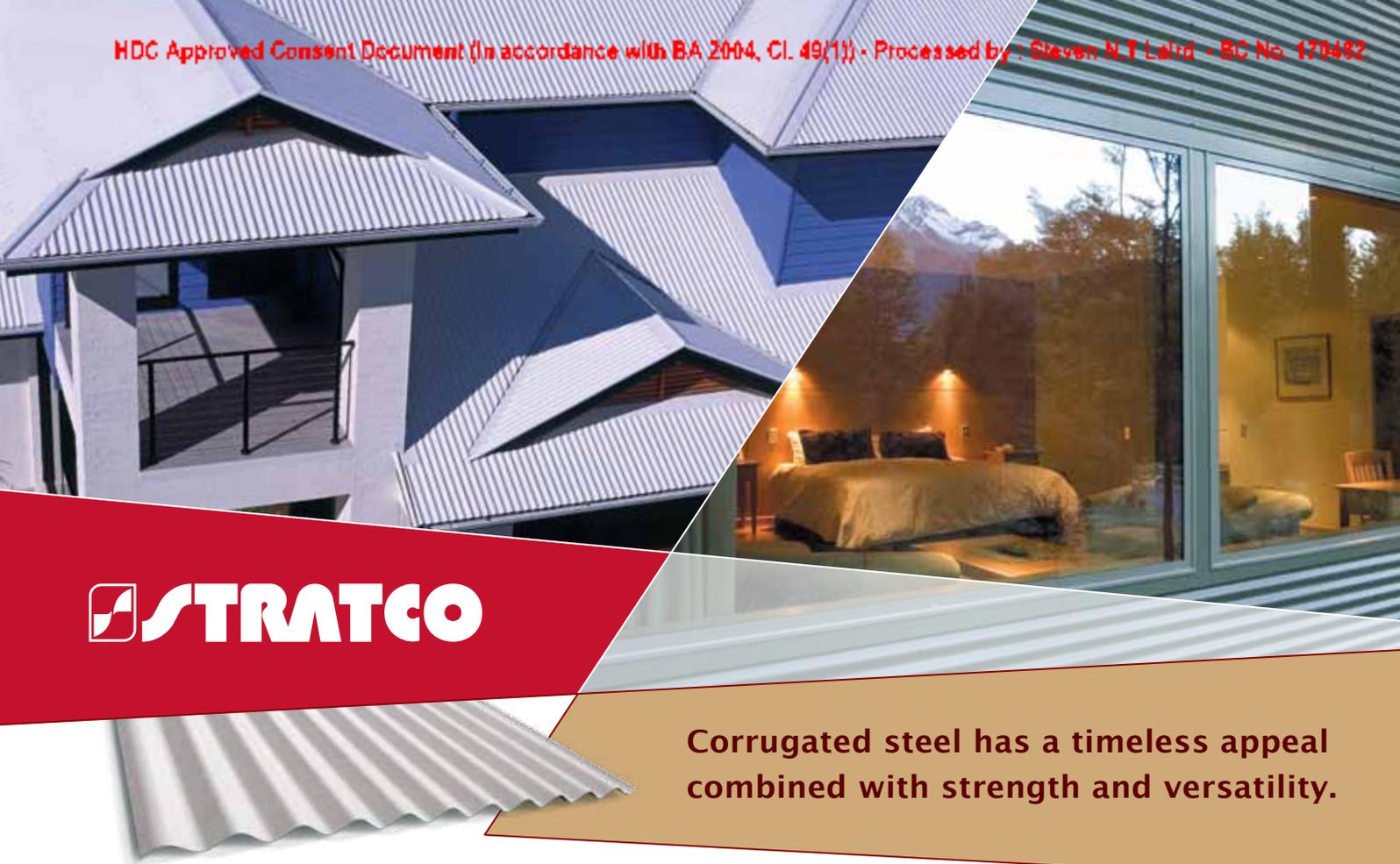


CGI Corrugated

 STRATCO





Corrugated steel has a timeless appeal combined with strength and versatility.

FORM AND FUNCTION

Stratco Corrugated Iron (CGI) provides you with the style and strength that have been popular in Australia and New Zealand for well over one hundred years. CGI has the advantage of high strength, adaptability and easy handling and installation. It is a practical and versatile solution for roofing and walling applications. Its profile enables it to blend in with contemporary homes, older styled homes, industrial buildings or sheds. In addition, CGI is popular in domestic fencing applications.

CGI is made from high tensile steel for strength and impact resistance. It is available in long lengths for added life and enhanced appearance. It has a non-syphoning side lap which reduces the risk of moisture transfer between sheets due to capillary action, thus reducing the risk of roof leakage. CGI is available in un-painted zinc/alum, and in an attractive range of factory pre-painted colours.

CUSTOM MADE FOR YOUR PROJECT

For lengths longer than 1.2 metres, CGI is rolled to the specific length you require, provided satisfactory transport and handling facilities can be arranged. If lengths longer than ten metres are required, consult your nearest Stratco for advice on handling and transport.

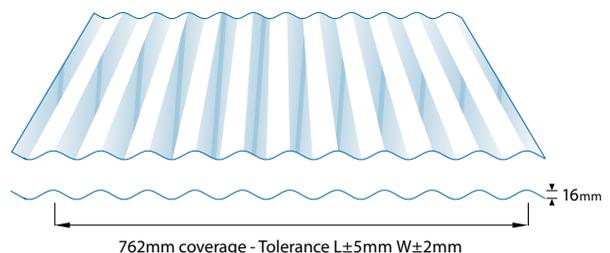
To give your roof a professional finish, painted self-drilling screws are available. Stratco offer a complete range of accessories and flashings for use with CGI, and can provide professional advice on specific flashings. In addition to straight CGI sheeting, pre-curved or bullnosed CGI sheets are available. Technical details are provided in a brochure which deals with this type of application.

DESIGN CONSIDERATIONS

CGI has a 762mm coverage and the minimum recommended roof pitch is five degrees (1 in 12). CGI roofing is subject to thermal expansion. Darker colours are affected more than light, and spring curved sheeting needs additional consideration. The maximum length before an expansion joint is needed is 24 metres for light colours, and 16 metres for dark colours. For spring curved sheeting this distance is 20 metres for light colours and 16 metres for dark colours.

Spring Curving

CGI roofing may be spring curved using purlins at a maximum spacing of 800mm for .42mm BMT and 1000mm for .48mm BMT. The curve must have a minimum radius of 12m for .42mm BMT and 10m for .48mm BMT. The maximum radius is 35m to allow for sufficient drainage over a crest. The side laps must be sealed wherever the roof pitch is less than the recommended minimum.





MATERIAL SPECIFICATIONS

Material Properties	Finish	0.35 BMT	0.42 BMT	0.48 BMT
Total Coated Thickness (TCT) mm	Zinc/alum	0.40	0.47	0.53
	Colour	0.43	0.50	0.56
Mass (kg/linear metre)	Zinc/alum	2.74	3.26	3.70
	Colour	2.79	3.32	3.76
Mass (kg/square metre)	Zinc/alum	3.60	4.28	4.86
	Colour	3.67	4.35	4.93
Yield (square metre/tonne)	Zinc/alum	277.9	233.8	205.9
	Colour	272.3	229.8	202.8
Tensile Strength (MPa)	Zinc/alum & Colour	550	550	550
Width Coverage (mm)	Zinc/alum & Colour	762	762	762
Sheet Tolerances (mm)	Length & Width	±5 ±2	±5 ±2	±5 ±2
Minimum Roof Pitch	Zinc/alum & Colour	N/A	5°	5°

Table 1.0

COMPLIANCE

The Wind Capacity Tables are based on testing in accordance with AS1562.1-1992 and AS4040.0, 1 & 2-1992. Span tables have been developed by determining wind pressures in accordance with AS4055-2006 for domestic applications and AS/NZS 1170.2:2002 for all other applications. Capacity tables are in limit state format.

SPANS

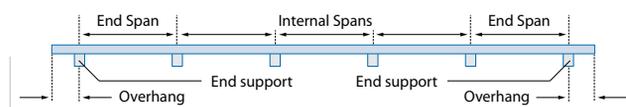
Spans are determined by wind speeds for non-cyclonic areas. For domestic applications, the pressures and spans are based on a maximum: eaves height of six metres, roof pitch of 35 degrees and total roof height of 8.5 metres. For commercial and industrial applications, tables are based on a maximum overall height of ten metres and a 500 year design return period.

Roofing calculations are based on $C_{pe} = -0.9$ and $C_{pi} = 0.2$, walling is based on $C_{pe} = -0.65$ and $C_{pi} = 0.2$. A local pressure factor, $K_l = 2.0$ has been used for all roofing and walling spans for both strength and serviceability limit states. Roof spans allow for loads incidental to maintenance.

All pressures have been determined assuming the wind loading in any direction is not affected by topography. The following shielding factors have been used for each of the terrain categories: Category 3 = 0.85, Category 2.5 = 0.95, and Category 2 = 1.

The carport and verandah spans only apply to structures not enclosed by peripheral walls. Spans are based on $C_{pn} = -0.9$ and $K_l = 1.5$ applied over the entire span, and are suitable for all span types. Loads on supporting purlins may limit these spans.

Stratco can provide additional engineering advice if any design parameters vary from those above.



Span Definitions

Wind Load Conversion

For domestic applications use the appropriate wind classification for the area. To read the span tables for commercial and industrial applications, select the region and category for the area, then convert it to the correct classification using table 2.0 below.

WIND LOAD CONVERSION

Wind Classification (Domestic)	Region & Category (Commercial/Industrial)
N1 (W28)	Reg A, Cat 3
N2 (W33)	Reg A, Cat 2.5 - Reg B, Cat 3
N3 (W41)	Reg A, Cat 2 - Reg B, Cat 2.5
N4 (W50)	Reg B, Cat 2

Table 2.0



MAXIMUM RECOMMENDED SPANS (mm)

Span Type	Roofing (BMT)		Walling (BMT)		
	0.42mm	0.48mm	0.35mm	0.42mm	0.48mm
Single Span	800	900	1300	1650	1900
End Span	950	1300	1750	2100	2250
Internal Span	1200	1800	2300	2700	2800
Un-stiffened Overhang	200	250	150	200	250
Stiffened Overhang	300	350	250	300	350

Roofing spans are limited, based on typical maintenance foot traffic. Walling spans are based on N1 (W28) wind loading. Spans are based on three fasteners per sheet, per support.

Table 3.0

DOMESTIC CARPORT/VERANDAH SPANS

Wind Classification	Base Metal Thickness	
	0.42mm	0.48mm
N1 (W28)	1700mm	2000mm
N2 (W33)	1700mm	2000mm
N3 (W41)	1450mm	1600mm
N4 (W50)	1050mm	1050mm

Table 4.0

SPANS (mm)

BMT	Application	Span Type	THREE FASTENERS				FIVE FASTENERS			
			N1 (W28)	N2 (W33)	N3 (W41)	N4 (W50)	N1 (W28)	N2 (W33)	N3 (W41)	N4 (W50)
0.35mm	Walling	Single	1300	850	600	-	1650	1450	1250	1000
		End	1750	1200	750	-	2050	1750	1450	1000
		Internal	2300	1650	1100	-	2450	2200	1950	1600
0.42mm	Roofing	Single	800	800	600	-	800	800	800	800
		End	950	950	750	-	950	950	950	950
		Internal	1200	1200	1050	-	1200	1200	1200	1200
	Walling	Single	1650	1350	1050	900	1700	1500	1350	1300
		End	2100	1550	1100	1000	2200	1900	1500	1450
		Internal	2700	2200	1700	1450	2700	2300	2050	1950
0.48mm	Roofing	Single	900	900	600	-	900	900	900	900
		End	1300	1300	1000	-	1300	1300	1300	1300
		Internal	1800	1800	1550	-	1800	1800	1800	1750
	Walling	Single	1900	1450	1100	950	2100	1750	1450	1400
		End	2250	1850	1500	1300	2250	1950	1700	1650
		Internal	2800	2200	1950	1800	2800	2300	2100	2000

Table 5.0

WIND CAPACITIES (kPa)

BMT	Span Type	Limit State	SPAN (mm) - THREE FASTENERS								SPAN (mm) - FIVE FASTENERS									
			600	900	1200	1500	1800	2100	2400	2700	3000	600	900	1200	1500	1800	2100	2400	2700	3000
0.35mm	Single	Serviceability	1.25	0.88	0.64	0.55	0.45	0.37	0.29	0.21	-	3.22	2.04	1.36	0.91	0.45	0.37	0.29	0.21	-
		Strength	3.12	2.55	2.10	1.80	1.50	1.20	0.90	0.65	-	4.86	3.93	3.03	2.68	2.33	2.04	1.75	1.46	-
	End	Serviceability	1.36	1.15	0.95	0.78	0.60	0.42	0.25	0.18	-	3.96	2.76	1.95	1.18	0.88	0.59	0.29	0.18	-
		Strength	3.34	2.63	2.15	1.82	1.50	1.17	0.85	0.55	-	4.39	3.61	2.98	2.39	2.24	2.09	1.94	1.46	-
	Internal	Serviceability	1.57	1.38	1.19	1.00	0.86	0.71	0.57	0.43	-	4.26	3.15	2.51	1.91	1.50	1.09	0.68	0.45	-
		Strength	4.12	3.38	2.80	2.35	1.95	1.55	1.15	0.94	-	6.09	5.15	4.26	3.56	3.00	2.44	1.88	1.73	-
0.42mm	Single	Serviceability	1.73	1.40	1.09	0.78	0.46	0.40	0.34	0.27	-	4.68	2.82	1.64	1.00	0.45	0.39	0.33	0.27	-
		Strength	5.07	3.60	2.65	2.10	1.80	1.56	1.38	1.11	-	7.41	6.27	5.25	4.26	3.27	2.86	2.46	2.06	-
	End	Serviceability	1.85	1.48	1.17	0.99	0.80	0.62	0.44	0.36	-	5.29	3.52	2.09	1.27	1.00	0.73	0.45	0.36	-
		Strength	5.17	3.66	2.67	2.10	1.86	1.63	1.39	1.15	-	7.14	5.81	4.55	3.50	3.21	2.92	2.63	2.33	-
	Internal	Serviceability	1.94	1.75	1.54	1.36	1.18	1.00	0.81	0.63	-	5.70	3.86	2.67	1.97	1.59	1.20	0.82	0.64	-
		Strength	5.87	4.75	3.80	3.48	3.15	2.83	2.50	1.88	-	7.64	6.37	5.43	5.03	4.64	4.25	3.86	2.33	-
0.48mm	Single	Serviceability	-	1.48	1.13	0.91	0.69	0.50	0.32	0.27	0.22	-	-	1.88	1.18	0.89	0.62	0.35	0.29	0.23
		Strength	-	5.03	4.31	3.87	3.50	3.13	2.64	2.19	2.01	-	-	6.62	5.85	5.25	4.67	4.08	3.35	2.63
	End	Serviceability	-	1.74	1.47	1.23	0.98	0.74	0.50	0.39	0.27	-	-	2.47	1.60	1.14	0.82	0.50	0.40	0.31
		Strength	-	4.90	4.22	3.85	3.50	3.14	2.65	2.22	1.77	-	-	7.11	6.32	5.64	5.01	4.38	3.68	2.98
	Internal	Serviceability	-	2.30	1.99	1.70	1.41	1.09	0.76	0.66	0.55	-	-	3.76	2.53	1.72	1.27	0.83	0.67	0.52
		Strength	-	5.92	4.98	4.30	3.75	3.21	2.66	2.23	1.80	-	-	8.28	6.89	5.96	5.25	4.54	3.78	3.02

The values in all of the above tables are for use with steel supports with a minimum thickness of 0.75mm, G550.

Table 6.0



WATER CARRYING CAPACITY

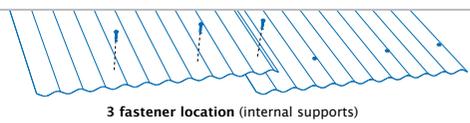
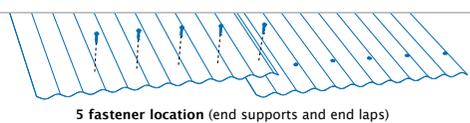
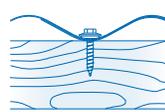
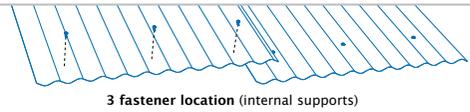
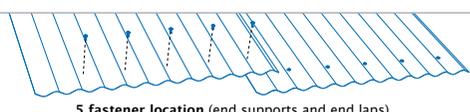
Roof Slope	MAXIMUM ROOF RUN FOR DRAINAGE (m)			Peak Rainfall Intensity				
	150 mm/hr	180 mm/hr	200 mm/hr	250 mm/hr	300 mm/hr	350 mm/hr	400 mm/hr	450 mm/hr
5°	27	23	20	16	13	11	10	9
7.5°	34	28	25	20	17	14	12	11
10°	39	32	29	23	19	10	14	13
15°	48	40	36	29	24	20	18	16
22°	59	49	44	35	29	25	22	19
30°	71	59	53	42	35	30	26	23

The peak rainfall intensities shown represent a 100 year average recurrence interval (ARI) for a five minute rainfall duration. If roof penetrations exist, the total roof run will generally be greater than the distance from ridge to eaves at the location the penetration interferes with the runoff. Contact Stratco if further advice is required.

Table 7.0

FIXING RECOMMENDATIONS

CGI sheets should be laid into the prevailing wind and sit neatly on the preceding roof sheet, with a side lap of 1.5 corrugations, as shown in the laying procedure below. They should be fixed within the recommended support spacings. Avoid 'stretching' the width of the sheet when installing, as this could allow wind and rain to enter. Side lap fixing is recommended to maintain a weather proof seal and to secure the overlap especially when the roof is walked on occasionally. This is best done with either 8 x 12mm self drilling stitching screws or a 3.2mm blind rivet (rivets should be sealed to prevent water penetration). It is recommended side lap fasteners are secured mid-span, when spans exceed 900mm for roofing and 1200mm for walling. On roofing, at the end of the sheets, the valleys of each corrugation should be turned up at crest of the roof and down into the gutter using a turn up/down tool.

	FASTENER SIZE SELECTION		Laying Procedure >> Prevailing Wind Laying Direction <<
	Fixing to Steel	Fixing to Timber	
ROOFING Crest fixing All roofing screws must have a neoprene washer for a weather tight seal	 12 x 35mm Self drilling and tapping screw or M6 x 50mm TS self drilling screw (For 0.55mm thick battens use M6 x 50 TS self drilling screws)	 12 x 50mm Type 17 hex head screw or M6 x 50mm TS self drilling screw	 3 fastener location (internal supports)
			 5 fastener location (end supports and end laps)
WALLING Pan fixing Fasten adjacent to overlapping rib	 10 x 16mm Self drilling and tapping screw with neoprene washer	 10 x 25mm Type 17 hex head screw with neoprene washer	 3 fastener location (internal supports)
			 5 fastener location (end supports and end laps)

The above fastener sizes are suitable for fixing over an insulation blanket up to 55mm thick, for thicknesses up to 100mm, the next standard screw length to that indicated is to be used.



WALKING ON CGI

When walking on CGI roofing, it is recommended you walk over the purlins to avoid any damage. Wear flat, rubber soled shoes and walk flat footed, spreading your weight over as many corrugations as possible. For carport and verandah applications, crawl boards should be used to avoid damage during installation and maintenance.

ORDERING

Sheets are available custom cut, allowing you to minimise waste, and enhance your design options. CGI is available in un-painted zinc/alum, and in an attractive range of factory pre-painted colours. Subject to the delivery location, quantity and material availability, delivery is usually within 48 hours, or at an agreed time that suits your building schedule. Unless advised differently, a one tonne maximum is usually applied to larger packs. Arrangements for unloading the truck are the responsibility of the customer, and should be arranged before ordering. When unloading you must ensure the load is adequately spread using spreaders and slings to prevent damage. If packs are to be loaded directly above structural members, they must be of sufficient strength, such as over portal frames, or braced roof trusses.

USING CGI

Stratco CGI will have a long, useful life if used according to Stratco specifications. While roofing materials in outer urban and rural areas may have a life-span in excess of 30 years, this can reduce to only a few years in coastal and industrial environments.

Zinc/alum and pre-painted steel should not be used in very aggressive areas such as near swimming pools and spas. It is important that dirt, soil, compost, paving sand, or other materials which retain moisture are not placed against steel sheeting. Concrete should not be poured against zinc/alum material. Check with Stratco before using in these severe environments.

Incompatible Metals

The best way of reducing corrosion is to keep incompatible metals apart. Zinc/alum and pre-painted steel cannot be used with lead, copper and monel. Galvanised steel and pure zinc material can be used with zinc/alum, but you must avoid water run-off from zinc/alum onto galvanised material. Fixings such as rivets and self-drilling screws must be compatible with the material they are fixing.

Handling and Cutting of CGI

For safety, wear gloves when handling CGI. Ensure your hands or gloves are clean, especially when handling zinc/alum which can mark. Use a coloured pencil for marking steel, as lead or black pencils contain graphite which promotes rusting. CGI is best cut using tin snips, but for larger cuts it may be necessary to use a power saw with a steel cutting blade or a power nibbler. Avoid using abrasive discs as they can cause burred edges and coating damage. Where possible cut sheets on the ground, and always clean off any swarf and metal filings progressively during the installation. Dispose of off-cuts carefully.

Insulation and Sealants

The use of blanket insulation is recommended in domestic roofing to assist in temperature, condensation and sound control. CGI can be used with an insulating blanket up to 55mm thick. Increased thicknesses require longer fasteners and greater care when installing.

When choosing a silicone sealant, ensure it is suitable for roofing and guttering use and of a non-acetic, amine free, neutral cure type. Sealants that smell of ammonia, vinegar or lemons are not usually suitable.

MAINTENANCE REQUIREMENTS

The performance of CGI over time depends on its correct application and maintenance. Maintenance should be performed as often as is required to remove any dirt, salt and pollutants. Where CGI is used in severely corrosive environments, cleaning should be performed more often. It is important that screws have the same life expectancy as the CGI cladding you have specified.

Packs of CGI should always be kept dry and stored above ground level while on site. If the sheets have become wet, they should be separated, wiped and placed in the open to dry.

Refer to the Stratco "Selection, Use and Maintenance" brochure, for more detailed information about the correct use and maintenance of this product.



SELECTION, USE AND MAINTENANCE

OF STRATCO STEEL PRODUCTS



SELECTION, USE AND MAINTENANCE

OF STRATCO STEEL PRODUCTS

PRODUCT SELECTION

WIDE PRODUCT RANGE

Stratco produces a wide range of products and materials for the building and home improvement industry as well as for industrial applications. Various thicknesses, widths, colours and finishes are often available, so it is important to clearly specify your requirements when placing an order.

WIDE COLOUR RANGE

A wide range of colours is available to suit any environment. The colour is usually supplied single-sided with a light colour or washcoat on the reverse side. The colour surface is thicker on the main colour side for extra life. On the reverse side, some colour variation can occur. Due to our harsh climate, some colour fading may occur over time; dark colours are more likely to fade, but the colour change is usually slow and even.

CORROSION PREVENTION

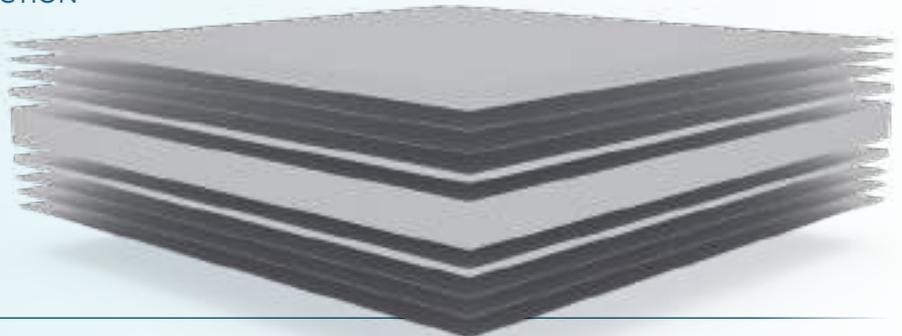
Corrosion is prevented on Stratco steel products by either a galvanised (zinc) or zinc/alum (zinc/aluminium) protective coating. The product may have an additional colour surface. The raw edges of newly cut steel are unlikely to rust because this coating will sacrifice itself to prevent corrosion forming.

When flat steel is rolled into a profile, lubricant is applied to the steel to aid the process. This lubricant usually evaporates quickly. Sometimes the steel mill applies a yellow chromate coating to protect the steel, this coating will simply weather-off.

Some Stratco products have specific performance guarantees while others merely refer to a typical life in normal conditions. Consult your nearest Stratco to discuss details of your project.

FIGURE 1.0 - STRATCO STEEL CROSS SECTION

- Finish colour coat
- Corrosion inhibitive primer
- Conversion coating
- Zinc/alum or galv coating
- Base metal
- Zinc/alum or galv coating
- Conversion coating
- Corrosion inhibitive primer
- Protective washcoat



Note: Cut edges are cathodically protected by galv or zinc/alum coat which inhibits the base metal rusting.

CONSIDER YOUR ENVIRONMENT

YOUR DESIGN IS IMPORTANT

Your steel product will have a long life-span if it is used according to Stratco specifications. Stratco can provide comprehensive literature on all our products. Literature that covers important points such as; roof pitch, support spacing, metal thickness and laying procedures.

Unusual loads such as wind, snow or other adjoining materials need to be considered by the owner when designing a structure.

ENVIRONMENTAL CONSIDERATIONS

The area a steel product will be used in needs to be considered. While roofing and purlin materials in outer urban and rural areas may have a life-span in excess of 30 years, this can reduce to only a few years in severe coastal or industrial environments.

A steel product in a non-aggressive environment will have a long life-span. Non-aggressive areas are outer urban and rural areas, away from pollution and the shoreline. In an aggressive environment a steel products life-span may be reduced. These are coastal and industrial areas, close to salt water and pollution.

In very severe conditions material with a stainless steel base should be used. In both severe and some moderate conditions the material will need a thicker primer coat with a paint designed for aggressive environments. In benign and moderate conditions, normal pre-painted steel is suitable.

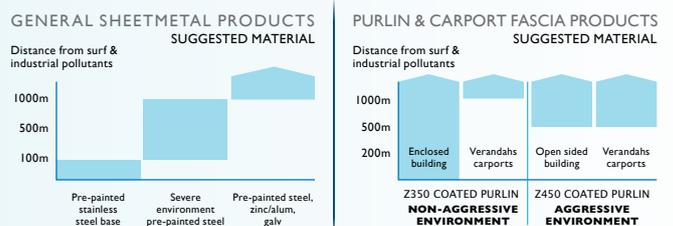
Very severe conditions are within 100 metres of active surf and industrial pollution. Severe conditions are between 100 to 1000 metres of these areas. Moderate conditions can still contain salt or moist, acid laden air for up to 1000 metres away from surf or industrial pollution. Benign conditions are outer urban and rural areas far away from the shoreline.

Very severe conditions also include areas close to swimming pools and spas. Zinc/alum, galvanised and pre-painted steel should not be used in these areas. Concrete should not be poured against zinc/alum based products. Any material that retains moisture such as dirt, compost or paving sand should not be placed against steel and zinc/alum based products.

Galvanised steel may be suitable in specific circumstances for areas around animal shelters, formwork, or embedded in concrete. Check with Stratco before using in these environments.

The steel manufacturer can provide additional information and they should be consulted whenever you are uncertain of what finish is suitable for your application.

FIGURE 2.0





THINGS YOU SHOULD KNOW ABOUT STEEL

WHY STEEL RUSTS

When iron comes into contact with air, a thin porous film of iron oxide forms on it. If moisture is present an electric cell is formed between the iron and the oxide. Current flows through the moisture dissolving the iron and forming rust. In seaside or industrial atmospheres, or where incompatible metals are used, the current in the cell increases causing rust to form quicker.

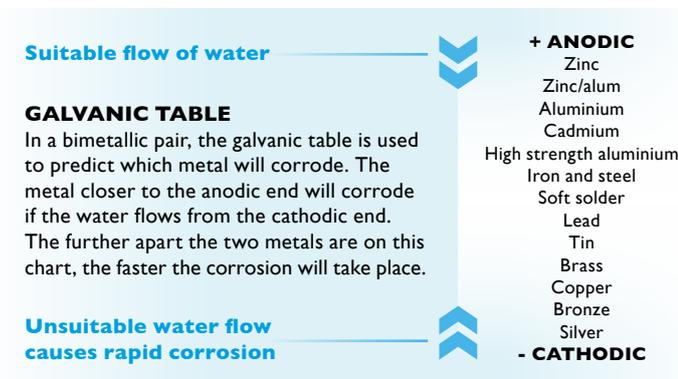
INCOMPATIBLE METALS

Galvanised steel can be used with lead, but zinc/alum coated and pre-coloured steel cannot. Galvanised steel and pure zinc material can be used with zinc/alum. Copper cannot be used with either of these materials and monel should not be used with zinc/alum. Fixings such as rivets and self-drilling screws should be compatible with the material they are fixing. The best way of reducing corrosion is to keep incompatible metals apart.

RUN-OFF FROM OTHER SURFACES

Water should not be allowed to flow from copper or lead over zinc/alum sheet, or from copper over galvanised material. In addition water should not flow from zinc/alum or pre-painted steel over galvanised material. The overflow from air-conditioning systems often runs onto metal roofing causing rapid deterioration.

FIGURE 3.0

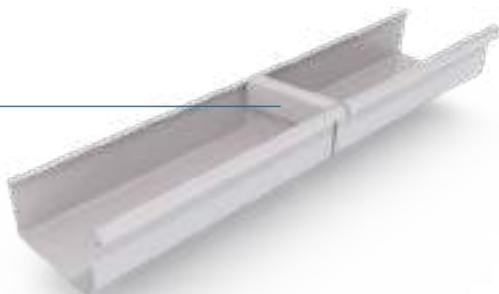


EXPANSION AND CONTRACTION

When using very long lengths of steel, thermal expansion should be considered. For example: a 15 metre metal sheet can expand up to 12mm over a temperature rise from 0°C to 65°C. The use of expansion joints can overcome this. Gutter expansion joints in steel should be included in any run over 20 metres.

FIGURE 4.0

Gutter expansion joint



CONDENSATION

Condensation occurs when there is a difference in temperature between two adjacent air masses, such as where warm moist air in a roof space meets a roof sheet in contact with cold outside air. Here the dew point is quickly reached and condensation occurs. To avoid this, a vapour barrier or sarking should be used to prevent moisture from forming.

COMPLY WITH REGULATIONS

All building work must be carried out in accordance with the Building Code. This code provides acceptable standards of product manufacture and building practice. These include:

- AS/NZ 3500.3 Plumbing and Drainage, Stormwater Drainage
- AS/NZS 3500.5 National Plumbing and Drainage, Domestic Installations

Prospective users of Stratco materials should first ensure that they understand these requirements and any other regulations that may apply.

Care should also be taken in the design and installation of roof drainage systems given the wide range of factors such as rainfall intensity, gutter capacity and selection, number and placement of downpipes and sumps. Care should also be taken to select the most suitable gutter style. Gutters that have a front higher than the back are popular to hide the exposed ends of roofing, but unless manufactured with optional slots or fixed with the bead lower than the top of the fascia may contravene building regulations. Other fixing options can be used to eliminate overflow from the back of a gutter into a building. These include additional overflow weirs placed either in the gutter or stop end, rainheads with overflow weirs, custom back flashings, leaving a gap between the fascia and gutter back, or other proprietary systems or trade solutions.

Drainage, solar power generation, hot water systems and the installation of rainwater tanks may also be dependant on local government regulations. Users and installers should first check with these authorities when determining their requirements.

Up to date information about Stratco products, spans, installation requirements and technical advice can be found on our website at 'stratco.co.nz' and it is advisable to obtain current information prior to ordering any materials. If additional information is required contact the Stratco office in your area.

CUTTING STEEL

When marking steel for cutting use a coloured pencil. Black or lead pencil contains graphite that will promote rust. Use hand tools such as a hacksaw or snips for cutting steel. If this is impractical, use steel metal cutting blades in a power saw.

SWARF DAMAGE

Power tools when cutting, drilling and filing steel cause hot metal particles called swarf. The hot particles weld themselves to surrounding metal surfaces, then rust, causing unsightly brown stains that are very visible on coloured steel.

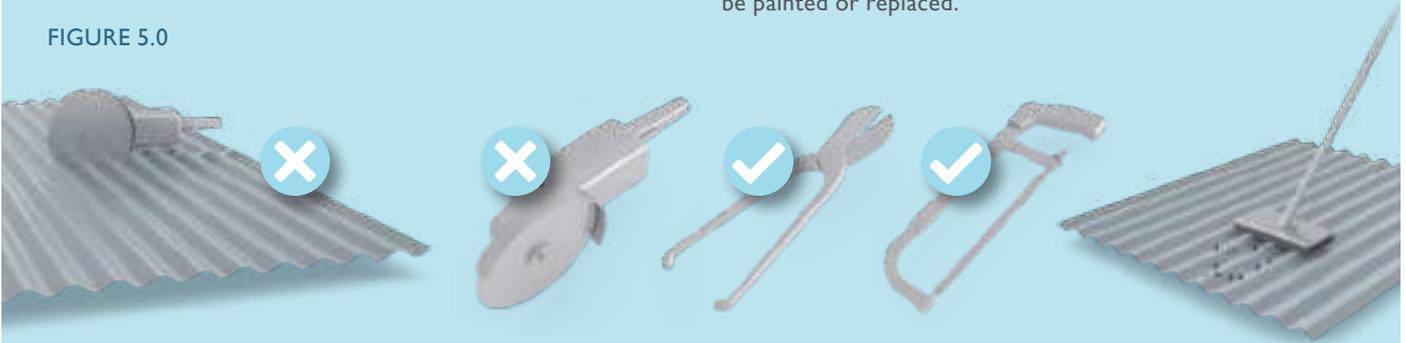
Avoid swarf damage by cutting away from other sheets or by using a cover. When cutting coloured steel with a saw, use padded supports and cut the sheets with the colour face down.

After work has finished, always sweep down new roofs and clean the gutters to ensure rivet stubs and metal cuttings are removed. Mild swarf staining does not mean the steel itself will rust as the steel core is surrounded by a protective coating. The effect is mainly visual unless the damage is severe.

SWARF REMOVAL

Swarf can be removed from steel by scrubbing the area with a stiff nylon brush dipped in a mild detergent solution. Rinse the surface with water afterwards to ensure any particles are washed away. If necessary, mop up any excess water with a clean cloth. Ensure any particles that are swept into the gutters are removed. If swarf staining has already occurred it is not easily removed and badly affected areas may need to be painted or replaced.

FIGURE 5.0



FIXING STEEL PRODUCTS

FASTENER SELECTION

Rivets are ideal for holding together two thin layers of material, such as sheeting, or sheeting to a steel rail. There are several types of rivet available, choose one that is compatible with your material and is the correct size for your job. Rivets can be sealed or non-sealed, and a smear of silicon over the rivet is recommended where weather proofing is required.

Self-drilling and tapping screws are fast and strong and can be found with a neoprene washer for sealing. They have an unthreaded drilling point so that the drilling action is completed before the thread starts to engage. The length of the unthreaded point needs to be as long or longer than the materials thickness. Use screws with a seal for roofing. To prevent water intrusion, crest fixing is recommended to keep the screw out of the path of the water.

Type 17 screws work in a similar way to self-drilling and tapping screws but are used for timber. It is important that the fastener has the same life as the material being fixed.

SEALANT SELECTION

While there is a wide range of sealants available, not all are compatible with Stratco steel products. Silicone sealants have the flexibility of being able to join galvanised, zinc/alum and pre-painted steels. Mastic type sealants will not usually last as long as is required. Soldering is an acceptable form of joining galvanised product together, but zinc/alum coated steel cannot be soldered.

When choosing a silicone sealant, it must be suitable for roofing and guttering use, and of a non-acetic, amine free, neutral cure type. Sealants that smell of ammonia, vinegar or lemons are not usually suitable.

Silicone sealants should be applied as a gasket, sandwiched between the two surfaces to be joined. Refer to Figure 7.0 through to Figure 9.0 for an example of creating a gasket. This method not only creates a strong join but it protects the sealant from UV exposure. Always remove metal filings from the area to be joined and smear the sealant over any fasteners.

FIGURE 6.0



FIGURE 7.0

Sealant Application: **STEP 1**
Clean the surface

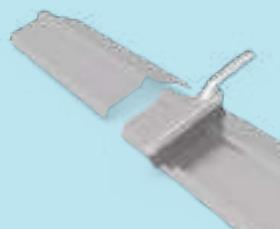


FIGURE 8.0

Sealant Application: **STEP 2**
Apply silicone



FIGURE 9.0

Sealant Application: **STEP 3**
Join the two surfaces



PROTECTING YOUR INVESTMENT

STANDARD STRATCO SAFEGUARDS

Scuffing and scratching can damage steel with a pre-coloured finish. To minimise this, Stratco supplies some products such as gutters, downpipes, flashings and ridging with a removable plastic coating. Do not leave this coating exposed to the sunlight for long periods of time because it may be hard to remove. Coloured steel sheeting is supplied either wrapped in plastic and cardboard or with the top sheet turned over. The reverse side is normally unprotected, but extra packing sheets can be supplied at the customer's cost, and are a good idea if double sided colour fencing sheets are ordered.

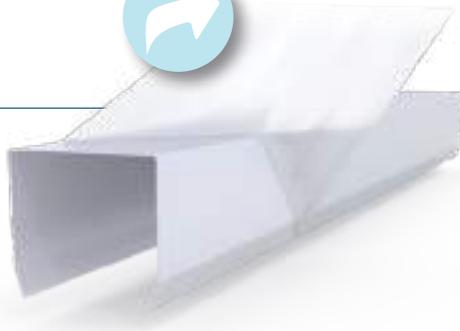
STORAGE AND HANDLING OF STEEL

For safety, wear gloves when handling steel sheets. Ensure your hands or gloves are clean, especially when handling zinc/alum which can mark. Steel products should be kept dry before installation. This is important for tightly nested products such as packs of corrugated iron. Separate and dry these products immediately if they get wet, as discolouration can occur.



FIGURE 10.0

Remove Plastic Coating



PAINTING STEEL PRODUCTS

TOUCHING UP SCRATCHES

Pre-painted steel may get scratched while being handled, however the use of touch-up paints is not recommended. They will weather differently to the original oven cured coating and this may cause variations in colour and exaggerate minor blemishes over time.

In most cases, minor damage to roofing and guttering cannot be seen and any attempt to overspray the damage may become more unsightly in the future.

The consumer must accept that some minor scratches will be inevitable on low-level projects such as verandahs and carports. Fabricators and erectors should ensure that maximum care is taken to protect pre-painted steel surfaces from damage. Replacements should be considered if the damage is severe. Additional over painting information is available from Stratco.

OVER PAINTING

Zinc/alum coated steel can be painted without the need for an etch primer. Some paints allow galvanised material to be over painted without priming so check your paint for details. Steel supplied with a pre-painted surface can be repainted with minimal preparation.

FIGURE 11.0

Touch-up paint is not recommended



SAFETY FIRST

HANDLING STEEL

Always take appropriate safety precautions when handling steel products. The edges of many steel products, especially steel sheeting, can be very sharp and will easily cut. Always wear cut-resistant gloves that are clean and dry to prevent marking the steel surface, and to prevent the steel from cutting the skin.

Many steel products are used and installed outdoors and hence it is recommended that suitable sun protection is applied when installing or using steel products outside.

However, it is important to note that sunscreens that include semi-conducting metal oxides like zinc oxide (ZnO) and titanium dioxide (TiO₂) can speed the deterioration of paint. To protect the surface of pre-painted steel, prevent sunscreens that contain titanium dioxide (TiO₂) and zinc oxide (ZnO) from coming into contact with the painted surface.

BEWARE OF WET, WINDY CONDITIONS

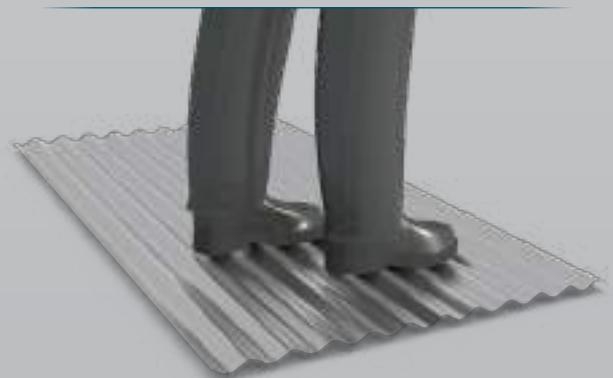
The installation of Stratco steel products in wet and windy conditions can be dangerous. When installing steel sheets, the wind can easily lift the sheets causing damage to people and property. Always ensure that roofing is securely tied down before fixing. Walking on roofing or using power tools in wet conditions is dangerous.

WALKING ON ROOFING

On metal roofing, it is important to walk on the purlins. This is both for safety and to avoid damage to the roof. Try to keep your weight evenly distributed and walk flat footed rather than with a heel and toe action. When walking on corrugated iron, spread your weight over as many corrugations as possible. On high profile decking only walk in the pans of the sheet.

When delivered, some sheets have an oily film that can be slippery especially when damp. Take extreme care when handling them.

FIGURE 12.0



TRANSLUCENT SHEETING

Stratco markets translucent fibreglass and polycarbonate. Special wire safety mesh must be used to support the sheeting when used in commercial and industrial applications. This is not required in domestic applications, but a danger of falling through the sheeting still exists and care should be taken.

MAINTENANCE

NORMAL MAINTENANCE

Regular maintenance is essential to maintain the good looks of your Stratco steel product. It will ensure you receive the maximum possible life-span for a steel product in your location, this is especially important for coloured pre-painted steel.

To maintain the product's surface, wash it with clean water at least every six months. A more frequent wash is recommended in coastal or industrial areas. Maintenance must be frequent enough to prevent dust, salts, pollutants and any other material to accumulate on the product and reduce its life. Products that are regularly washed by rain require no additional maintenance.

Avoid locating a Stratco steel product near polluted areas or in areas with aggressive environmental factors that could reduce the life of the steel. This includes areas near barbecues, diesel fumes, air-conditioners, clothes dryers, sprinklers, bore water, water softeners and industrial applications. Stratco steel products and materials are not recommended for use over, or near swimming pools and spas.

FIGURE I3.0



AREAS NOT WASHED BY RAIN

More regular maintenance is required on the areas of a product that are not naturally washed by rain. These areas include the underside of verandahs and carports, roofing visible through exposed eaves, and steel fascias and gutters. Other products such as garage doors and cladding under eaves may also require additional attention. A products life-span may be reduced from not following a regular maintenance program because night time condensation in these areas can combine with salt and pollution on the surface, resulting in accelerated corrosion.

Wash areas that are not naturally cleaned by rain with fresh, clean water. It is recommended that you clean the surface as often as you would wash your car to maintain its duco. In marine or industrial environments you should wash more often. Maintenance must be frequent enough to prevent dust, salts, pollutants and any other material to accumulate on the product and reduce its life.

If washing with clean water does not completely clean the surface, a mild solution of detergent should be added to the water and applied with a soft bristled nylon brush. Rinse the coloured surface thoroughly. Never use abrasive or solvent based cleaners such as turps, petrol or kerosene.

Contact Stratco or the steel manufacturer for more information on the correct maintenance for your application.

This brochure has been produced in the interest of customer education and good consumer relations. Stratco have endeavoured to provide the most technically correct and up-to-date advice possible but assume no responsibility whatsoever in relation to such information or advice. Alteration in the recommendations may occur from time to time. Please contact Stratco for the most up-to date advice available prior to using this information. Additional information is available from steel manufacturers, other Stratco technical bulletins, trade schools and other competent bodies, and these should be consulted prior to purchasing and installation of Stratco steel products. Consumers should satisfy themselves that they are using the correct materials, approach and techniques.

stratco.co.nz

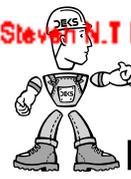


Follow us on





design features



Dektite®

First and the Best!

To develop a product that is universally accepted as the best on the market Deks consider every aspect of the Dektite® design: installation, functionality and materials.

Success in this is proven by the performance of the Dektite®. The ingenious shoulder moulding, results in less distortion, which reduces stress on the material, and eliminates ponding with complete water run-off in every situation. The low profile not only looks good but provides a generous internal clearance, so even the steepest roofs are handled with ease.

Installation is easier with the Dektite®.

- The large base area provides more coverage and greater latitude in cut-out size.
- The cone has clearly marked cut lines for different pipe diameters.
- Around the base of the cone a flexible bead reduces stress on the flashing membrane (to which an aluminium flange is bonded), as it is formed over the roof profile.
- Underneath, moulded ribbing increases sealant retention to ensure an effective, weatherproof seal.

FLEXIBLE CONE SLEEVE

Dektite® cone shape eliminates seal breakdown due to vibration or expansion and contraction, while isolation of pipe from sheeting dampens noise levels.

EASILY IDENTIFIED SIZING

Pipe diameter rings are clearly marked on the cone sleeve (metric and imperial) for cutting to match the appropriate pipe diameter.

LOW PROFILE DESIGN

Sleek, unobtrusive shape is designed to minimise silhouette on roofline, while managing to provide generous internal clearance for steep, angular installations.

STRESS ISOLATION POINTS

Unique to Dektite® two flexible shoulders absorb distortion and stop transfer of stresses from base to cone, as unit is formed over roofing profile.

BONDED ALUMINIUM FLANGE

Corrosion-resistant, malleable flange, evenly distributes fastening pressure and allows ease of hand-shaping on most sheet profiles.

INTEGRITY OF FLASHING SHAPE

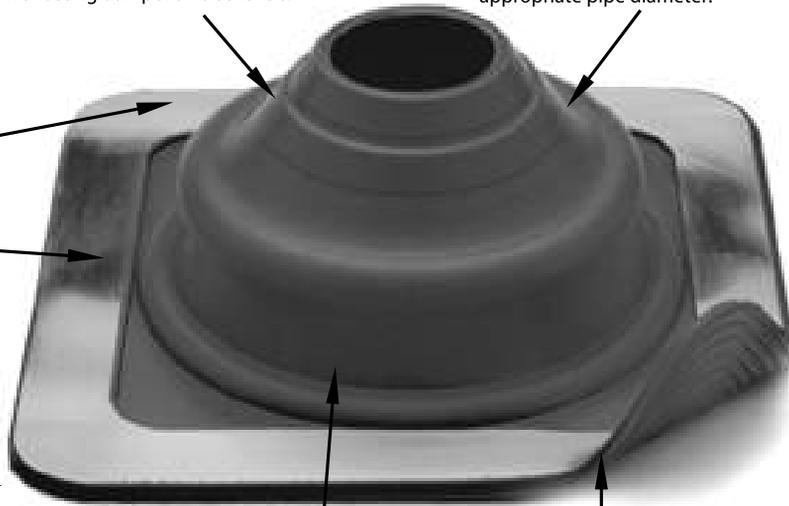
Minimal distortion after installation, maintains natural flashing shape and seal around pipe, while water run-off is improved and 'ponding' eliminated.

LARGE BASE AREA

For better coverage of penetration cut-out and improved performance over steep roof pitches and a wider variety of cladding profiles.

IMPROVED WATERPROOFING

Designed to strengthen sealant bond and improve waterproofing, the ribbed base has an angled skirting edge to help shed moisture and contribute to a superior waterproof seal. For even more efficient water run off the Dektite® can be fitted on the Diamond.



Dektite®



The versatile solution for hundreds of applications.

Designed to enable practically any pipe flashing operation to be carried out within minutes, **Dektite®** is simple to install - and very effective. Providing the perfect weatherproof, flexible seal, **Dektite®** protects against leakage on a wide range of pipe or vent projections, and is designed to conform to most roof profiles and pitch. For a maintenance-free seal on pipes from 0 - 440mm diameter, it's much more than a flexible solution to pipe flashing. It's a means of saving **time and money!**

Easy Selection Guide

Code	PIPE mm	BASE mm	PITCH	COLOUR
DB 0-35 DG 0-35	0-35	99x99	0 - 60°	} BLACK (EPDM)* DB GREY (EPDM)* DG
DB 5-55 DG 5-55	5-55	137x137	0 - 45°	
DB 50-70 DG 50-70	50-70	178x178	0 - 45°	
DB 5-120 DG 50-120	5-120	218x218	0 - 45°	
DB 110-170 DG 110-170	110-170	284x284	0 - 45°	
DB 160-220 DG 160-220	160-220	365x365	0 - 45°	
DB 160-300 DG 160-300	160-300	453x453	0 - 45°	
DB 290-440 DG 290-440	290-440	581x581	0 - 45°	

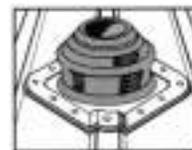
E.P.D.M. withstands temperatures from -50°C to 115°C, & up to 150°C intermittently

* **DEKTITE®** Pipe Flashings can also be used to flash square pipes. Just add 30% to the pipe diameter and trim the cone to suit.

EPDM - Perfect for approved flues!

Dektite® EPDM polymer flashings have been officially tested by the Coal Corporation of Victoria, Australia and conform to all Australian and UK Standards on approved flue systems. Under no circumstances should any polymer flashing be installed on a non approved flue or an 'active' combustion heater flue.

For more effective drainage always fit the Dektite on the Diamond or bias.



1 Cut a neat hole in roofing sheet with minimum clearance for pipe and insert pipe through hole. Trim the cone to suit pipe size using sharp tin snips. Where necessary, support cut sections of sheet with additional framing.



2 Slide Dektite® flashing down over pipe. Lubricating the pipe with water allows the pipe to slide snugly into position.



3 Apply a neutral cure silicone* sealant by turning back the flexible flange.



4 Press base to the roof profile by hand, smooth out any awkward creases. Don't fully extend to allow for vibration.



5 Fasten using sealed rivets or washered screws. Fit fasteners progressively outward in opposing pairs to avoid gaps.

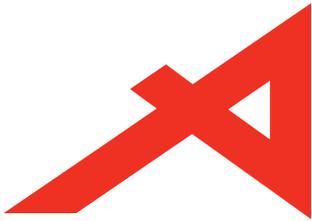


Dektite®

First and the Best!

*Refer to page 28 for silicone usage

HINT: When flashing a metal flue that has an exposed seam, using a neutral cure sealant, seal the seam from underside of cowl to the top of Dektite® cone.



BRANZ Appraised

Appraisal No. 548 [2013]

TEKTON® BUILDING WRAP

Appraisal No. 548 [2013]

This Appraisal replaces BRANZ Appraisal No. 548 [2007], issued 27 July 2007.
Amended 17 December 2013.



BRANZ Appraisals

Technical Assessments of products for building and construction.



Marshall Innovations Limited

PO Box 9411
Greerton
Tauranga
Tel: 07 543 0948
Fax: 07 541 1029
Web: www.mwnz.com



BRANZ

1222 Moonshine Rd,
RD1, Porirua 5381
Private Bag 50 908
Porirua 5240,
New Zealand
Tel: 04 237 1170
branz.co.nz



Product

- 1.1 Tekton® Building Wrap is a synthetic breather-type flexible wall underlay and air barrier for use under direct and non-direct fixed wall cladding on timber and steel framed buildings. The product is manufactured of a coated spun-bonded polypropylene.

Scope

- 2.1 Tekton® Building Wrap has been appraised for use as a flexible wall underlay on timber framed buildings within the following scope:
 - the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 with regards to building height and floor plan area; and,
 - with absorbent wall claddings directly fixed to framing; and,
 - with absorbent and non-absorbent wall claddings installed over an 18 mm minimum drained cavity; and,
 - with masonry veneer in accordance with NZBC Acceptable Solution E2/AS1; and,
 - situated in NZS 3604 Wind Zones up to, and including Very High.
- 2.2 Tekton® Building Wrap has been appraised for use as a flexible wall underlay on steel framed buildings within the following scope:
 - the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 with regards to building height and floor plan area; and,
 - with absorbent and non-absorbent wall claddings installed over an 18 mm minimum drained cavity; and,
 - with masonry veneer subject to specific design; and,
 - situated in NZS 3604 Wind Zones up to, and including Very High.
- 2.3 Tekton® Building Wrap has been appraised for use as a flexible wall underlay over rigid wall underlays on timber and steel framed buildings within the following scope:
 - the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 with regards to building height and floor plan area; and,
 - with absorbent and non-absorbent wall claddings installed over an 18 mm minimum drained cavity; and,
 - with masonry veneer in accordance with NZBC Acceptable Solution E2/AS1 for timber framed buildings or specific design for steel framed buildings; and,
 - situated in NZS 3604 Wind Zones up to and including Extra High.
- 2.4 Tekton® Building Wrap has also been appraised for use on buildings subject to specific weathertightness design. Building designers are responsible for the building design and for the incorporation of Tekton® Building Wrap into their design in accordance with the declared properties and the instructions of Marshall Innovations Limited.



Building Regulations

New Zealand Building Code (NZBC)

3.1 In the opinion of BRANZ, Tekton® Building Wrap, if used, designed, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet, or contribute to meeting the following provisions of the NZBC:

Clause B2 DURABILITY: Performance B2.3.1 (a), not less than 50 years, B2.3.1 (b), 15 years and B2.3.2. Tekton® Building Wrap meets these requirements. See Paragraphs 9.1 and 9.2.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.2. When used as part of the cladding system, Tekton® Building Wrap will contribute to meeting this requirement. See Paragraphs 12.1 – 12.3.

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

3.2 This is an Appraisal of an **Alternative Solution** in terms of the New Zealand Building Code compliance.

Technical Specification

4.1 Tekton® Building Wrap is a 100 g/m² light grey sheet polypropylene membrane material approximately 0.6 mm thick.

4.2 The product is supplied in rolls 1.370 m x 74 m and 2.743 m x 37 m. The product is printed with the Tekton® logo repeated along the length of the roll. The rolls are wrapped with an instruction sticker.

Accessories

4.3 Accessories used with Tekton® Building Wrap which are supplied by the installer are:

- Fixings – staples, clouts, screws or proprietary wrap fixings, or other temporary fixings to attach the wall wrap to the framing.
- Wall underlay support – polypropylene strap, 75 mm galvanised mesh or galvanised wire, or vertical cavity battens where required to support the wall wrap in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.5.

Handling and Storage

5.1 Handling and storage of the product, whether on or off site, is under the control of the installer. The rolls must be protected from damage and weather. They must be stored on end, under cover, in clean, dry conditions and must not be crushed.

Technical Literature

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

Design Information

Timber and Steel Framing

7.1 Studs must be provided at maximum 600 mm centres. Dwargs must be fitted flush between the studs at maximum 1200 mm centres.

General

7.2 Tekton® Building Wrap is intended for use as an alternative to conventional building papers which are fixed over timber and steel framed walls in order to limit the entry of wind into building cavities, and to act as a secondary barrier to wind-driven rain.

- 7.3 The material also provides a degree of temporary weather protection during early construction. However, the product will not make the building weathertight and some wetting of the underlying structure is always possible before the building is closed in. Hence, the building must be closed-in and made weatherproof before moisture sensitive materials such as wall or ceiling linings and insulation materials are installed.
- 7.4 Tekton® Building Wrap must not be exposed to the weather or ultra violet light for a total of more than 60 days before being covered by the wall cladding.
- 7.5 Tekton® Building Wrap is suitable for use under wall claddings as a wall underlay as called up in NZBC Acceptable Solution E2/AS1, Table 23, except that it must not be used with non-absorbent wall claddings such as vinyl or metal based sidings or weatherboards in direct fixed installations. Tekton® is suitable for use under cavity based wall claddings as a non-absorbent synthetic wall underlay as called up in NZS 2295, Table 2.4 on steel framed buildings. Refer to Table 1.
- 7.6 Tekton® Building Wrap is also suitable for use as an air barrier to walls that are not lined, such as attic spaces at gable ends, as called up in NZBC Acceptable Solution E2/AS1, Paragraph 9.1.4 [c]. Refer to Table 1.

Table 1: NZBC E2/AS1 Table 23 Requirements

NZBC E2/AS1 Table 23 Wall Wrap Properties	Property Performance Requirement	Actual Property Performance
Absorbency	$\geq 100 \text{ g/m}^2$	Classified as non-absorbent [see paragraph 7.4]
Vapour Resistance	$\leq 7 \text{ MN s/g}$	Pass
Water Resistance	$\geq 20 \text{ mm}$	Pass
pH of Extract	$\geq 5.5 \text{ and } \leq 8$	9.78 [Note 1]
Shrinkage	$\leq 0.5\%$	Pass
Mechanical	Edge tear and tensile strength	Edge tear: Machine direction = 228 N Cross direction = 186 N Tensile strength: Machine direction = 4.4 kN/m Cross direction = 3.9 kN/m
Air Barrier	Air resistance: $\geq 0.1 \text{ MN s/m}^3$	Pass

Note 1: Further testing of Tekton® Building Wrap was completed to determine the effect of the high pH level on the wall underlay and materials it is likely to come into contact with during its serviceable life. The testing confirmed that the high pH had no adverse effects on the wall underlay performance, or the performance of other materials.

- 7.7 In cavity installations where the cavity battens are installed at greater than 450 mm centres, the wall underlay must be supported between the battens to prevent the wall underlay bulging into the cavity space when bulk insulation is installed in the wall frame cavity in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.5.



BRANZ Appraised
Appraisal No. 548 [2013]

BRANZ Appraisal
Appraisal No. 548 [2013]
16 December 2013

TEKTON® BUILDING WRAP

Stucco Plaster

- 7.8 Tekton® Building Wrap is suitable for use as a non-rigid backing material for stucco plaster in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.3.5.1. The wall underlay must be supported with 75 mm galvanised mesh or plastic tape or wire at 150 mm centres run across the cavity battens to limit deflection to a maximum of 5 mm in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.3.5.2.
- 7.9 Tekton® Building Wrap may also be used as a slip layer over rigid backings for stucco plaster in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.3.3 [b].

Structure

- 8.1 Tekton® Building Wrap is suitable for use in all Wind Zones of NZS 3604 up to, and including, Very High when used as a flexible building underlay, and all Wind Zones of NZS 3604 up to, and including, Extra High when used as an overlay for rigid building underlays.

Durability

- 9.1 Tekton® Building Wrap meets code compliance with NZBC Clause B2.3.1 [a], not less than 50 years for building wraps used where the cladding durability requirement or expected serviceable life is not less than 50 years, and code compliance with NZBC Clause B2.3.1 [b], 15 years for building wraps used where the cladding durability requirement is 15 years.

Serviceable Life

- 9.2 Provided it is not exposed to the weather or ultra-violet light for a total of more than 60 days, and provided the exterior cladding is maintained in accordance with the cladding manufacturer's instructions and the cladding remains weather resistant, Tekton® Building Wrap is expected to have a serviceable life equal to that of the cladding.

Control of Internal Fire and Smoke Spread

- 10.1 Tekton® Building Wrap has an AS 1530 Part 2 flammability index of not greater than 5 and therefore meets the requirements of NZBC Acceptable Solutions C/AS2 to C/AS6, Paragraph 4.17.8 b), for the surface finish requirements of suspended flexible fabric used as an underlay to exterior cladding that is exposed to view in occupied spaces. It may therefore be used with no restrictions in all buildings.

Prevention of Fire Occurring

- 11.1 Separation or protection must be provided to Tekton® Building Wrap from heat sources such as fire places, heating appliances, flues and chimneys. Part 7 of NZBC Acceptable Solutions C/AS1 – C/AS6 and NZBC Verification Method C/VM1 provide methods for separation and protection of combustible materials from heat sources.

External Moisture

- 12.1 Tekton® Building Wrap must be used behind claddings that meet the requirements of the NZBC, e.g. such as those covered by NZBC Acceptable Solution E2/AS1, or claddings covered by a valid BRANZ Appraisal.
- 12.2 Tekton® Building Wrap, when installed in accordance with the Technical Literature and this Appraisal, will assist in the total cladding systems compliance with NZBC Clause E2.
- 12.3 When used as an air barrier, particular care must be taken to ensure an air tight barrier is achieved, and weather sealing at all openings and penetrations through the cladding meets the requirements of the NZBC.

Installation Information

Installation Skill Level Requirements

- 13.1 Installation must always be carried out in accordance with the Technical Literature and this Appraisal, by competent tradespersons with an understanding of wall wrap installation.

Wrap Installation

- 14.1 Tekton® Building Wrap must be fixed to all framing members at maximum 300 mm centres with hot-dip galvanised, large-head clouts 20 mm long, zinc plated 6-8 mm staples, self-drilling screws, or proprietary wrap fixings. The membrane must be pulled taut over the framing before fixing.
- 14.2 Tekton® Building Wrap must be run horizontally and must extend from the upper-side of the top plate to the under-side of the bearers or wall plates supporting ground floor joists, or below bottom plates on concrete slabs. Horizontal laps must be no less than 75 mm wide, with the direction of the lap ensuring that water is shed to the outer face of the membrane. End laps must be made over framing and be no less than 150 mm wide.
- 14.3 The wall underlay should be run over openings and these left covered until windows and doors are ready to be installed. Openings are formed in the membrane by cutting on a 45 degree diagonal from each corner of the penetration. The flaps of the cut membrane must be folded inside the opening and stapled to the penetration framing. Excess wall underlay may be cut off flush with the internal face of the wall frame.
- 14.4 Tekton® Building Wrap can be added as a second layer over head flashings in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.10.3.
- 14.5 When fixing the product in windy conditions, care must be taken due to the large sail area created by wide roll widths.
- 14.6 Any damaged areas of Tekton® Building Wrap, such as tears, holes or gaps around service penetrations, must be repaired. Damaged areas can be repaired by covering with new material lapping the damaged area by at least 150 mm and taping, or by taping small tears.

Inspections

- 14.7 The Technical Literature must be referred to during the inspection of Tekton® Building Wrap installations.

Basis of Appraisal

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

Tests

- 15.1 The following tests have been carried out on Tekton® Building Wrap by Scion: Folding strength of paper in accordance with AS/NZS 1301.423; edge tear resistance and tensile strength in accordance with AS/NZS 4200.1 and air resistance in accordance with BS 6538-3.
- 15.2 The following tests have been carried out on Tekton® Building Wrap by BRANZ: Absorbency in accordance with AS/NZS 4201.6, Vapour transmission in accordance with ASTM E 96B, Shrinkage in accordance with AS/NZS 4201.3, Water barrier in accordance with AS/NZS 4201.4 and pH of extract in accordance with AS/NZS 1301.421. A range of these tests were completed before and after Tekton® Building Wrap was exposed to ultra-violet light.
- 15.3 The Flammability Index of Tekton® Building Wrap has been evaluated in accordance with AS 1530.2.

Other Investigations

- 16.1 A durability opinion was given by BRANZ technical experts.
- 16.2 Site inspections were carried out by BRANZ to assess methods used for the installation of Tekton® Building Wrap, and to examine completed installations.
- 16.3 The marketer's Technical Literature, including installation instructions, have been examined by BRANZ and found to be satisfactory.



BRANZ Appraised
Appraisal No. 548 [2013]

BRANZ Appraisal
Appraisal No. 548 [2013]
16 December 2013

TEKTON® BUILDING WRAP

Quality

- 17.1 The manufacture of Tekton® Building Wrap has not been examined by BRANZ, but details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory. BRANZ has taken note of product certification by ICC-ES and CCMC covering quality aspects associated with the product.
- 17.2 The quality of supply to the market is the responsibility of Marshall Innovations Limited.
- 17.3 Building designers are responsible for the design of the building, and for the incorporation of the wall wrap into their design in accordance with the instructions of Marshall Innovations Limited.
- 17.4 Quality of installation is the responsibility of the installer in accordance with the instructions of Marshall Innovations Limited.

Sources of Information

- AS 1530.2 – 1993 Test for flammability of materials.
- AS/NZS 1301.421s: 1998 Determination of the pH value of aqueous extracts of paper, board and pulp – cold extraction method.
- AS/NZS 4200.1: 1994 Pliable building membranes and underlays – materials.
- AS/NZS 4201.1: 1994 Pliable building membranes and underlays – Methods of test – Resistance to dry delamination.
- AS/NZS 4201.2: 1994 Pliable building membranes and underlays – Methods of test – Resistance to wet delamination.
- AS/NZS 4201.3: 1994 Pliable building membranes and underlays – Methods of test – Shrinkage.
- AS/NZS 4201.4: 1994 Pliable building membranes and underlays – Methods of test – Resistance to water penetration.
- AS/NZS 4201.6: 1994 Pliable building membranes and underlays – Methods of test – Surface water absorbency.
- BS 6538.3: 1987 Method for determination of air permeance using the Garley apparatus.
- NZS 2295: 2006 Pliable, Permeable Building Underlays.
- NZS 3604: 2011 Timber-framed buildings.
- Compliance Document for New Zealand Building Code External Moisture Clause E2, Department of Building and Housing, Third Edition July 2005 [Amendment 5, 1 August 2011].
- Ministry of Business, Innovation and Employment Record of Amendments for Compliance Documents and Handbooks.
- The Building Regulations 1992.

Amendment

Amendment No. 1, dated 17 December 2013.

This Appraisal has been amended to fix an editorial error.



BRANZ Appraised
Appraisal No. 548 [2013]

BRANZ Appraisal
Appraisal No. 548 [2013]
16 December 2013

TEKTON® BUILDING WRAP



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

The Appraisal is issued only to **Marshall Innovations Limited**, and is valid until further notice, subject to the Conditions of Appraisal.

Conditions of Appraisal

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

For BRANZ

A handwritten signature in blue ink, appearing to read 'Cheydra Percy'.

Cheydra Percy

Chief Executive

Date of Issue:

16 December 2013

Where the SUPER-STICK Building Tape installation is subject to a building consent it should be undertaken or supervised by a Licensed Building Practitioner (LBP).

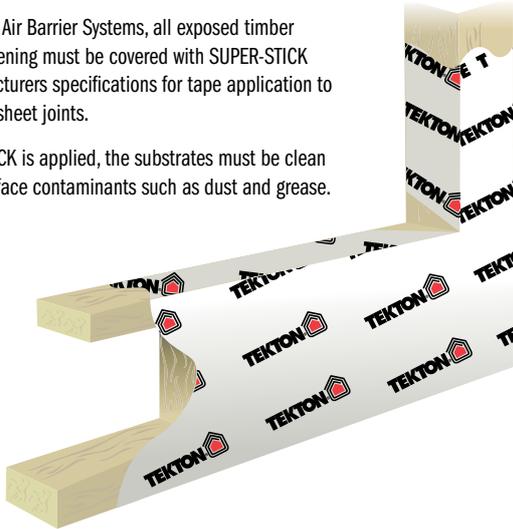
Preparation

The flexible building underlay must be installed in accordance with the manufacturer's specifications.

With proprietary Rigid Air Barrier Systems, all exposed timber around the joinery opening must be covered with SUPER-STICK Tape, refer to manufacturers specifications for tape application to joinery openings and sheet joints.

Before any SUPER-STICK is applied, the substrates must be clean and free from any surface contaminants such as dust and grease.

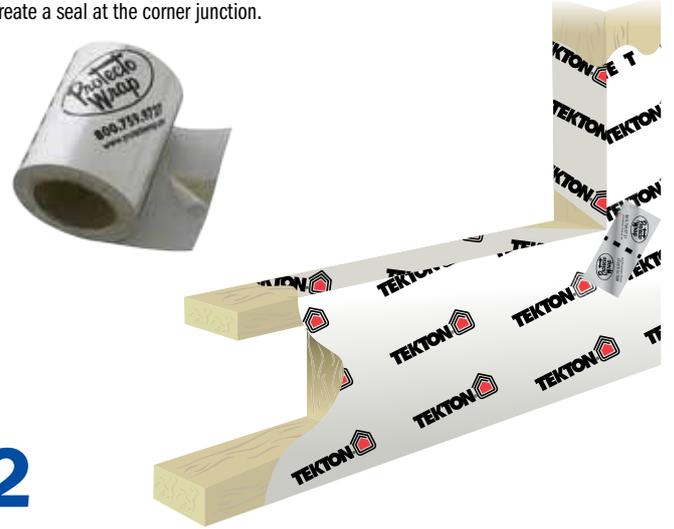
1



Jamb/Sill Butterfly application

Cut 4 strips of tape 150mm by 75mm. Apply 2 strips on the bottom corners at a 45 degree angle and overlapping the corner by 3mm to create a seal at the corner junction.

2

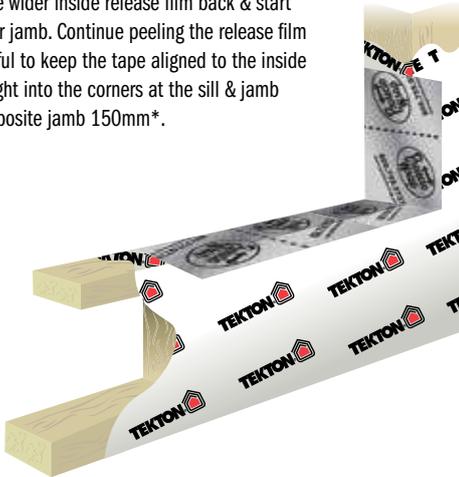


Sill Installation

Measure and cut a length of SUPER-STICK tape to the length of the sill + 300mm. The tape is installed flush with interior face of the opening & is applied along the entire length of the sill & 150mm up the jamb. Start by peeling 100mm of the wider inside release film back & start 150mm* up the window / door jamb. Continue peeling the release film as you move along being careful to keep the tape aligned to the inside edge of the sill and forming tight into the corners at the sill & jamb junctions. Run the tape up opposite jamb 150mm*.

*Note for ex 150mm framing increase height up jambs to 200mm with SUPER-STICK to get sufficient cover.

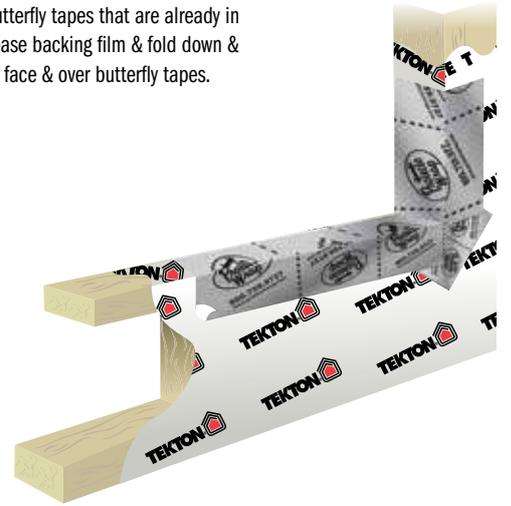
3



Sill installation stage 2

The overhanging tape is cut at the corners of the opening to allow the tape to be folded onto the face of the building wrap & butterfly tapes that are already in place. Peel off the release backing film & fold down & apply to building wrap face & over butterfly tapes.

4

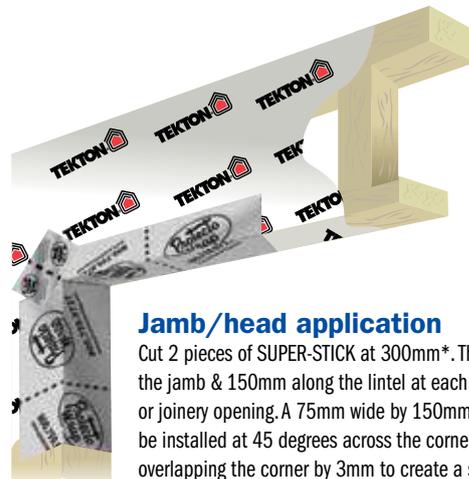
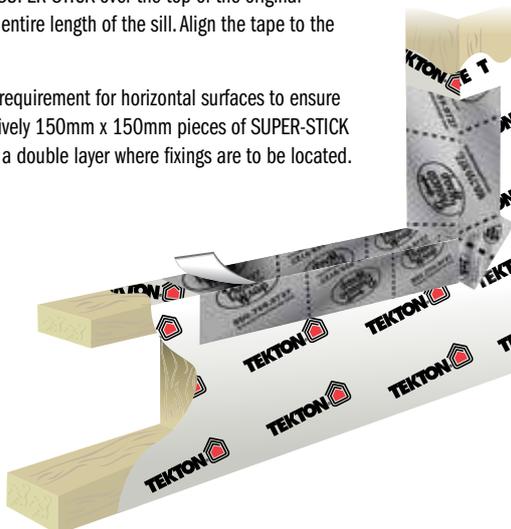


Sill & Nail Sealability

Apply a layer of 75mm SUPER-STICK over the top of the original flashing tape along the entire length of the sill. Align the tape to the outside face of the sill.

This is a Building Code requirement for horizontal surfaces to ensure nail sealability. Alternatively 150mm x 150mm pieces of SUPER-STICK maybe overlaid to form a double layer where fixings are to be located.

5



6

Jamb/head application

Cut 2 pieces of SUPER-STICK at 300mm*. The tape is installed 150mm down the jamb & 150mm along the lintel at each of the top corners of the window or joinery opening. A 75mm wide by 150mm long sealing butterfly tape must be installed at 45 degrees across the corner of the head/jamb junction overlapping the corner by 3mm to create a seal at the corner junction.

*Note for ex 150mm framing cut 2 pieces of SUPER-STICK at 400mm to get sufficient cover. When lapping SUPER-STICK, the lap must be a minimum of 100mm.

*Ensure all the tape is pressed firmly onto substrate to achieve adequate adhesion.



TEKTON
HouseWrap

MOISTURE
WIND
MOISTURE VAPOUR

50 YEARS DURABILITY

BRANZ Appraised
Appraisal No.548 [2013]

Benefits of Tekton Wall Underlay

- BRANZ Appraised #548 (2013).
- Is breather type coated, spun-bonded polypropylene.
- Can be left exposed for 60 days.
- Superior water holdout. Taking the industry to a new level for water resistance.
- Optimal surfactant resistance. Wash your building with confidence.
- Fire retardant with the Highest Fire rating of all papers in NZ. It has a 0 rating on the Flammability Index.
- A leader in tear strength.
- Suitable for all wind zones including extra high when used with RAB Systems.
- Can be used with no internal wall linings, ie: gable ends.
- Increases your building's energy efficiency.
- 50 year durability warranty.
- Used for residential and commercial applications.
- Will not support the growth of mould.
- Contains more than 23% recycled content



TEKTON SPECIFICATION

PRODUCT DESCRIPTION

Tekton Wall Underlay is a synthetic breather-type Wall Underlay for use as a wall underlay and air barrier under direct and non-direct fixed wall cladding on timber and steel framed buildings. The product is a coated spun-bonded polypropylene, and is approximately 0.6mm thick. Tekton Wall Underlay is supplied in rolls 2740mm x 37m and 1370mm x 37m.

FEATURES /BENEFITS

- Tekton Wall Underlay can be used in all wind zones up to and including very high and extra high with RAB Systems.
- Tekton Wall Underlay is fire retardant with a zero flammability index and can be used without restriction on all buildings, however must be separated from fireplaces, heating appliances, flues and chimneys in accordance with the NZ Building Code.
- Tekton Wall Underlay can be installed as an air barrier to walls that are not lined, such as gable ends.
- Tekton Wall Underlay has superior water hold out - keeping framing drier while permanent cladding is installed.
- Tekton Wall Underlay has 50 year durability.
- Tekton Wall Underlay can be left exposed for up to 60 days.
- Tekton Wall Underlay has optimal surfactant resistance (will not lose integrity if exposed to most soaps, detergents and cleaning chemicals).
- Tekton Wall Underlay is Branz appraised # 548 (2013)
- Tekton Wall Underlay can be used as a non-rigid backing material for stucco plaster and as a slip layer over rigid backing for stucco plaster.
- Tekton Wall Underlay is compatible with metal cavity battens.

APPLICATION RANGE

TIMBER FRAMED BUILDINGS

- With absorbent wall claddings directly fixed to the framing.
- With absorbent and non-absorbent wall claddings installed over an 18mm minimum drained cavity.
- With masonry veneer.
- In building wind zones up to and including very high.

STEEL FRAMED BUILDINGS

- With absorbent and non-absorbent wall claddings installed over an 18mm minimum drained cavity.
- With masonry veneer.
- In building wind zones up to and including very high.

Tekton Wall Underlay can also be used on buildings subject to specific weathertightness design.

STORAGE

Tekton Wall Underlay must be stored on its end in a clean and dry environment. It is the responsibility of the installer to protect the roll from damage and weather.

SURFACE PREPARATION

Studs must be provided at a maximum of 600mm centres. Nogs must be fitted flush between the studs at a maximum of 1200mm centres. The framing must be free from any sharp protrusions that may damage the wall underlay.

TEKTON Specification

INSTALLATION

PLACEMENT

- The branded side of the wall underlay must face away from the framing.
- The wall underlay must run horizontally.
- The wall underlay must extend from the upper side of the top plate to the underside of the bearers or wall plates supporting ground floor joists, or below bottom plates on concrete slabs.
- Horizontal laps must be no less than 75mm with the direction of the lap ensuring that water is shed to the outside.
- End laps must be made over framing and be no less than 150mm wide.

It is preferable to tape all joins.

APPLICATION

- Position the roll of Tekton Wall Underlay against the framing with a short length of wall underlay free of the roll.
- Align the guide marks printed on the Tekton Wall Underlay with visible studs and nail /staple to the framing

Fix the wall underlay into place using 6-8mm zinc/ stainless plated staples, hot dip galvanised large head clouts or proprietary wall underlay fixings.

- Unroll the wall underlay across the framing and fix to all framing members at a maximum of 300mm centres.
- Keep the wall underlay straight and taut over the framing.
- The wall underlay should be run over any openings and these should be left covered until the windows and doors are ready to be installed. To form the openings cut the wall underlay at a 45 degree diagonal in from each corner. Fold and staple the wall underlay to the inside of the framed opening. Excess wall underlay can be trimmed.

- All openings must be detailed using a Branz appraised flexible flashing system like Super-Stick, Protecto One Piece Sill Tape or the Protecto Sill System.
- Where cavity battens are installed at greater than 450 mm centres, the wall underlay must be supported between the battens to prevent the wall underlay bulging into the cavity space when insulation is installed.
- Tekton Wall Underlay can be added as a second layer over head flashings as per E2/AS1 or the headflashing can be sealed to the wall underlay using Protecto Head Flashing Tape.
- Any damaged areas of the wall underlay must be repaired by overlapping with new material and taping, or by taping small tears .

When fixing wall underlay in windy conditions, care must be taken due to the large sail area created by the roll widths.

WARRANTY

Tekton Wall Underlay meets the durability requirements of NZBC B2.3.1(a), 50 years and B2.3.1(b), 15 years. Tekton Wall Underlay is warranted to be free of defect in manufacture. This warranty is limited to replacement of the Tekton Wall Underlay material. Marshall Innovations NZ/AUS Ltd (the distributor) is not liable for incorrect installation or any accidental or wilful damage to the product.



ECOPLY® BRACING SPECIFICATIONS: EPI



Information contained in this document is specific to the CHH Woodproducts range of plywood products and cannot be used with any other plywood products no matter how similar they may appear.

For further information contact customer services or visit www.chhwoodproducts.co.nz

0800 326 759
www.chhwoodproducts.co.nz



SINGLE SIDED STRUCTURAL PLYWOOD BRACE

Specification No.	Minimum Wall Length	Lining Requirements	BU's/m Wind	BU's/m Earthquake
EPI_0.4	0.4 m	Ecoply® one side	80	95
EPI_0.6	0.6 m		95	105
EPI_1.2	1.2 m		120	135

FRAMING

Wall framing must comply with:

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

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

BOTTOM PLATE FIXING

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

LINING

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

FASTENING THE ECOPLY®

Fasteners

Fasten with 50 x 2.8 mm galvanised or stainless steel flat head nails for direct fix, or 60 x 2.8 mm over cavity battens. Place fasteners no less than 7 mm from sheet edges. Screws cannot be used. Power driven nails are suitable. Do not overdrive, nails must be full round head.

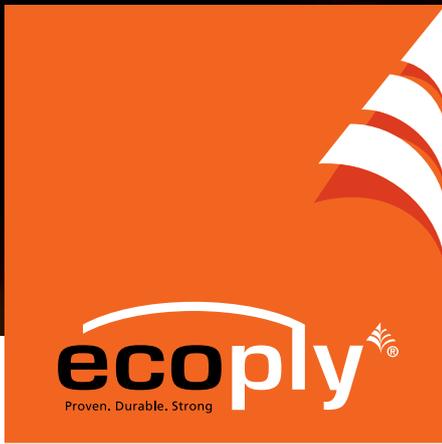
Fasteners for H3.2 CCA treated Ecoply

Where fasteners are in contact with H3.2 CCA treated timber or plywood, fasteners shall be a minimum of hot dip galvanised.

In certain circumstances stainless steel fasteners may be required. Refer to table 8 of the Ecoply Specification and Installation Guide for these circumstances and further fastener selection advice. Where stainless steel nails are required, annular grooved nails must be used.

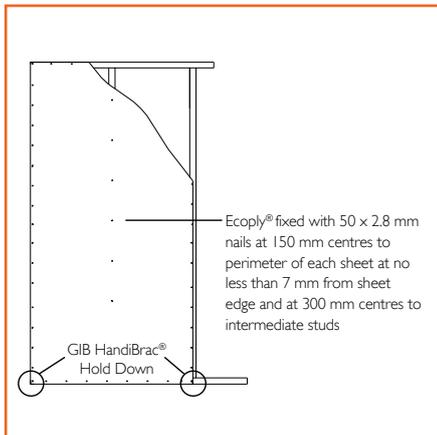
Ecoply® Bracing Systems are designed to meet the requirements of the New Zealand Building Code and have been tested and analysed using the P21 method referenced in NZS 3604:2011 listed as an acceptable solution B1/AS1 Structure. Testing was carried out using Ecoply manufactured by Carter Holt Harvey and

SG8 timber framing, and GIB® products manufactured by Winstone Wallboards Ltd. Substituting materials may compromise performance of the system. GIB® and GIB Handibrac® are registered trade marks of Fletcher Building Holdings Ltd.



Fastening centres

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



ECOPLY® SUITABILITY FOR BRACING APPLICATIONS INCLUDING TREATMENT TYPE AND FASTENER MATERIAL*

Application	Plywood Treatment	Fastener Material
Plywood bracing in interior spaces with no risk of exposure to weather or moisture penetration conducive to decay (all exposure zones ¹ including sea spray):	Ecoply Untreated	Hot dipped galvanised or better
Plywood bracing in enclosed spaces (protected from the weather) but with a risk of moisture penetration conducive to decay in exposure zones ¹ B & C:	Ecoply H3.1 LOSP/H3.2 CCA treated Ecoply Barrier (rigid air barrier)	Hot dipped galvanised or better
Plywood bracing in enclosed spaces (protected from the weather) but with a risk of moisture penetration conducive to decay in exposure zone ¹ D (sea spray):	Ecoply H3.1 LOSP/H3.2 CCA treated Ecoply Barrier (rigid air barrier)	Stainless steel
Cladding	Refer to Shadowclad® Specification & Installation Guide	
Rigid Air Barrier	Refer to Ecoply Barrier® Specification & Installation Guide	
Bracing on framing exposed to ground atmosphere in exposure zones ¹ B & C	Ecoply H3.1 LOSP/H3.2 CCA treated	Hot dipped galvanised or better
Bracing on framing exposed to ground atmosphere in exposure zones ¹ D	Ecoply H3.1 LOSP/H3.2 CCA treated	Stainless steel
Bracing in wet process buildings in all exposure zones ¹ (including sea spray)	Ecoply H3.1 LOSP/H3.2 CCA treated	Stainless steel

¹ Exposure zones as per section 4 of NZS 3604

* Refer to Table 8, page 15 of Ecoply Specification & Installation Guide.

Ecoply® Bracing Systems are designed to meet the requirements of the New Zealand Building Code and have been tested and analysed using the P21 method referenced in NZS 3604:2011 listed as an acceptable solution B1/AS1 Structure. Testing was carried out using Ecoply manufactured by

Carter Holt Harvey and SG8 timber framing, and GIB® products manufactured by Winstone Wallboards Ltd. Substituting materials may compromise performance of the system. GIB® and GIB HandiBrac® are registered trade marks of Fletcher Building Holdings Ltd.

MARCH 2014



Product Data Sheet

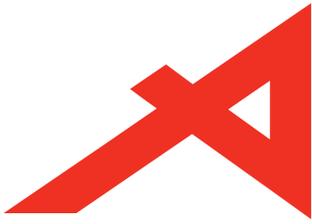
0800 BRICKS | 0800 274 257
www.nzbrickdistributors.co.nz

Brand	Austral
Range	Distinction Series
Product	Enzo
Origin	NSW, Australia



Typical Properties	
Length (mm)	230mm
Width (mm)	70 mm
Height (mm)	119mm
Finish (Vitrated™, Slurry, Colour Through)	Colour Through
Dimensional Category	DW1
Average Weight/ Unit	2.45 kg
Units per m ²	33
Pack Size (subject to change)	416
Characteristic Unconfirmed Compressive Strength (f _{uc})	40 MPa
24 Hour Cold Water Absorbtion	<10%
Initial Rate of Absorbtion (IRA) Gross	1.0-2.0kg/m ² min
Estimated 15 year Coefficient of Expansion (e factor)	<1.0mm/m
Perforation Volume	<40%
Durability Class	Exposure Grade
Liability to Efflorescence	None
Lime Pitting Liability	No
Solar Absorbance Rating	Light





BRANZ Appraised
Appraisal No. 447 [2010]

**LINEA®
WEATHERBOARD
CAVITY CLADDING**



Appraisal No. 447 [2010]

Amended 01 March 2016

BRANZ Appraisals

Technical Assessments of products
for building and construction.



James Hardie New Zealand

PO Box 12 070

Penrose

Auckland

Tel: 0800 808 868

Fax: 0800 808 988

Web: www.jameshardie.co.nz



BRANZ

1222 Moonshine Rd,

RD1, Porirua 5381

Private Bag 50 908

Porirua 5240,

New Zealand

Tel: 04 237 1170

branz.co.nz



Product

- 1.1 Linea® Weatherboard Cavity Cladding is a cavity-based bevelbacked fibre cement weatherboard wall cladding. It is designed to be used as part of an external cladding system for residential and light commercial type buildings where domestic construction techniques are used.
- 1.2 Linea® Weatherboard Cavity Cladding consists of Linea® Weatherboard, which is a bevelbacked fibre cement weatherboard, fixed over timber battens to form the cavity. The cladding is finished with a latex paint system.
- 1.3 The cladding incorporates a primary and secondary means of weather resistance (first and second line of defence) against water penetration by separating the cladding from the external wall framing with a nominal 20 mm cavity. The cavity allows for any occasional ingress of water that may get past the external skin to drain to the exterior of the building, and any remaining moisture to dry by evaporation.

Scope

- 2.1 Linea® Weatherboard Cavity Cladding has been appraised as an external wall cladding for buildings within the following scope:
 - the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1; and,
 - constructed with timber framing complying with the NZBC; and,
 - with a risk score of 0-20, calculated in accordance with NZBC Acceptable Solution E2/AS1, Table 2; and,
 - situated in NZS 3604 Wind Zones up to, and including Extra High.
- 2.2 Linea Weatherboard Cavity Cladding has also been appraised for weathertightness and structural wind loading when used as an external horizontally fixed wall cladding solution for buildings within the following scope:
 - the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 with regards to building height and floor plan area; and,
 - constructed with timber framing complying with the NZBC; and,
 - situated in specific design wind pressures up to a maximum design differential ultimate limit state (ULS) of 2.5 kPa.
- 2.3 Linea® Weatherboard must only be installed horizontally on vertical surfaces.
- 2.4 Linea® Weatherboard Cavity Cladding is appraised for use with aluminium window and door joinery that is installed with vertical jambs and horizontal heads and sills. *[The Appraisal of Linea® Weatherboard Cavity Cladding relies on the joinery meeting the requirements of NZS 4211 for the relevant Wind Zone.]*

[Note: Linea® Weatherboard Cavity Cladding can be used to provide fire resistance rated construction, but these aspects have not been assessed by this Appraisal and are outside its scope.]

Building Regulations

New Zealand Building Code (NZBC)

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

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

Clause B2 DURABILITY: Performance B2.3.1 (b), 15 years and B2.3.2. Linea® Weatherboard Cavity Cladding meets these requirements. See Paragraphs 10.1 and 10.2.

Clause C3 FIRE AFFECTING AREAS BEYOND THE FIRE SOURCE: Performance C3.7. Linea® Weatherboard Cavity Cladding meets this requirement. See Paragraph 12.1.

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

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

3.2 This is an Appraisal of an **Alternative Solution** in terms of New Zealand Building Code compliance.

Technical Specification

4.1 Linea® Weatherboards are bevelback weatherboards with a tongue and groove at each end for jointing. The weatherboards are pre-primed with an acrylic primer on the front face and both edges. Linea® Weatherboards are 16 mm thick and are available 135 mm, 150 mm and 180 mm wide. All boards are supplied 4200 mm long.

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

Accessories

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

- **Axent™ Trim** - a 16 mm thick fibre cement trim manufactured from a reduced density cellulose fibre cement formulation. Axent™ Trim is pre-primed with an acrylic primer on the front face and both edges, and is available in sizes of 84 mm and 100 mm wide by 2600 mm long.
- **External and internal corner mouldings** - chromate treated aluminium external box corner, 90° internal corner 'W' mould and 135° internal corner 'W' mould. The mouldings are available in 2700 mm and 4000 mm lengths.
- **Corner soakers** - 90° soakers are available for 135 mm, 150 mm and 180 mm Linea® Weatherboards. The soakers are available in chromate treated aluminium, copper and stainless steel.
- **Cavity vent strip** - uPVC, available in 3000 mm lengths.

4.4 Accessories used with Linea® Weatherboard Cavity Cladding which are supplied by the building contractor are:

- **Flexible wall underlay** - building paper complying with NZBC Acceptable Solution E2/AS1 Table 23, or breather-type membranes covered by a valid BRANZ Appraisal for use as wall underlays.
- **Flexible building underlay support** - polypropylene strap, 75 mm galvanised mesh, galvanised wire, or additional vertical battens for securing the flexible building underlay in place and preventing bulging of the bulk insulation into the drainage cavity. *[Note: mesh and wire galvanising must comply with AS/NZS 4534.]*



BRANZ Appraised
Appraisal No. 447 [2010]

BRANZ Appraisal
Appraisal No. 447 [2010]
14 September 2010

LINEA® WEATHERBOARD CAVITY
CLADDING

- **Rigid wall underlay** – Plywood or fibre cement sheet complying with NZBC Acceptable Solution E2/AS1, Table 23, or rigid sheathing covered by a valid BRANZ Appraisal for use as rigid air barrier systems.
- **Flexible sill, head and jamb flashing tape** – flexible flashing tapes complying with NZBC Acceptable Solution E2/AS1, Paragraph 4.3.11, or flexible flashing tapes covered by a valid BRANZ Appraisal for use around window and door joinery openings.
- **Cavity battens** – nominal 50 mm wide by 25 mm thick (minimum finished size of 45 mm wide by 18 mm thick) timber treated to Hazard Class H3.1.
- **Joinery head flashings** – folded from aluminium or galvanised steel to suit the window or door trim opening. Refer to NZS 3604, Section 4 and NZBC Acceptable Solution E2/AS1, Table 20 for durability requirements.
- **Planted sill and scribes** – timber treated to Hazard Class H3.1, pre-primed before installation.
- **Window and door trim cavity air seal** – air seals complying with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.6, or self-expanding, moisture cure polyurethane foam air seals covered by a valid BRANZ Appraisal suitable for use around window, door and other wall penetration openings.
- **Flexible sealant** – sealant complying with NZBC Acceptable Solution E2/AS1, or sealant covered by a valid BRANZ Appraisal for use as a weather sealing sealant for exterior use.
- **Cavity batten fixings** – 40 x 2.8 mm flat head hot-dip galvanised nails.
- **Linea® Weatherboard fixings** – 60 x 3.15 mm flat head hot-dip galvanised HardieFlex nails or stainless steel ring shank HardieFlex nails (for concealed nailing in NZS 3604 wind zones up to and including Very High), 75 x 3.15 mm jolt head hot-dip galvanised nails or stainless steel ring shank nails (for face nailing in NZS 3604 wind zones up to and including Very High), and 90 x 4.0 mm jolt head hot-dip galvanised nails or stainless steel ring shank nails (for face nailing in the NZS 3604 Extra High Wind Zone and specific design wind pressures up to a maximum design differential ULS of 2.5 kPa).
- **Axent™ Trim fixings** – 60 x 3.15 mm or 75 x 3.15 mm hot-dip galvanised jolt head nails and stainless steel ring shank jolt head nails.

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

Paint System Specification

- 4.5 Paint systems are not supplied by James Hardie New Zealand and have not been assessed, therefore they are outside the scope of this Appraisal.
- 4.6 All exposed faces, including top edges at sills and all bottom edges of Linea® Weatherboard, Axent™ Trim and accessories must be finished with a latex exterior paint system complying with any of Parts 7, 8, 9, or 10 of AS 3730.

Handling and Storage

- 5.1 Handling and storage of all materials supplied by James Hardie New Zealand or the building contractor, whether on site or off site, is under the control of the building contractor. Linea® Weatherboards must be stacked flat, off the ground and supported on a level platform. They must be kept dry at all times either by storing under cover or providing waterproof covers to the stack. Care must be taken to avoid damage to edges, ends and surfaces. Weatherboards must always be carried on edge.
- 5.2 Accessories must be stored so they are kept clean, dry and undamaged. All accessories must be used within the maximum storage period recommended by the manufacturer.

Technical Literature

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

Design Information

Framing

Timber Treatment

- 7.1 Timber wall framing behind Linea® Weatherboard Cavity Cladding must be treated as required by NZBC Acceptable Solution B2/AS1.

Timber Framing

- 7.2 Timber framing must comply with NZS 3604 for buildings or parts of a building within the scope limitations of NZS 3604. Buildings or parts of a building outside the scope of NZS 3604 must be to a specific design in accordance with NZS 3603 and AS/NZS 1170. Where specific design is required, the framing must be of at least equivalent stiffness to the framing provisions of NZS 3604. Studs must be at maximum 600 mm centres in Low, Medium, High and Very High Wind Zones and maximum 400 mm centres for the NZS 3604 Extra High Wind Zone and specifically designed buildings. Nogs must be fitted flush between the studs at maximum 800 mm centres [for studs at 600 mm centres] or maximum 1200 mm centres [for studs at 400 mm centres].
- 7.3 Timber framing must have a maximum moisture content of 24% at the time of the cladding application. *[If weatherboards are fixed to framing with a moisture content of greater than 24% problems may occur at a later date due to excessive timber shrinkage.]*
- 7.4 Timber wall framing must have a maximum moisture content of 18% before the weatherboards are painted.

General

- 8.1 When the Linea™ Weatherboard Cavity Cladding is used for specifically designed buildings up to 2.5 kPa ULS wind pressure, only the weathertightness and structural aspects of the cladding are within the scope of this Appraisal. All other aspects of the building need to be specifically designed and are outside the scope of this Appraisal.
- 8.2 Punchings in the cavity vent strip provide a minimum ventilation opening area of 1000 mm² per lineal metre of wall.
- 8.3 At ground level the bottom edge of Linea® Weatherboards must be kept clear of paved surfaces, such as footpaths, by a minimum of 100 mm and unpaved surfaces by 175 mm in accordance with NZBC Acceptable Solution E2/AS1, Table 18. The ground clearances to finished floor levels as set out in NZS 3604 must be adhered to.
- 8.4 At balcony, deck or low pitch roof/wall junctions, the bottom edge of Linea® Weatherboards must be kept clear of any adjacent surface, or above the top surface of any adjacent roof flashing by a minimum of 50 mm.
- 8.5 All external walls of buildings must have barriers to airflow in the form of interior linings with all joints stopped for wind zones up to and including Very High, and rigid underlays for buildings in the Extra High wind zone and specifically designed buildings up to 2.5 kPa design differential ULS wind pressure. Unlined gables and walls must incorporate a rigid sheathing or an air barrier which meets the requirements of NZBC Acceptable Solution E2/AS1, Table 23. For attached garages, wall underlays must be selected in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.3.4. Where rigid underlays are used, the cavity batten fixing lengths must be increased by a minimum of the thickness of the underlay.
- 8.6 Where cladding penetrations are wider than the cavity batten spacing, allowance must be made for airflow between adjacent cavities by leaving a minimum gap of 10 mm between the bottom of the vertical cavity batten and the flashing to the opening.
- 8.7 Where Linea® Weatherboard Cavity Cladding abuts other cladding systems, designers must detail the junction to meet their own requirements and the performance requirements of the NZBC. Details not included within the Technical Literature have not been assessed and are outside the scope of this Appraisal.



BRANZ Appraised
Appraisal No. 447 [2010]

BRANZ Appraisal
Appraisal No. 447 [2010]
14 September 2010

LINEA® WEATHERBOARD CAVITY
CLADDING

Interstorey Junctions

- 8.8 Inter-storey drained joints must be constructed in accordance with the Technical Literature. Inter-storey drained joints must be provided to limit continuous cavities to the lesser of 2-storeys or 7 metres in height, in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.9.4 [b].

Structure

Mass

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

Impact Resistance

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

Wind Zones

- 9.3 Linea® Weatherboard Cavity Cladding is suitable for use in all Wind Zones of NZS 3604 up to, and including, Extra High where buildings are designed to meet the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 1.1, or up to 2.5 kPa ULS wind pressure where buildings are specifically designed.

Durability

Serviceable Life

- 10.1 Linea® Weatherboard Cavity Cladding installations are expected to have a serviceable life of at least 50 years provided the paint coating system is maintained in accordance with this Appraisal to ensure the Linea® Weatherboards and fixings remain dry in service. Linea® Weatherboards must be painted within 3 months of fixing.
- 10.2 Coastal locations can be very corrosive to fasteners, especially locations within distances of up to 500 m from the sea including harbours, or 100 metres from tidal estuaries and sheltered inlets, and otherwise as shown in NZS 3604, Figure 4.2. These coastal locations are defined in NZS 3604 as Zone D. To achieve a 50 year serviceable life in Zone D, Linea® Weatherboards must be fixed with stainless steel fasteners. Fasteners outside Zone D may be hot-dip galvanised steel.
- 10.2 Microclimatic conditions, including geothermal hot spots, industrial contamination and corrosive atmospheres, and contamination from agricultural chemicals or fertilisers can convert mildly corrosive atmosphere into aggressive environments for fasteners. The fixing of Linea® Weatherboards in areas subject to microclimatic conditions requires specific design in accordance with NZS 3604, Paragraph 4.2.4, and is outside the scope of this Appraisal.

Maintenance

- 11.1 Regular maintenance is essential for Linea® Weatherboard Cavity Cladding installations to continue to meet the NZBC durability performance provision and to maximise their serviceable life.
- 11.2 Annual inspections must be made to ensure that all aspects of the cladding system, including the paint coating system, flashings and any sealed joints remain in a weatherproof condition. Any damaged areas or areas showing signs of deterioration which would allow water ingress must be repaired immediately. Sealant and paint coatings must be repaired in accordance with the sealant or paint coating manufacturer's instructions.
- 11.3 Regular cleaning [at least annually] of the paint coating surface is recommended to remove grime, dirt and organic growth and to maximise the life and appearance of the coating. Paint systems must be recoated at approximately 7-15 yearly intervals in accordance with the paint manufacturer's instructions.



BRANZ Appraised
Appraisal No. 447 [2010]

BRANZ Appraisal
Appraisal No. 447 [2010]
14 September 2010

LINEA® WEATHERBOARD CAVITY
CLADDING

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

Control of External Fire Spread

- 12.1 Linea® Weatherboard has a peak heat release rate of less than 100 kw/m² and a total heat released of less than 25 MJ/m² in accordance with NZBC Acceptable Solution C/AS1, Table 5.1. The system is suitable for use on buildings with a SH Risk Group classification, at any distance to the relevant boundary. Linea® Weatherboard is also suitable for use where a non combustible material is specified. When Linea® Weatherboard is finished with a paint coating of not more than 1.0 mm in thickness, the exterior surface finishes requirements of NZBC Acceptable Solutions C/AS2 – C/AS6, Paragraph 5.8.1 do not apply in accordance with NZBC Acceptable Solutions C/AS2 – C/AS6, Paragraph 5.8.2 a).

Prevention of Fire Occurring

- 13.1 When Linea® Weatherboard Cavity Cladding is finished with a paint coating of not more than 1.0 mm in thickness, clearance separations from chimneys and flues are not required. However, when used in conjunction with, or attached to heat sensitive materials, the heat sensitive material must be separated from chimneys and flues in accordance with the requirements of NZBC Acceptable Solutions C/AS1 - C/AS6, Paragraph 7.5.9 for the protection of combustible materials.

External Moisture

- 14.1 Linea® Weatherboard Cavity Cladding, when installed in accordance with this Appraisal and the Technical Literature will prevent the penetration of moisture that could cause undue dampness or damage to building elements.
- 14.2 The cavity must be sealed off from the roof and sub-floor space to meet code compliance with Clause E2.3.5.
- 14.3 Linea® Weatherboard Cavity Cladding allows excess moisture present at the completion of construction to be dissipated without permanent damage to building elements to meet code compliance with Clause E2.3.6.
- 14.4 The details given in the Technical Literature for weather sealing are based on the design principle of having a first and second line of defence against moisture entry for all joints, penetrations and junctions. The ingress of moisture must be excluded by detailing joinery and wall interfaces as shown in the Technical Literature. Weathertightness details that are developed by the designer are outside the scope of this Appraisal and are the responsibility of the designer for compliance with the NZBC.
- 14.5 The use of Linea® Weatherboard Cavity Cladding where there is a designed cavity drainage path for moisture that penetrates the cladding, does not reduce the requirement for junctions, penetrations, etc to remain weather resistant.

Internal Moisture

- 15.1 Buildings must be constructed with an adequate combination of thermal resistance and ventilation, and space temperature must be provided to all habitable spaces, bathrooms, laundries and other spaces where moisture may be generated or may accumulate.

Water Vapour

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



Installation Information

Installation Skill Level Requirements

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

System Installation

Building Underlay and Flexible Sill and Jamb Tape Installation

- 17.1 The selected building underlay and flexible sill and jamb tape system must be installed by the building contractor in accordance with the underlay and tape manufacturer's instructions prior to the installation of the cavity battens and the rest of the Linea® Weatherboard Cavity Cladding system. Flexible building underlay must be installed horizontally and be continuous around corners. Underlay must be lapped 75mm minimum at horizontal joints and 150mm minimum over studs at vertical joints. Generic rigid sheathing materials must be installed in accordance with NZBC Acceptable Solution E2/AS1 and be overlaid with a flexible wall underlay. Proprietary systems shall be installed in accordance with the manufacturer's instructions. Particular attention must be paid to the installation of the building underlay and sill and jamb tapes around window and door openings to ensure a continuous seal is achieved and all exposed wall framing in the opening is protected.

Cavity Battens

- 17.2 Cavity battens must be installed over the building underlay to the wall framing at maximum 600 mm centres where the studs are at 600 mm centres or at 400 mm centres when studs are at 400 mm centres. The battens must be fixed in place with 40 x 2.8 mm hot-dip galvanised flat-head nails at maximum 800 mm centres.
- 17.3 Where studs are at greater than 400 mm centres, a building underlay support must be installed over the building underlay between the cavity battens at maximum 300 mm centres.

Linea® Weatherboard Installation

- 17.4 Linea® Weatherboards may be cut on site by power saw. Holes and cut-outs may be formed by drilling a number of holes around the perimeter of the opening required and tapping out the centre with a hammer, or by using a hole saw.
- 17.5 Weatherboards must be dry prior to installation. Before the weatherboards are installed, cut ends exposed to the exterior such as at aluminium box corners or internal corners must be sealed with an acrylic sealer to reduce the absorbency of the fibre cement.
- 17.6 Linea® Weatherboards must be installed starting at the bottom of the wall. A cant strip (H3.1 treated timber or fibre cement) must be fixed behind the bottom course of weatherboards to ensure the weatherboards are set at the correct angle. The cant strip must be continuous around the perimeter of the building. The bottom course of weatherboards must overhang the bottom plate by a minimum of 50 mm.
- 17.7 Before the weatherboards are installed, the corner detail must be prepared to suit the selected option, e.g. external box corner, corner soaker. The necessary flashings, including window flashings, must be installed before commencing weatherboard fixing.
- 17.8 The first course of weatherboards must be full length, i.e. 4200 mm and commence from an external corner. Jointing of Linea® Weatherboards is made off the stud using the pre-cut tongue and groove joint. Tongue and groove joints may be located centrally between the studs, but must be no closer than 100 mm to the edge of a stud. A bead of sealant must be applied to the front side of the tongue before the corresponding board is inserted. Subsequent courses of weatherboards must be installed so that the tongue and groove joints are staggered by 600 mm minimum from joints in the previous course.



BRANZ Appraised
Appraisal No. 447 [2010]

BRANZ Appraisal
Appraisal No. 447 [2010]
14 September 2010

LINEA® WEATHERBOARD CAVITY
CLADDING

- 17.9 Linea® Weatherboards must have a minimum lap of 30 mm, and should be set out so as near to a full board as possible will finish under and over windows and doors and at the top of the wall. A storey rod can be used to accurately position weatherboard courses.
- 17.10 Linea® Weatherboards must be fixed to each stud using concealed fixings behind the lap of the boards or face nailing, except that face nailing must be provided at all corners and vertical edges of openings.
- 17.11 Concealed fixing must be carried out using 60 x 2.8 mm hot-dip galvanised or stainless steel Hardieflex nails depending on the location - see Paragraph 10.2. Nails must be fixed 25 mm from the top edge of the board and must be driven flush with the board surface.
- 17.12 Face nailing must be carried out using 75 x 3.15 mm hot-dip galvanised or stainless steel jolt-head nails in NZS 3604 wind zones up to and including Very High, or 90 x 4.0 mm hot-dip galvanised or stainless steel jolt-head nails in the NZS 3604 Extra High Wind Zone and specific design wind pressures up to a maximum design differential ULS of 2.5 kPa, depending on the location - see Paragraph 10.2. Nails must be fixed 15 mm up from the bottom of the board and punched a maximum of 2 mm below the surface of the board. When stainless steel nails are used, the top board at each lap must be pre-drilled.
- 17.13 Linea® Weatherboards can be hand or gun nailed. Nails must not be closer than 25 mm to the end of the board when hand nailing, or closer than 50 mm when gun nailing. *[Note: Gun nailing must only be used for concealed nailing.]*

Aluminium Joinery Installation

- 17.14 Aluminium joinery and associated head and sill flashings must be installed by the building contractor in accordance with the Technical Literature. A 7.5 mm nominal gap must be left between the joinery reveal and the wall framing so a PEF rod and air seal can be installed after the joinery has been secured in place.
- 17.15 After installing the window and door joinery, Axent™ Trim, planted sills and scribes may be installed in accordance with the Technical Literature to provide additional weatherproofing for the joinery/weatherboard junction.

Inspections

- 17.16 The Technical Literature must be referred to during the inspection of Linea® Weatherboard Cavity Cladding installations.

Finishing

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

Health and Safety

- 18.1 Cutting of Linea® Weatherboard must be carried out in well ventilated areas, and a dust mask and eye protection must be worn.
- 18.2 When power tools are used for cutting, grinding or forming holes, health and safety measures as set out in the Technical Literature must be observed because of the amount of dust generated.
- 18.3 Safe use and handling procedures for Linea® Weatherboard and the components that make up the cladding system are provided in the relevant manufacturer's Technical Literature.



Basis of Appraisal

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

Tests

- 19.1 The following testing has been completed by BRANZ:
- BRANZ expert opinion on NZBC E2 code compliance for Linea® Weatherboard Cavity Cladding was based on testing and evaluation of all details within the scope and as stated within this Appraisal. Linea® Weatherboard Cavity Cladding was tested to E2/VM1 [as contained within NZBC Clause E2, Third Edition, Amendment 5]. The testing assessed the performance of the foundation detail, window head, jamb and sill details, meterbox head, jamb and sill details, balustrade to wall junction, parapet cap and internal and external corners. In addition to the weathertightness test, the details contained within the Technical Literature have been reviewed, and an opinion has been given by BRANZ technical experts that the system will meet the performance levels of NZBC Acceptable Solution E2/AS1 for drained cavity claddings.
 - Uniform wind face load tests to simulate wind pressures on 12 mm thick Linea® Weatherboards were carried out by BRANZ, and the results were used in assessing 16 mm thick Linea® Weatherboard used in Linea® Weatherboard Cavity Cladding.
 - Cone Calorimeter testing to determine the peak rate of heat release and total heat release of Linea® Weatherboard was completed by BRANZ. The testing was carried out in accordance with AS/NZS 3837.
- 19.2 Linea® Weatherboards have been tested by a James Hardie NATA accredited laboratory in accordance with AS/NZS 2908.2. The testing covered: soak-dry, bending strength, warm water soaking, heat/rain, freeze/thaw and apparent density. The test methods and results have been reviewed by BRANZ and found to be satisfactory.
- 19.3 Testing has been carried out by James Hardie New Zealand to determine the modulus of rupture and inter-laminar bond strength of carbonated and non-carbonated Linea® Weatherboard. The test methods and results have been reviewed by BRANZ and found to be satisfactory.

Other Investigations

- 20.1 Weathertightness, structural, fire and durability opinions have been provided by BRANZ technical experts.
- 20.2 Site visits have been carried out by BRANZ to assess the practicability of installation, and to examine completed installations.
- 20.3 The manufacturer's Technical Literature has been examined by BRANZ and found to be satisfactory.

Quality

- 21.1 The manufacture of Linea® Weatherboard has been examined by BRANZ, and details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory.
- 21.2 The quality of materials, components and accessories supplied by James Hardie New Zealand is the responsibility of James Hardie New Zealand. The quality control system of James Hardie New Zealand has been assessed and registered as meeting the requirements of ISO 9001: 2008.
- 21.3 Quality on site is the responsibility of the installer.
- 21.4 Designers are responsible for the building design, and building contractors are responsible for the quality of installation of the building underlay, cavity battens, Linea® Weatherboard and accessories in accordance with the instructions of James Hardie New Zealand.
- 21.5 Building owners are responsible for the maintenance of Linea® Weatherboard Cavity Cladding in accordance with the instructions of James Hardie New Zealand.



BRANZ Appraised
Appraisal No. 447 [2010]

BRANZ Appraisal
Appraisal No. 447 [2010]
14 September 2010

LINEA® WEATHERBOARD CAVITY
CLADDING

Sources of Information

- AS 3730 Guide to the properties of paints for buildings.
- AS/NZS 1170: 2002 Structural design actions.
- AS/NZS 2908.2: 2000 Cellulose-cement products - Flat sheet.
- AS/NZS 3837: 1998 Method of test for heat and smoke release rates for materials and products using an oxygen consumption calorimeter.
- AS/NZS 4534: 1998 Zinc and zinc/aluminium-alloy coatings on steel wire.
- AS/NZS 4680: 2006 Hot-dip galvanized [zinc] coatings on fabricated ferrous articles.
- NZS 3602: 2003 Timber and wood-based products for use in building.
- NZS 3603: 1993 Timber Structures Standard.
- NZS 3604: 1999 Timber framed buildings.
- NZS 4211: 2008 Specification for performance of windows.
- Compliance Document for New Zealand Building Code External Moisture Clause E2, Department of Building and Housing, Third Edition July 2005.
- Ministry of Business, Innovation and Employment Record of Amendments for Compliance Documents and Handbooks.
- The Building Regulations 1992.

Amendments

Amendment No. 1, dated 31 January 2012.

This Appraisal has been amended to update clause changes as required by the introduction of NZS 3604: 2011 and NZBC Acceptable Solution E2/AS1 Third Edition, Amendment 5.

Amendment No. 2, dated 30 October 2013.

This Appraisal has been amended to change the Appraisal Holder, change the Product Name and to update clause changes as required by the introduction of NZBC Fire Clauses C1 – C6 Protection from Fire and A3 Building Importance Levels.

Amendment No. 3, dated 5 March 2014.

This Appraisal has been amended to alter the scope to include NZS 3604 Wind Zone Extra High, and specific design wind pressures up to and including 2.5 kPa.

Amendment No. 4, dated 01 March 2016.

This Appraisal has been amended to remove the term Scyon®.



BRANZ Appraised
Appraisal No. 447 [2010]

BRANZ Appraisal
Appraisal No. 447 [2010]
14 September 2010

LINEA® WEATHERBOARD CAVITY
CLADDING



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

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

Conditions of Appraisal

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

For BRANZ

Pieter Burghout

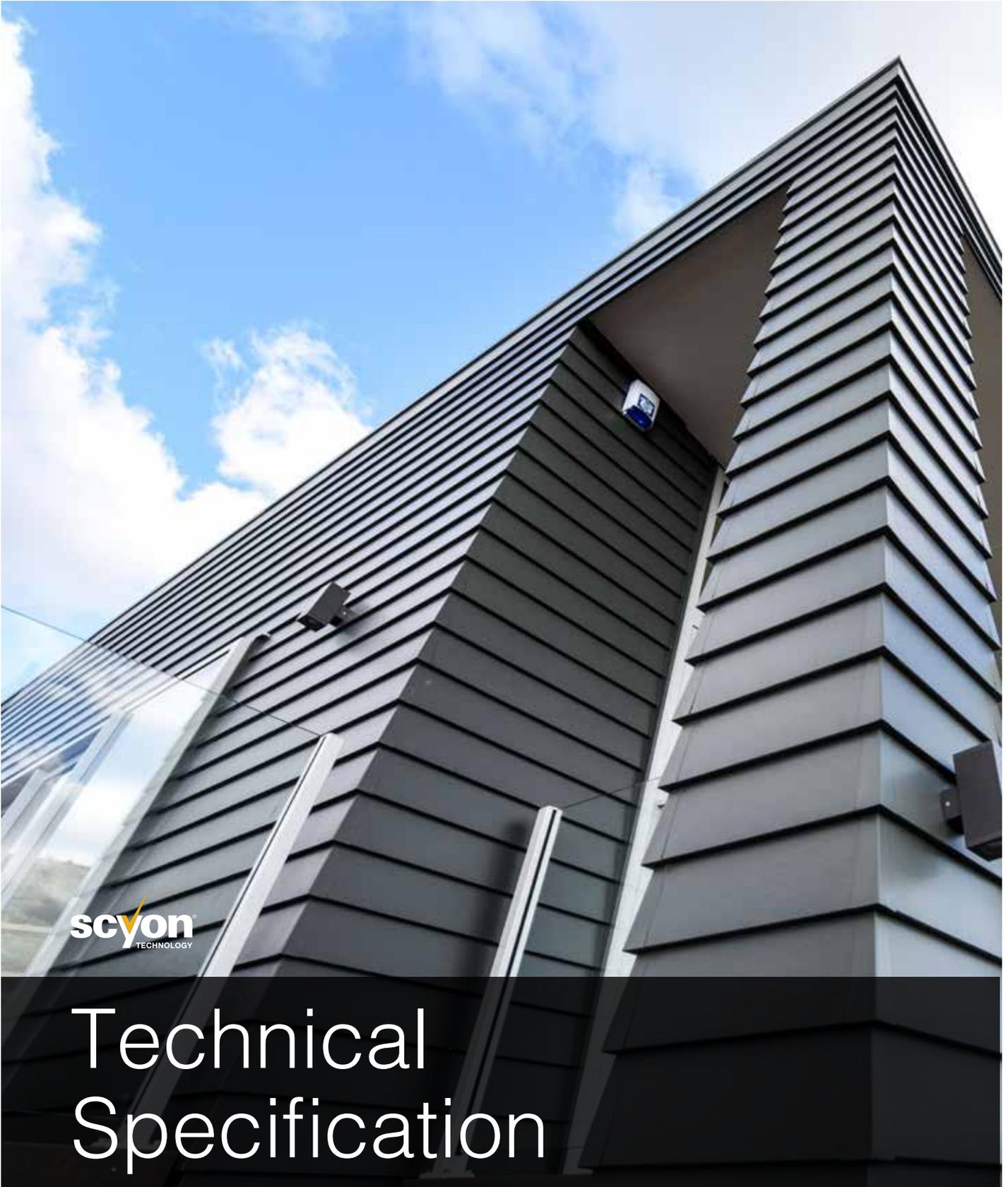
Chief Executive

Date of Issue:

14 September 2010



Linea®
WEATHERBOARD



Technical Specification

Contents

1	APPLICATION AND SCOPE	3	4	PREPARATION	6
1.1	Application	3	4.1	Flexible Underlay or HomeRAB Pre-Cladding	6
1.2	Scope	3	4.2	Rigid Air Barrier	6
1.3	Details	3	4.3	Flashing	6
1.4	Specific Design	3	4.4	Vent Strip	6
			4.5	Cavity Battens	6
2	DESIGN	3	4.6	Intermediate Support	6
2.1	Compliance	3	4.7	Corners	6
2.2	Responsibility	3	4.8	Junctions and Penetrations	6
2.3	Site and Foundation	3			
2.4	Surface Clearances	4	5	FIXING LINEA® WEATHERBOARD	7
2.5	Moisture Management	4	5.1	General	7
2.6	Structure	4	5.2	Fastener Durability	7
2.7	Wind Loading	4	5.3	Nail Sizes and Fixing Method	7
2.8	Structural Bracing	4	5.4	Gun Nailing	8
2.9	Fire Rated Walls	4			
2.10	Energy Efficiency	4	6	JOINTING	8
3	FRAMING	5	7	FINISHING	8
3.1	General	5	7.1	Preparation and Priming	8
3.2	Timber Grade	5	7.2	Sealants	8
3.3	Durability	5	7.3	Painting	8
3.4	Frame Construction	5			
3.5	Tolerances	5	8	STORAGE AND HANDLING	8
			9	MAINTENANCE	9
			10	PRODUCT INFORMATION	9
			10.1	Manufacturing and Classification	9
			10.2	Trim	9
			10.3	Durability	9
			10.4	Product Sizes and Mass	9
			10.5	Size and Weight	9
			11	SAFE WORKING PRACTICES	10
			12	PRODUCT SIZES	11
			13	ACCESSORIES	12
			14	DETAILS	14
				PRODUCT WARRANTY	51

WE VALUE YOUR FEEDBACK

To continue with the development of our products and systems, we value your input. Please send any suggestions, including your name, contact details, and relevant sketches to:

Ask James Hardie™
 Fax 0800 808 988
literaturefeedback@jameshardie.co.nz



1 Application and scope

1.1 APPLICATION

Linea® Weathrboard is a 16mm thick, pre-primed bevel back fibre cement weatherboard and is classified as lightweight wall cladding suitable for residential and light commercial construction using timber framed external walls. Linea Weatherboard is available in 135mm, 150mm and 180mm widths.

James Hardie also has available:

- Axent™ Fascia in two widths. Axent Fascia is a 16mm thick, pre-primed fibre cement product designed to accommodate James Hardie soffit linings.
- Axent™ Trim comes in a variety of widths for use as decorative trims around openings and external corners. Axent Trim is a 16mm thick, pre-primed fibre cement product.

Specifier

If you are a specifier or other responsible party for a project ensure that the information in this document is appropriate for the application you are planning and that you undertake specific design and detailing for areas which fall outside the scope of these specifications.

Installer

If you are an installer ensure that you follow the design, moisture management principles, associated figures and material selection provided by the designer and this James Hardie Technical Specification.

All the details provided in this document must be read in conjunction with the specifiers specification.

Make sure your information is up to date

When specifying or installing James Hardie products, ensure you have the current manual. If you're not sure you do, or, if you need more information, visit www.jameshardie.co.nz or Ask James Hardie on 0800 808 868.

1.2 SCOPE

This specification covers the use of Linea Weatherboard on buildings that fall within the scope limitations of the New Zealand Building Code (The NZBC) Acceptable Solution E2/AS1, Paragraph 1.1.

This specification includes the use of Linea Weatherboard in both direct to stud and cavity construction method and must be read in conjunction with the current BRANZ Appraisals for Linea Weatherboard.

This specification also covers the use of Linea Weatherboard in cavity construction for specific design projects (SED) subject to a wind pressure of 2.5kPa (ULS) maximum. This document is intended for use by architects, designers, specifiers or builders who are involved in specifying Linea Weatherboard. The document also serves the purpose of an installation manual for this product.

1.3 DETAILS

Various Linea Weatherboard details are provided in the Details section of this document. This specification and details in CAD file are also available to download from our website at www.jameshardie.co.nz.

1.4 SPECIFIC DESIGN

For use of Linea Weatherboard outside this published scope, the architect, designer or engineer must undertake specific design.

For advice on designs outside the scope of this specification, Ask James Hardie on 0800 808 868.

2 Design



2.1 COMPLIANCE

Linea Weatherboard direct fixed and cavity cladding has been issued a CodeMark certificate number GM-10-30018 which confirms Linea Weatherboard is deemed to comply with the requirements of the NZBC. Please refer to our website www.jameshardie.co.nz for a copy of the CodeMark certificate. Linea Weatherboard also has a BRANZ Appraisal number 446 (2010) and 447 (2010) at www.branz.co.nz or www.jameshardie.co.nz.

2.2 RESPONSIBILITY

The specifier or other party responsible for the project must ensure that the information and details in this specification are appropriate for the intended application and that additional detailing is performed for specific design or any areas that fall outside the scope of this technical specification. For applications outside the scope of this literature and figures which are not provided herein, the architect, designer or engineer must undertake specific design and it should be ensured that the intent of their design meets the requirements of the NZBC.

All dimensions shown are in millimetres unless noted otherwise. All New Zealand Standards referenced in this manual are current edition and must be complied with.

James Hardie conducts stringent quality checks to ensure that any product manufactured falls within our quality spectrum. It is the responsibility of the builder to ensure that the product meets aesthetic requirements before installation. James Hardie will not be responsible for rectifying obvious aesthetic surface variations following installation.

2.3 SITE AND FOUNDATION

The site on which the building is situated must comply with the NZBC Acceptable Solution E1/AS1 'Surface Water'. Foundation design must comply with the requirements of NZS 3604 'Timber-framed Buildings' or be as per specific engineering design. The grade of adjacent finished ground must slope away from the building to avoid any possibility of water accumulation in accordance with the NZBC requirements.

2.4 SURFACE CLEARANCES

The clearance between the bottom edge of cladding and paved/unpaved ground must comply with section 9.1.3 of E2/AS1. The finished floor level must also comply with these requirements. These clearances must be maintained throughout the life of the building.

Linea Weatherboards must overhang the bottom plate on a concrete slab by a minimum of 50mm as required by the NZBC Acceptable Solution, E2/AS1 Table 18.

On the roofs and decks the minimum clearance must be 50mm.

Do not install external cladding such that it may remain in contact with water or ground.

2.5 MOISTURE MANAGEMENT

It is the responsibility of the specifier to identify moisture related risks associated with any particular building design.

Wall construction design must effectively manage moisture, considering both the interior and exterior environments of the building, particularly in buildings that have a higher risk of wind driven rain penetration or that are artificially heated or cooled. Walls shall include those provisions as required by the NZBC Acceptable Solution E2/AS1 'External Moisture'. In addition, all wall openings, penetrations, junctions, connections, window sills, heads and jambs must incorporate appropriate flashings for waterproofing. The other materials, components and installation methods used to manage moisture in the walls, must comply with the requirements of relevant standards and the NZBC. For information in relation to designing for weathertightness, refer to BRANZ and the Ministry of Business Innovation & Employment (MBIE) updates on the following websites, respectively www.branz.co.nz and www.dbh.govt.nz.

2.6 STRUCTURE

Timber framing must comply with NZS 3604 for buildings or parts of buildings within the scope limitations of NZS 3604. Buildings or parts of buildings outside the scope of NZS 3604 must be to a specific engineering design in accordance with NZS 3603 and AS/NZS 1170. Where specific engineering design is required, the framing stiffness must be equivalent to or more than the framing provisions of NZS 3604. In all cases stud spacing must not exceed 600mm centres maximum for buildings designed to NZS 3604 and 400mm centres maximum for specific engineering design buildings subject to design wind pressures higher than 1.5kPa.

For timber frame walls longer than 12m, it is best practice to allow for construction joints to accommodate movements generated due to timber shrinkage or deflection etc

2.7 WIND LOADING

Linea Weatherboard cladding is suitable for use in all wind zones as defined in NZS 3604. It is also suitable for use in SED buildings exposed to wind pressures up to 2.5kPa (ULS).

For wind pressures higher than those mentioned above, contact James Hardie at 0800 808 868 for assistance.

2.8 STRUCTURAL BRACING

Linea Weatherboard direct fixed installed as per Linea Weatherboard specific bracing details will provide bracing for buildings designed and constructed in accordance with NZS 3604. The Linea Weatherboard bracing systems have been independently tested by SCION using direct fixed construction. The following range of bracings can be achieved

- Wind 75 – 130 BU'S/m
- Earthquake 67 – 101 BU'S/m

Refer to the James Hardie Bracing Design Manual for details.

2.9 FIRE RATED WALLS

Walls clad with Linea Weatherboard using a direct fix or cavity construction method can achieve fire ratings of up to 90/90/90 when constructed in accordance with the James Hardie 'Fire and Acoustic' Design Manual. Linea Weatherboard must be face fixed for Fire Rated applications.

Refer to Fire and Acoustic Design Manual for further information about fire rated systems.

2.10 ENERGY EFFICIENCY

External walls constructed as per this technical specification, using Linea Weatherboard and bulk insulation, where the area of glazing is 30% or less of the total wall area, complies with the minimum R-value requirements for walls as per the NZBC Acceptable Solution H1/AS1 (The NZBC Clause H1 Energy Efficiency), Replacement Table 1. To meet the minimum thermal insulation requirements for the construction, the bulk insulation as specified in Table 1 must be used. This insulation may be substituted with insulation material having higher R-values. Thermal insulation of a wall is affected when the depth of the timber framing is increased or decreased or stud spacing is decreased. The calculation used in Table 1 is based on a timber framing size 90 x 45mm and an internal lining material such as James Hardie Villaboard® Lining or a 10mm plasterboard.

Table 1

Insulation capability		
Climate Zone	Construction R-Value Requirement	Minimum R-Value of Insulation Required
1 and 2	1.9 m ² °C/W	#R2.0
3	2.0 m ² °C/W	#R2.2

Total construction R-Value depends on the insulation material used and the framing ratio. The insulation material R-Values specified in this table are for studs spaced at 600mm c/c and nogs spaced at 800mm c/c.

To achieve higher construction R-Values the wall insulation material must be replaced with an insulation material having higher R-Values to suit the requirements.

For further guidance on insulation requirement refer to current edition of 'House Insulation Guide' published by BRANZ.

3 Framing

3.1 GENERAL

This Linea Weatherboard technical specification is only suitable for timber-framed buildings. Other framing materials are outside the scope of this specification.

For Steel Framing refer to James Hardie Claddings Installation to Steel Framing Technical Supplement.

3.2 TIMBER GRADE

Timber must be graded in accordance with NZS 3631 'New Zealand Timber Grading Rules'. The timber grade to be used must be in accordance with NZS 3604 requirements.

3.3 DURABILITY

To comply with the NZBC requirements the external framing must be treated to a minimum H1.2 treatment. Refer to the NZBC Acceptable Solution B2/AS1 Durability for further information about the durability requirements. For timber treatment information refer to NZS 3602 (Timber and Wood-Based Products for use in Buildings) and NZS 3640 (Chemical Preservation of Round and Sawn Timber) for minimum timber treatment selection and treatment requirements. Also refer to framing manufacturer's literature for further guidance on timber selection.

Framing must be protected from moisture at sites in accordance with the recommendations of framing manufacturers.

Note: refer to NZS 3602 for information about the allowable moisture content in timber.

3.4 FRAME CONSTRUCTION

For buildings within the scope of NZS 3604 the framing sizes and set-out must comply with NZS 3604 with stud, nog/dwang centres as required by this specification.

In case of gable end trusses sitting on top plates of the external wall frame, the frame size must be in accordance with truss design and specification supplied by the frame and truss manufacturer/supplier supported by independent design producer statement.

3.4.1 Direct fixed construction method

The following framing must be provided for direct fixed construction method:

- Studs must be provided at 600mm centres maximum.
- Nogs must be provided at 1200mm centres maximum.
- Double studs are required at internal corners.
- Extra packers may be required at external corners.
- Extra studs are required for aluminium internal corner sections.

3.4.2 Cavity construction method

The following framing must be provided for cavity construction method:

- When studs are at 600mm centres the nogs must be provided at 800mm centres maximum.
- When studs are at 400mm centres the nogs may be provided at 1200mm centres maximum.
- Double studs are required at internal corners.
- Extra packers may be required at external corners.
- Extra studs are required for aluminium internal corner sections.

3.4.3 Specific Engineering Design (SED)

For EH wind zone and specific engineering design projects the timber framing is required to be designed in accordance with NZS 3603 and AS/NZS 1170. The minimum framing sizes and layout must comply with this specification.

- Stud spacing 400mm centres maximum
- Nog spacing 1200mm centres maximum
- Other requirements as per 3.5.2 above

3.5 TOLERANCES

In order to achieve an acceptable wall finish, it is imperative that framing is straight and true. Framing tolerances must comply with the requirements of NZS 3604 and the manufacturer's specifications. All framing must be made flush.

4 Preparation

4.1 FLEXIBLE UNDERLAY OR HOMERAB PRE-CLADDING

Flexible underlay must be provided as per the requirements of the NZBC Acceptable Solution E2/AS1 'External Moisture' Table 23. The flexible underlay must be fixed in accordance with E2/AS1 and the underlay manufacturer's recommendations. Walls which are not lined on the inside face (e.g. garage walls or gable ends) must include a rigid sheathing or an air barrier behind the cladding which complies with the requirements of the NZBC Acceptable Solution E2/AS1 Table 23. For attached garages, flexible underlays must be selected in accordance with the NZBC Acceptable Solution E2/AS1, Paragraph 9.1.3.4. HomeRAB Pre-Cladding is suitable for use in these applications. It must be installed in accordance with James Hardie Rigid Air Barriers installation manual.

4.2 RIGID AIR BARRIER

For EH wind zone or Specific Engineering Design (SED) projects where the design wind pressures are between 1.5kPa (ULS) and 2.5kPa (ULS), RAB Board (6mm) must be used. Refer to James Hardie Rigid Air Barriers installation manual for information regarding its installation.

4.3 FLASHING

All wall openings, penetrations, intersections, connections, window sills, heads and jambs must be flashed prior to weatherboard installation. Please refer to moisture management requirements in Clause 2.5. The flexible underlay must be appropriately incorporated with penetration and junction flashings. Materials must be lapped in such a way that water tracks down to the exterior on the face of flexible underlay. The selected flashing materials must comply with the durability requirements of Table 20 of the NZBC Acceptable Solution E2/AS1.

4.4 VENT STRIP

The James Hardie uPVC cavity vent strip must be installed at the bottom of all walls constructed using the drained and ventilated cavity construction method. James Hardie uPVC vent strip has an opening area of 1000mm²/m length. It is important that the openings in the vent strip are kept clear and unobstructed to allow free drainage and ventilation of cavities.

4.5 CAVITY BATTENS

Buildings with a risk score of 13-20 calculated in accordance with the NZBC Acceptable Solution E2/AS1 Table 3 require Linea Weatherboards to be installed on a cavity.

The cavity battens provide airspace between the frame and cladding and are considered a "packer" only in this specification.

The timber battens must be minimum H3.1 treated in accordance with NZS 3640 (Chemical Preservation of Round and Sawn Timber) to comply with the durability requirements of B2/AS1.

Cavity battens must comply with E2/AS1 and:

- be minimum 18mm thick.
- be minimum as wide as the width of studs.
- must be fixed by the cladding fixings to the main framing through the flexible underlay.
- fix cavity battens to studs at maximum 600mm centres.
- until claddings are fixed the battens need only to be tacked to framing with 40 x 2.8mm nails at 800mm centres maximum.

(Batten fixing is required temporarily to keep them straight on the wall during construction.)

4.6 INTERMEDIATE SUPPORT

Where studs are at 600mm centres an intermediate means of restraining the flexible underlay and insulation from bulging into the cavity must be installed. An acceptable method to achieve this is using one of the following:

- intermediate cavity batten between the studs; or
- 75mm galvanised mesh; or
- polypropylene tape at 300mm centres fixed horizontally and drawn taut.

No intermediate supports are required:

- where studs are at maximum 400mm centres; or,
- when rigid sheathings instead of flexible underlays are used.

4.7 CORNERS

Anticipated joist shrinkage must be allowed for in the design process. Do not run trims or aluminium extrusions continuously across solid floor joists. There are a number of options to select from when detailing external corners:

- 90° corner soaker in aluminium, copper or stainless steel. Refer to Figures 7 and 33.
- 135° corner soaker 180mm aluminium, contact James Hardie
- Box corners using Axent Trim. Refer to Figures 3, 4 and 30.
- Mitred corners to weatherboards. Refer to Figures 5 and 31.
- Aluminium boxed corners. Refer to Figures 6 and 32.

There are a number of options to select from when detailing internal corners:

- Scribed corner. Refer to Figures 8 and 34.
- 90° or 135° Aluminium W-mould. Refer to Figures 9, 10, 35 and 36.

4.8 JUNCTIONS AND PENETRATIONS

Refer to Clause 2.5 of this specification for moisture management requirements. All windows and doors must be detailed as per the requirements of this specification. James Hardie has developed the window details for Linea Weatherboards which meet the performance requirements of E2 'External Moisture', an approved document of the NZBC. Refer to Figures 11 to 22 and 38 to 51.

5 Fixing Linea Weatherboard

5.1 GENERAL

The horizontal lap of Linea Weatherboards must be 30mm minimum. In certain scenarios you may require to creep up the lap. This must not exceed 33mm. Linea Weatherboards must be kept dry whilst in storage prior to and during fixing. Cut ends which are exposed after installation or where sealant is applied to the boards such as slimline box corners, internal corners, mitred external corners etc, must be primed prior to installation. Dust and loose material must be removed before priming.

A minimum H3.1 treated timber cant strip must be provided to support the bottom board on the wall. Refer to Figure 1 and Figure 26.

5.2 FASTENER DURABILITY

Fasteners must meet the minimum durability requirements of the NZBC. NZS 3604 specifies the requirements for fixing's material to be used in relation to the exposure conditions and are summarised in Table 2.

Table 2

Exposure conditions and nail selection prescribed by NZS 3604

NAIL MATERIAL

Zone D *	Zone C outside sea spray zone and Zone B and Geothermal hot spots	Bracing — All zones
Grade 316 Stainless	Hot-dipped galvanised or 316 stainless	Grade 316 stainless

* (Zone C areas where local knowledge dictates that increased durability is required, appropriate selection shall be made)
Microclimate conditions as detailed in NZS 3604, Paragraph 4.2.4 require SED.

Also refer to the NZBC Acceptable Solution 'E2/AS1' Table 20 and 21 for information regarding the selection of suitable fixing materials and their compatibility with other materials.

5.3 NAIL SIZE AND FIXING METHOD

Linea Weatherboards and Axent Trim must be fixed to timber with the types of nails specified in Tables 3 and 4, in accordance with the following requirements:

- Linea Weatherboard can either be face/exposed fixed or concealed fixed.
- Linea Weatherboard must be fixed into studs at maximum 600mm centres. Fixing centres to coincide with stud spacing. Refer to Figure 2 and 28.
- All concealed nails must be driven flush with the board surface.
- When concealed fixing Linea Weatherboards, nails must be driven under the lap of boards, except at all corners and vertical edges of openings where Linea Weatherboards must be face fixed. Refer to Figure 2 and Figure 29.
- Nails must be fixed 25mm from the end of the board when hand nailing. For gun nailing refer to Section 5.4.
- When using concealed fixing method, any gaps that may appear under the lap due to site conditions can be minimised by fixing a jolt head nail through the lap as per the exposed nailing method. Refer to Figure 2 and 29.
- When using concealed fixing method, Linea Weatherboard can also be tied together by face fixing through the lap using 32mm brad nails if desired.

- When face fixing Linea Weatherboard, the upper board must be pre-drilled before fixing with a jolt head nail.

Table 3

Nail requirements for Linea Weatherboards

DIRECT TO STUD FIXING UP TO AND INCLUDING VH WIND ZONE

Concealed Nailing over flexible underlay	
40 x 2.8mm HardieFlex™ nails	Finish flush with the board surface.
Face Nailing over flexible underlay	
60 x 3.15mm jolt head nails	Hot-dipped galvanised jolt head nail with pre-drilling* through the top weatherboard.
	Stainless steel jolt head nail with pre-drilling* through the top weatherboard.
Concealed Nailing over rigid air barrier	
50 x 2.8mm HardieFlex™ nails	Finish flush with the board surface.
Face Nailing over rigid air barrier	
75 x 3.15mm jolt head nails	Hot-dipped galvanised jolt head nail with pre-drilling* through the top weatherboard.
	Stainless steel jolt head nail with pre-drilling* through the top weatherboard.

CAVITY FIXING UP TO AND INCLUDING VH WIND ZONE

Concealed Nailing over flexible underlay	
60 x 3.15mm HardieFlex™ nails	Finish flush with the board surface.
Face Nailing over flexible underlay	
75 x 3.15mm jolt head nails	Hot-dipped galvanised jolt head nail with pre-drilling* through the top weatherboard.
	Stainless steel jolt head nail with pre-drilling* through the top weatherboard.
Concealed Nailing over rigid air barrier	
75 x 3.15mm HardieFlex™ nails	Finish flush with the board surface.
Face Nailing over rigid air barrier	
90 x 4.0mm jolt head nails	Hot-dipped galvanised jolt head nail with pre-drilling* through the top weatherboard.
	Stainless steel jolt head nail with pre-drilling* through the top weatherboard.

CAVITY FIXING EH WIND ZONE AND SED PROJECTS (1.5KPA - 2.5KPA WIND PRESSURE)

Face Nailing	
90 x 4.0mm jolt head nail	Hot-dipped galvanised jolt head nail with pre-drilling** through the top weatherboard.
	Stainless steel shank jolt head nail with pre-drilling** through the top weatherboard.

7 Finishing

Table 4

Nail requirements for trim	
Single Thickness	60mm jolt head nails. If fixing over Linea Weatherboard use predrilled* 75 x 3.15mm jolt head nails.
Double Thickness	60mm jolt head nails.
Single plus packer	If fixing over Linea Weatherboard use 75 x 3.15mm jolt head nails through a pre-drilled* hole. When fixing to timber support use 60mm jolt head nails.

* Use a 3.0mm drill bit. ** Use a 3.5mm drill bit

Note: Special fixing arrangements are required for bracing and fire-resistance rated wall systems. For more information Ask James Hardie on 0800 808 868.

5.4 GUN NAILING

Linea Weatherboard can also be gun-nailed with a D head or RounDrive nail when concealed fixing method is used.

- Gun-nailing must not be used when Linea Weatherboard is used for bracing.
- Nails must be no closer than 50mm from the ends of boards when gun nailing is used — double studs will be required.
- Be minimum length and gauge as per Table 3.
- Be finished flush with surface of board.

6 Jointing

The ends of Linea Weatherboards are jointed off-stud by means of a tongue and groove joint. Tongue and groove joints may be located centrally between studs but no closer than 100mm from the edge of a stud. The joints must be staggered by 600mm minimum. Flexible sealant must be applied in the tongue and groove joint at the time of installation.

Note: Protective coating of Linea Weatherboard and Axent Trim is required in order to meet the durability requirements of the NZBC.

7.1 PREPARATION AND PRIMING

The Linea Weatherboard and Axent Trim must be dry before painting. Punch and fill all exposed nails a maximum of 2mm below the surface. Fill the hole with an exterior grade builders fill, allow to cure and sand smooth ready for priming. Prime the filled holes in accordance with paint manufacturer's specifications.

It is not recommended to seal under the lap of weatherboards as it helps circulation of air behind the weatherboard cladding.

7.2 SEALANTS

All sealants must demonstrate the ability to meet the relevant requirements of the NZBC and hold a current BRANZ Appraisal. Application and use of sealants must comply with manufacturer's instructions. Sealants, if coated, must be compatible with the paint system.

7.3 PAINTING

All Linea Weatherboards are pre-primed on their face and bottom edge with a factory applied acrylic base coat.

Linea Weatherboard must be painted within 90 days of installation. There is no restriction on the LRV of paint to be applied on the Linea Weatherboard. All exposed faces, including the top edges under the sills and bottom edges of Linea Weatherboard, Axent Trim and accessories must be finished with latex exterior paint system complying with any of parts 7, 8, 9, and 10 of AS 3730.

Dark coloured paints can be used on Linea Weatherboard and Trim. The dark colours in certain environments may fade over a period of time. Special paints/coatings are required in certain harsh environments.

Stainless steel soakers are generally left natural. For painting over stainless steel soakers, refer to paint manufacturer as special preparation and paints are required.

8 Storage and handling

Paint selection and the preparation required is dependant on paint chosen. Refer to the paint manufacturer for information before starting painting.

Linea Weatherboards and Axent Trim must be laid flat on a smooth level surface. To ensure optimum performance, store weatherboards under cover and keep dry prior to fixing. If the weatherboards should become wet, allow to dry thoroughly before fixing. Do not carry weatherboards on the flat, carry in the vertical position to avoid excessive bending.

9 Maintenance

The extent and nature of maintenance will depend on the geographical location and exposure of the building. It is the responsibility of the specifier to determine normal maintenance requirements to comply with The NZBC Acceptable Solution B2/AS1. As a guide, it is recommended that basic normal maintenance tasks shall include but not be limited to:

- Washing down exterior surfaces every 6-12 months*,
- Re-applying exterior protective finishes**,
- Maintaining the exterior envelope and connections including joints, penetrations, flashings and sealants,
- Cleaning out gutters, blocked pipes and overflows as required,
- Pruning back vegetation close to or touching the building,
- The clearances between the bottom edge of Linea Weatherboard and the finished/unfinished ground must always be maintained.
- Stainless steel soakers used in extreme coastal conditions or in sea spray zones may show some signs of 'tea staining'. It is an aesthetic issue and to minimise staining soaker must be washed/polished frequently.

*Do not use a water blaster to wash down the cladding.

*In extreme coastal conditions or sea spray zones, wash every 3-4 months.

**Refer to your paint manufacturer for washing down and recoating requirements related to paint performance.

10 Product information

10.1 MANUFACTURING AND CLASSIFICATION

James Hardie New Zealand is an ISO 9001 Telarc certified manufacturer. Linea Weatherboard and Axent Trim are manufactured to meet the requirements of AS/NZS 2908.2: 2000 'Cellulose-Cement Products', Linea Weatherboard has a classification of Type A Category 3 in accordance with this Standard. Linea Weatherboard is an advanced lightweight cement composite building product incorporating James Hardie proprietary Scyon technology. The basic composition of product is Portland cement, ground sand, cellulose fibre and water.

Linea Weatherboard has a bevel back and tongue and groove at the ends for jointing. The bottom front edge of Linea Weatherboard is chamfered. The weatherboards are supplied pre-primed on their face and bottom edge with an acrylic primer.

Linea Weatherboards and Axent Trim are identified by the printing at regular intervals of the name Linea on the back face.

10.2 JAMES HARDIE TRIM

The Axent Trim, used for box corners, around windows and doors as well as special architectural features, is also made with the CLD technology and is supplied pre-primed with an acrylic primer.

10.3 DURABILITY

Linea Weatherboard and Axent Trim, when installed and maintained as per the technical specification, will meet the durability requirements for claddings as required in the NZBC Approved Document B2 'Durability'.

10.3.1 Resistance to moisture/rotting

Linea Weatherboard and Axent Trim have demonstrated resistance to permanent moisture-induced deterioration (rotting) and has passed the following tests in accordance with AS/NZS 2908.2:

- Water Permeability (Clause 6.2)
- Warm Water (Clause 6.4)
- Heat Rain (Clause 6.5)
- Soak Dry (Clause 6.6).
- Freeze-Thaw (Clause 8.2.3)

10.3.2 Control of External Fire Spread

Linea Weatherboard meets the requirements of Appendix C C7.1.1 and is classified as 'Non-Combustible Material' which is suitable for use as external wall cladding and complies with the requirements of Paragraph 5.4 of the NZBC Acceptable Solution C/AS1 and Paragraph 5.8.1 of Acceptable Solutions C/AS2 to C/AS6 of the NZBC.

10.3.3 Alpine regions

In regions subject to freeze/thaw conditions, Linea Weatherboard must not be in direct contact with snow or ice build up for extended periods, e.g. external walls in alpine regions subject to snow drifts over winter.

The Linea Weatherboard has been tested in accordance with AS/NZS 2908.2 Clause 8.2.3.

10.4 PRODUCT SIZES AND MASS

Available sizes of Linea Weatherboard and Axent Trim and its weight are given in Table 6.

10.5 SIZE AND WEIGHT

Linea Weatherboard is categorised as a Light Weight Wall Cladding as described in NZS 3604. Physical properties of Linea Weatherboard and Axent Trim are provided in Table 6.

11 Safe working practices

WARNING — DO NOT BREATHE DUST AND CUT ONLY IN WELL VENTILATED AREA

James Hardie products contain sand, a source of respirable crystalline silica which is considered by some international authorities to be a cause of cancer from some occupational sources. Breathing excessive amounts of respirable silica dust can also cause a disabling and potentially fatal lung disease called silicosis, and has been linked with other diseases. Some studies suggest smoking may increase these risks. During installation or handling; (1) work in outdoor areas with ample ventilation; (2) minimise dust when cutting by using either ‘Score and Snap’ knife, fibre cement shears or, where not feasible, use a HardieBlade™ Saw Blade and dust-reducing circular saw attached to a HEPA vacuum; (3) warn others in the immediate area to avoid breathing dust; (4) wear a properly-fitted, approved dust mask or respirator (e.g. P1 or P2) in accordance with applicable government regulations and manufacturer instructions to further limit respirable silica exposures. During clean-up, use HEPA vacuums or wet cleanup methods — never dry sweep. For further information, refer to our installation instructions and Safety Data Sheets available at www.jameshardie.co.nz.

FAILURE TO ADHERE TO OUR WARNINGS, SAFETY DATA SHEETS, AND INSTALLATION INSTRUCTIONS MAY LEAD TO SERIOUS PERSONAL INJURY OR DEATH.

James Hardie recommended safe working practices

CUTTING OUTDOORS

1. Position cutting station so wind will blow dust away from the user or others in working area.
2. Use one of the following methods based on the required cutting rate:

BEST

- Dust reducing circular saw equipped with HardieBlade™ Saw Blade and HEPA vacuum extraction.

GOOD

- Dust reducing circular saw with HardieBlade™ Saw Blade.

SANDING/REBATING/DRILLING/OTHER MACHINING

When sanding, rebating, drilling or machining you should always wear a P1 or P2 dust mask and warn others in the immediate area.

IMPORTANT NOTES

1. For maximum protection (lowest respirable dust production), James Hardie recommends always using “Best” — level cutting methods where feasible.
2. NEVER use a power saw indoors.
3. NEVER use a circular saw blade that does not carry the HardieBlade™ logo.
4. NEVER dry sweep — Use wet suppression or HEPA vacuum.
5. NEVER use grinders.
6. ALWAYS follow tool manufacturers’ safety recommendations.

P1 or P2 respirators should be used in conjunction with above cutting practices to further reduce dust exposures. Additional exposure information is available at www.jameshardie.co.nz to help you determine the most appropriate cutting method for your job requirements. If concern still exists about exposure levels or you do not comply with the above practices, you should always consult a qualified industrial hygienist or contact James Hardie for further information.

Working instructions

Refer to recommended Safe Working Practices before starting any cutting or machining of product.

HardieBlade™ Saw Blade

The HardieBlade™ Saw Blade used with a dust-reducing saw connected to a HEPA vacuum is ideal for fast, clean cutting of James Hardie fibre cement products. A dust-reducing saw uses a dust deflector or a dust collector connected to a vacuum system. When sawing, clamp a straight-edge to the sheet as a guide and run the saw base plate along the straight edge when making the cut.



For irregular holes:

Small rectangular or circular holes can be cut by drilling a series of small holes around the perimeter of the hole then tapping out the waste piece from the sheet face.



Tap carefully to avoid damage to sheets, ensuring that the sheet edges are properly supported.

Storage and handling

All James Hardie building products should be stored to avoid damage, with edges and corners of the sheets protected from chipping.

James Hardie building products must be installed in a dry state and be protected from rain during transport and storage. The product must be laid flat under cover on a smooth level surface clear of the ground to avoid exposure to water or moisture, etc.

Hole-forming

For smooth clean cut circular holes:

Mark the centre of the hole on the sheet.

Pre-drill a pilot hole.

Using the pilot hole as a guide, cut the hole to the appropriate diameter with a hole saw fitted to a heavy duty electric drill.

Quality

James Hardie conducts stringent quality checks to ensure that any product manufactured falls within our quality spectrum. It is the responsibility of the builder to ensure that the product meets aesthetic requirements before installation. James Hardie will not be responsible for rectifying obvious aesthetic surface variations following installation.

12 Product sizes

Table 6

Linea Weatherboard and Axent Trim sizes						Coverage Information			
Product	Length (mm)	Width (mm)	Thickness (mm)	End Details	Effective Cover (mm)	No. of planks/ metre height (approx.)	Mass kg/lineal m (approx. at EMC)	Mass kg/m ² (approx. at EMC)	Weight/packs (60 units/pack)
Linea Weatherboard 135	4200*	135	16	T & G	105	9.5	2.62	25.70	660.00
Linea Weatherboard 150	4200*	150	16	T & G	120	8.3	3.1	24.93	781.00
Linea Weatherboard 180	4200*	180	16	T & G	150	6.7	3.57	23.92	899.00
Axent Trim 84mm	2600	84	16	Square	N/A	N/A	1.6	N/A	N/A
Axent Trim 100mm	2600	100	16	Square	N/A	N/A	1.9	N/A	N/A

*Length is 4200mm plus 5mm for the tongue and groove making overall length 4205mm

*The effective thickness of finished Linea Weatherboard on the wall at the lap is approximately 33 to 35mm

NOTE: All dimensions and masses provided are approximate only and are subject to manufacturing tolerances.

13 Accessories

Table 7

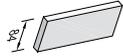
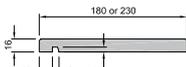
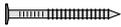
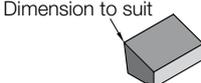
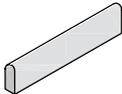
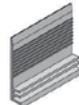
Accessories/Tools supplied by James Hardie			
Accessories	Description	Size (mm)	Code
	External corner soaker 90° for Linea Weatherboards 180mm <ul style="list-style-type: none"> Aluminium Copper Stainless Steel 	200 long	301186 301188 301197
	External corner soaker 135° for Linea Weatherboards 180mm <ul style="list-style-type: none"> Aluminium 	200 long	301178
	External corner soaker 90° for Linea Weatherboards 150mm <ul style="list-style-type: none"> Aluminium Stainless Steel 	170 long	302820 302821
	External corner soaker 90° for Linea Weatherboards 135mm <ul style="list-style-type: none"> Aluminium Stainless Steel 	155 long	301185 301196
	External Slimline Box Corner Mould Etched primed aluminium extrusion used to create external corner	2700 long 4000 long	301195 305809
	Box Corner 'Z' Flashing	2700 long	301203
	Internal 'W' Mould 90° Etched primed aluminium extrusion used to create 90° internal corner	2700 long 4000 long	301184 305807
	Internal 'W' Mould 135° Etched primed aluminium extrusion used to create 135° internal corner	2700 long	301183
	Vent Strip PVC moulding used as vermin proofing	3000 long	302490
	JH Corner Under Flashing 50 x 50mm PVC moulding used as under flashing for internal and external corners	3000 long	303745
	Axent Trim 84mm	84 x 2600 long	401943
	Axent Trim 100mm	100 x 2600 long	401930
	HardieFlex™ nail - 5kg	60 x 3.15mm	302782
	HardieFlex™ nail - 5kg	60 x 3.15mm	302784
	HardieBlade™ Saw Blade Diamond tip fibre cement circular saw blade. Spacers not included	4 tooth - 184mm	300660
	HardieBlade™ Saw Blade Diamond tip fibre cement circular saw blade. Spacers not included	6 tooth - 254mm	303375
	Axent Fascia - 180mm - 230mm	4200 long	401843 402230

Table 8

Accessories not supplied by James Hardie

James Hardie recommends the following products for use in conjunction with its Linea Weatherboard and Axent Trim. James Hardie does not supply these products. There may also be some other accessories required depending upon the application. Please contact component manufacturer for information on their warranties and further information on their products.

Accessories	Description	Size (MM)	Material/ appearance
	Head flashing Required over window heads to be supplied by window installer. Material must comply with Table 20 and 21 of E2/AS1.	To suit	Etch Primed Aluminium/Powder Coated
	D head or Roundrive Nail Gun nail for concealed fixing Linea Weatherboard.	50 x 2.87 60 x 3.15	Hot Dip Galvanised Stainless Steel
	HardieFlex™ Hot Dip Galv. Nails For fixing cavity battens.	40 x 2.8mm	Hot Dip Galvanised
	Jolt Head Nail for face fixing to Linea Weatherboard. Hot Dip Galvanised or 316 Stainless Steel	50 x 2.8mm 60 x 3.15mm 75 x 3.15mm 90 x 4.0mm	Self colour
	Joint sealant Paintable flexible sealants are recommended for filling the joints. Refer to Section 7.2 for information.	Tube	Sika, Holdfast
	PEF Rod	Polyethylene foam	Sika or similar
	Flexible tape A flexible self-adhesive tape used in preparation of a window. Refer to the Window installation section in this manual for more information. e.g. Tyvek®, Marshall Innovations or similar.	Proprietary tape to adhere to flexible underlay	Tyvek, Marshall Innovations or similar
	Flashing Material as per Table 20, 'E2/AS1'		Flashing Fabricator
	Planted Sill		H3.1 minimum Treated Timber Timber Merchant or cut on site
	Titanium Coated High Speed Drill Bit. For pre-drilling prior to face fixing with jolt head.	3.0mm 3.5mm	
	Timber Scriber To scribe beside window, site cut to suit.	As required	H3.1 minimum Treated Timber Timber Merchant or cut on site
	Fibre Cement Cutting Blade Diamond tip 305mm diameter circular saw blade to fit drop saw.	305mm	Diamond Tipped
	Meter Box Refer Electrical Suppliers		
	Cant Strip Redway Developments 03 358 5775 Predrill the weatherboards when fixing using Redway Development Cant/Vent Strips	To suit	uPVC
	Inseal 3109 Sealing Strip.	5 x 3mm x 25mm	Black Compressible Foam
	CRC Builders Fill Two part exterior grade fill to finish over jolt head nails.		

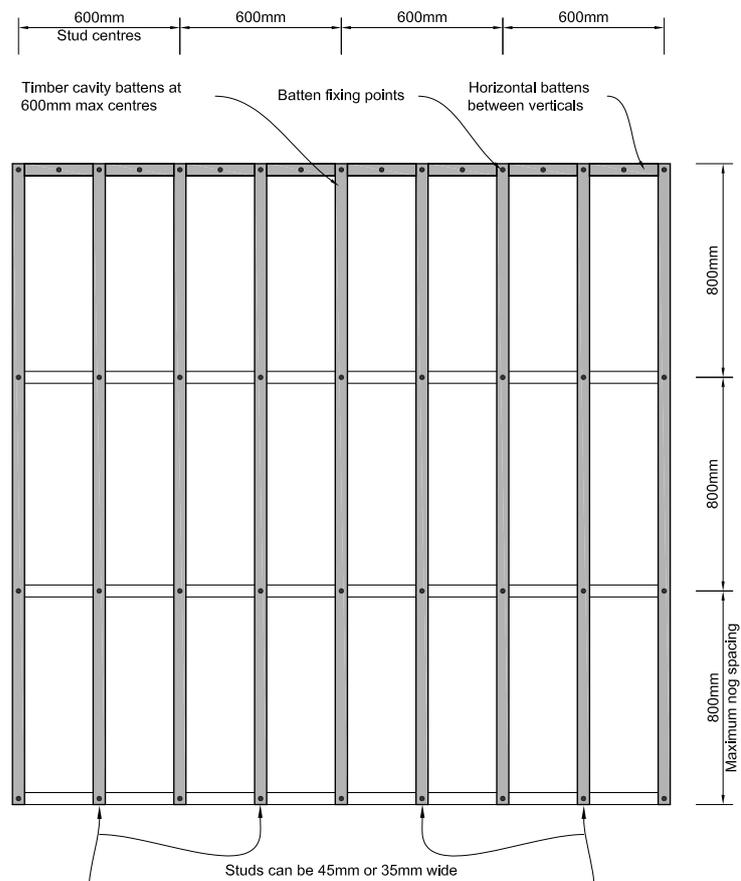
14 Details

Various details outlined in the following table are available on Pages 15 to 42.

Table 9

Details				
Description	Direct fixed		Timber Cavity Batten Construction	
	Figure	Page	Figure	Page
Foundation detail and soffit detail	Figure 1	15		
Weatherboard fixing	Figure 2	15	Figure 30	30
Boxed corner	Figure 3 & 4	16	Figure 31	31
Mitre corner	Figure 5	17	Figure 32	31
Aluminium box corner	Figure 6	17	Figure 33	31
External corner soaker	Figure 7	18	Figure 34	32
Internal corner	Figure 8	18	Figure 35	32
Internal 90° aluminium 'W' mould corner	Figure 9	19	Figure 36	33
Internal 135° aluminium 'W' mould corner	Figure 10	19	Figure 37	33
Window sill with facings			Figure 39	34
Window sill with sill tray and facings	Figure 11	20		
Window door and head with facings	Figure 12	20	Figure 40	35
Window door and jamb with facings	Figure 13	21	Figure 41	35
Window door and sill without facings	Figure 14	21	Figure 42	35
Window door and head without facings	Figure 15	22	Figure 43	36
Window door and jamb without facings	Figure 16	22	Figure 44	36
Head flashing termination	Figure 17	23	Figure 45	37
One piece apron flashing joint	Figure 18	23	Figure 46	37
Pipe penetration	Figure 19	24	Figure 48	38
Meter box at head	Figure 20	24	Figure 49	39
Meter box at sill	Figure 21	25	Figure 50	39
Meter box at jamb	Figure 22	25	Figure 51	40
Timber cavity fix meter box			Figure 52	41
Deck junction	Figure 23	26	Figure 61	47
Cantilevered timber deck junction	Figure 24	27	Figure 62	47
Sloping soffit to weatherboard junction	Figure 25	27	Figure 59	46
Timber cavity batten fixing			Figure 27	28
Foundation detail			Figure 28	29
Soffit detail			Figure 29	29
Batten layout at window opening			Figure 38	34
One piece gutter/wall junction			Figure 47	38
Floating lap over floor joist			Figure 53	42
Drainage joint			Figure 54	43
Enclosed deck balustrade to wall			Figure 55	43
Enclosed balustrade to wall			Figure 56	44
Enclosed deck	Figure 26	28	Figure 57	45
Parapet flashing			Figure 58	45
Sloping soffit and wall junction			Figure 60	46
Door sill support detail			Figure 63	48
Junction between Linea® Weatherboard and fascia board			Figure 64	49
Exclosed roof to wall intersection			Figure 65	50

Figure 27: Timber cavity batten fixing



The intermediate support for insulation between the studs could be a timber cavity batten, polypropylene tape or 75mm galvanised wire mesh. Refer to E2/AS1 Paragraph 9.1.8.5
Polypropylene tape must be fixed horizontally and drawn taut at 300mm centres.

Figure 28: Timber cavity foundation detail

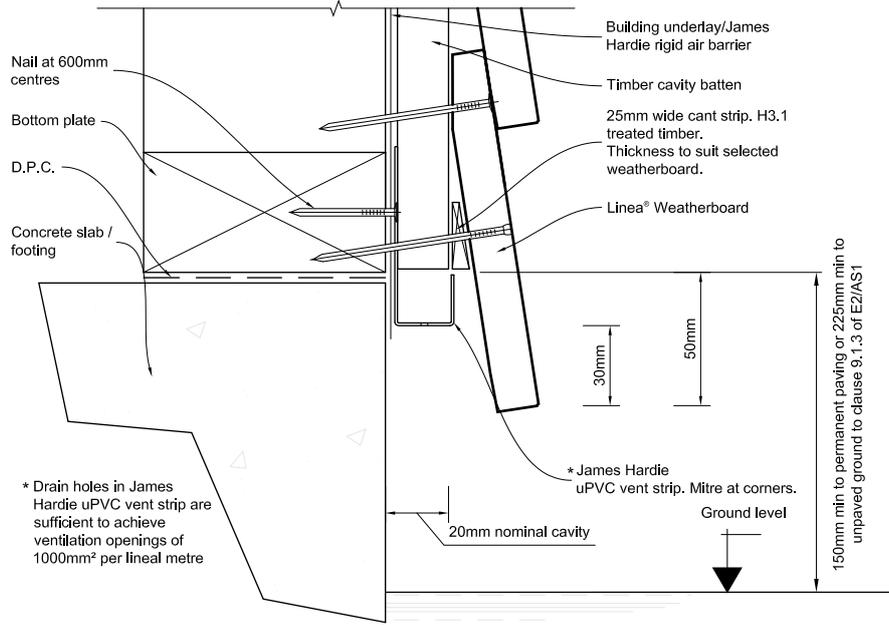


Figure 29: Timber cavity soffit detail

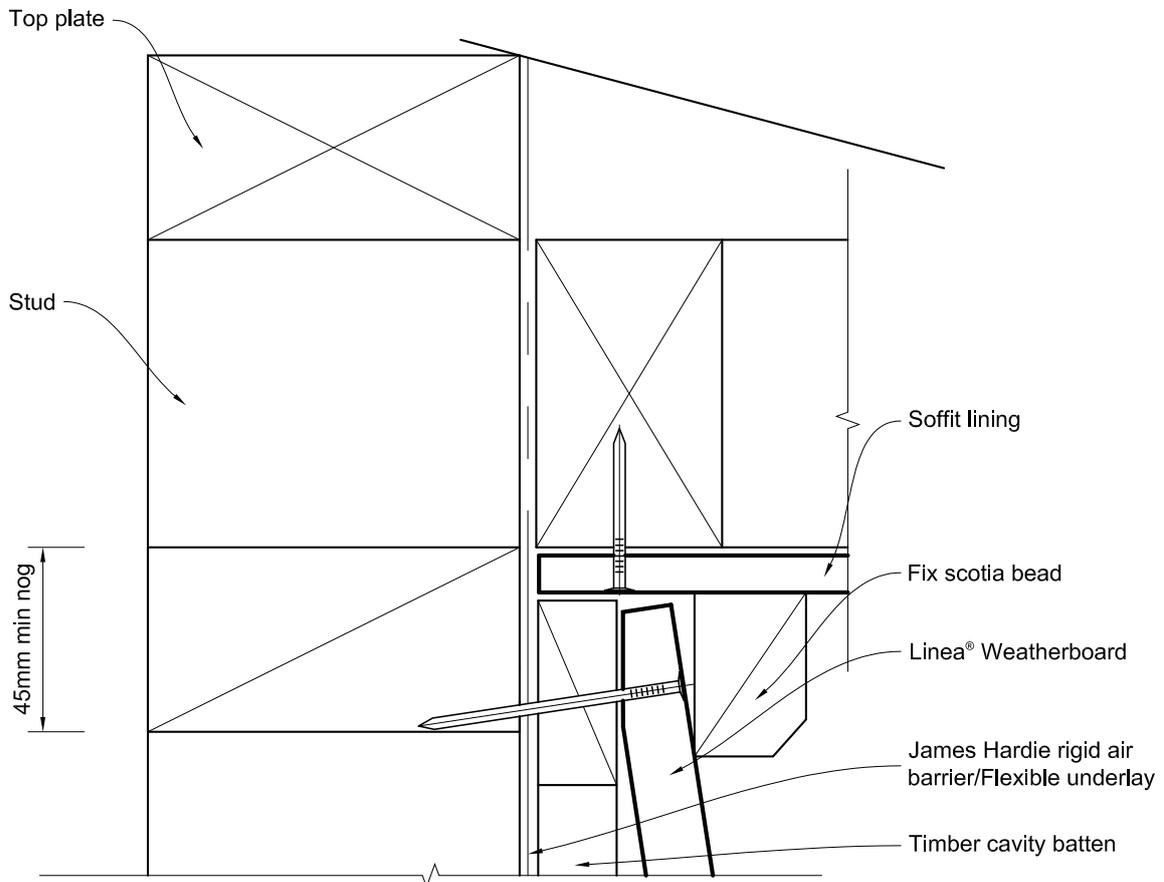


Figure 30: Timber cavity weatherboard fixing

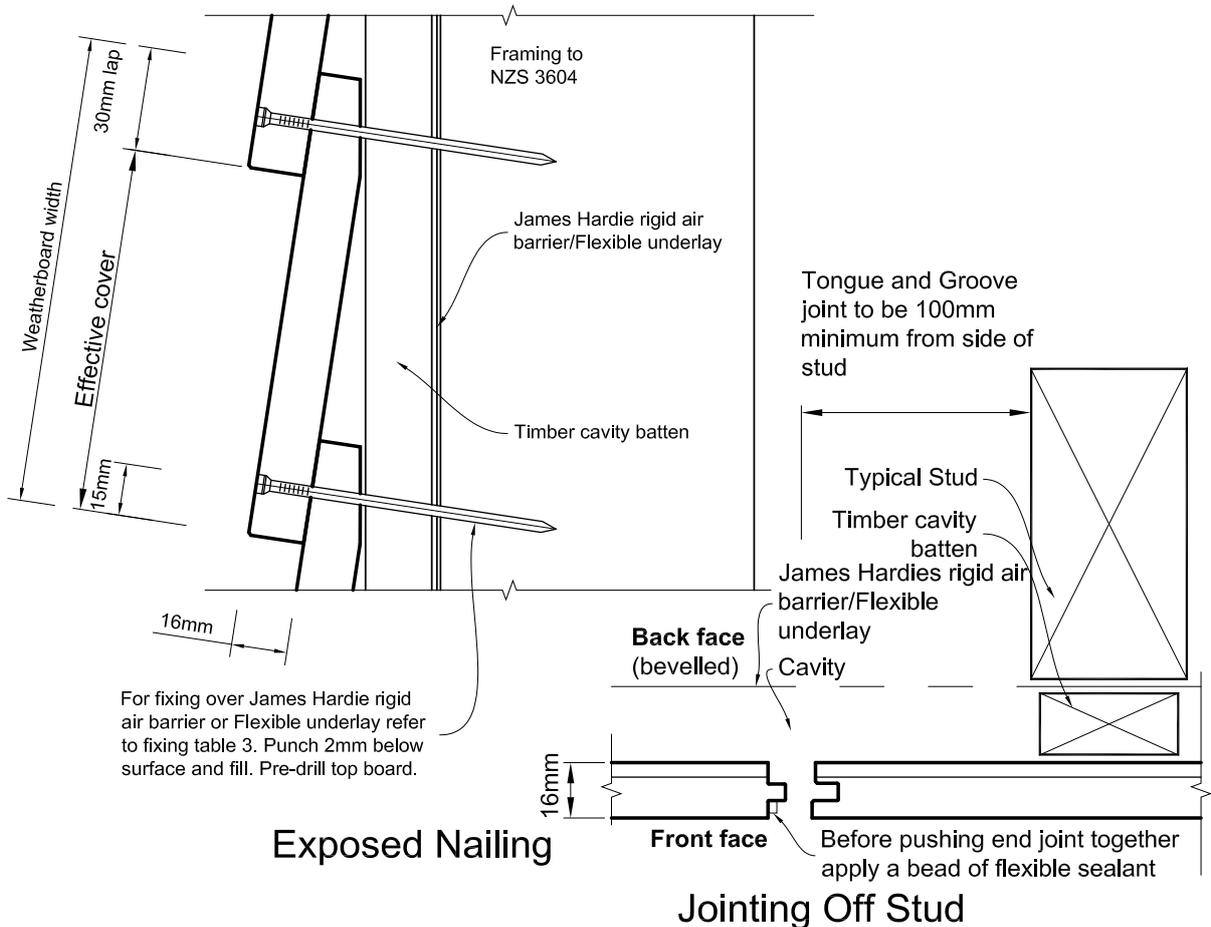
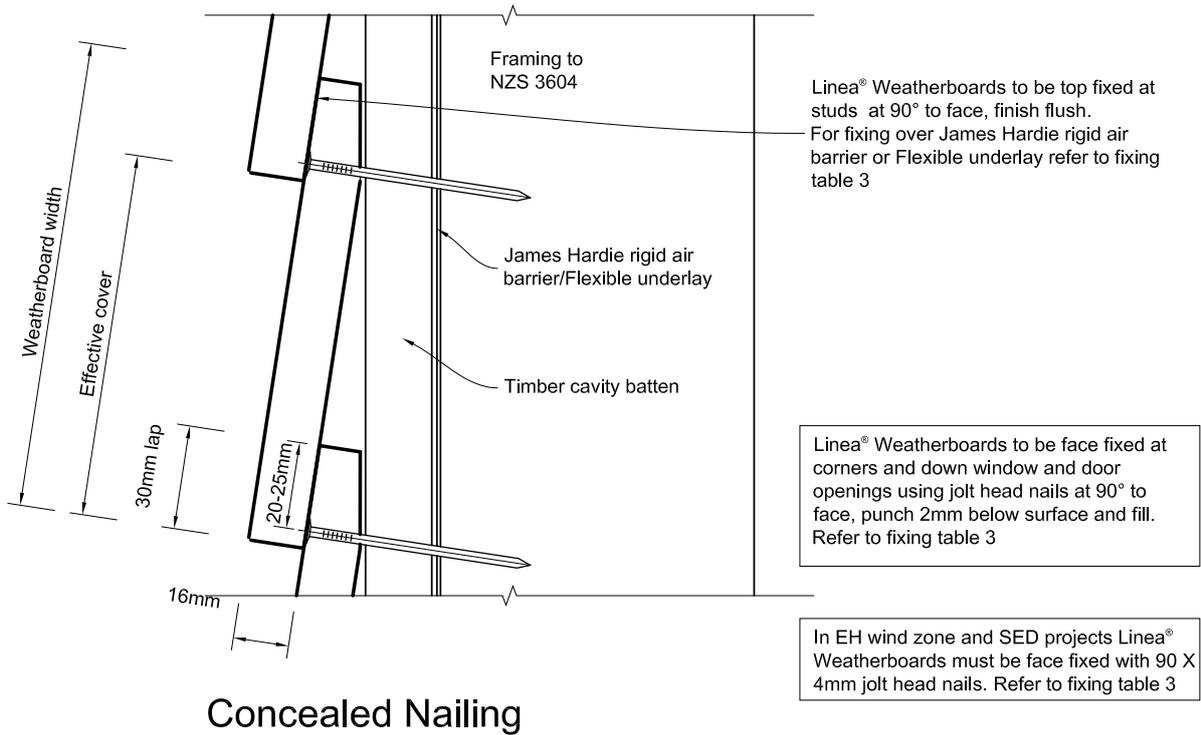
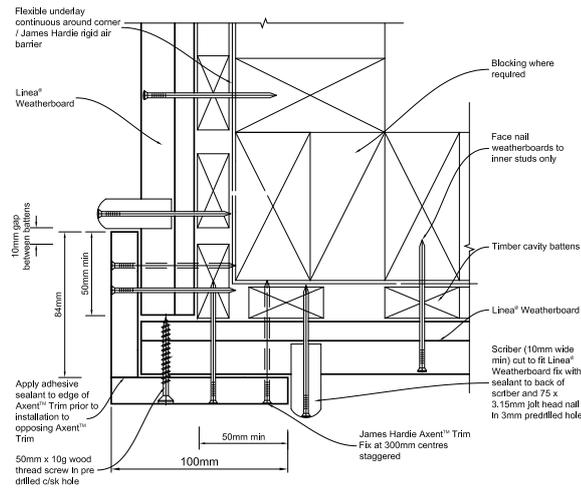


Figure 31: Timber cavity boxed corner



Note:
Box corner trim must not be continuous over solid floor joists.

Figure 35: Timber cavity internal corner

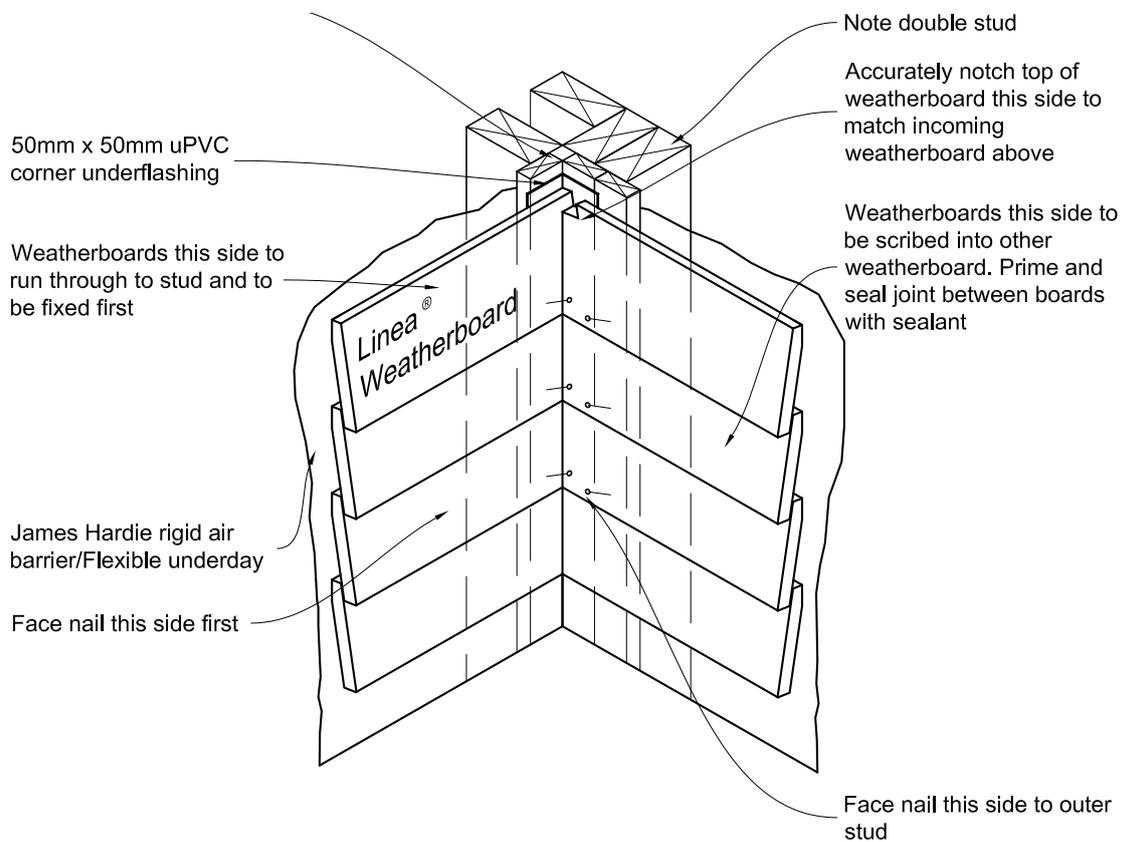
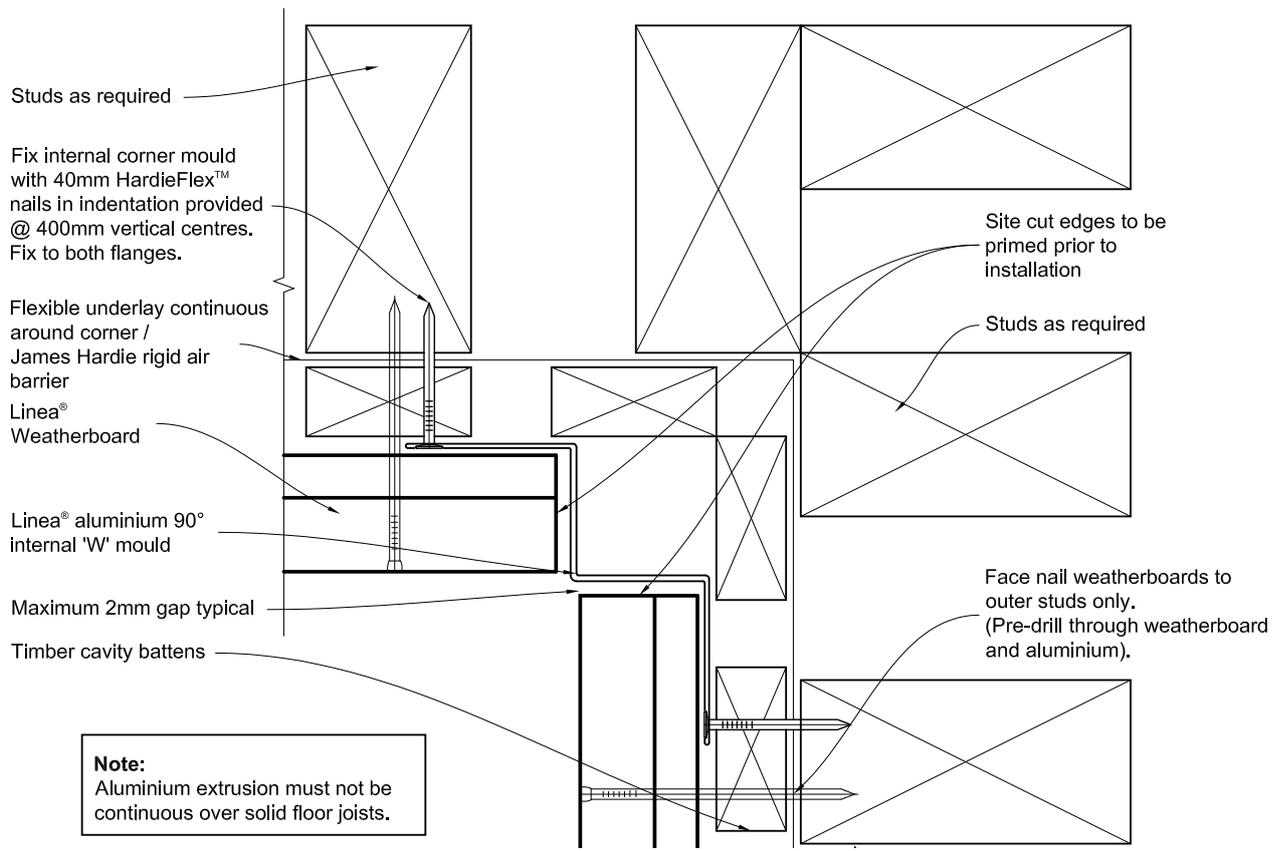
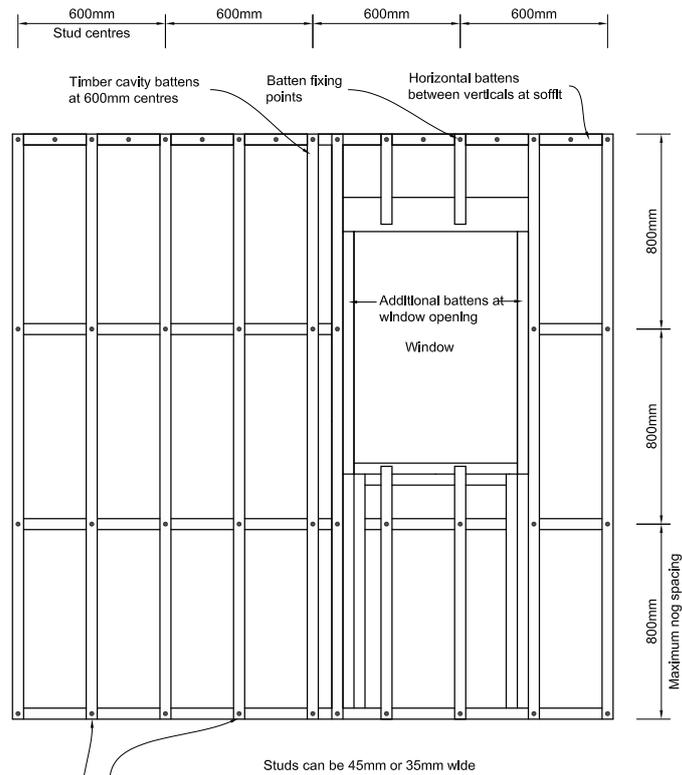


Figure 36: Timber cavity internal 90° aluminium 'W' mould corner



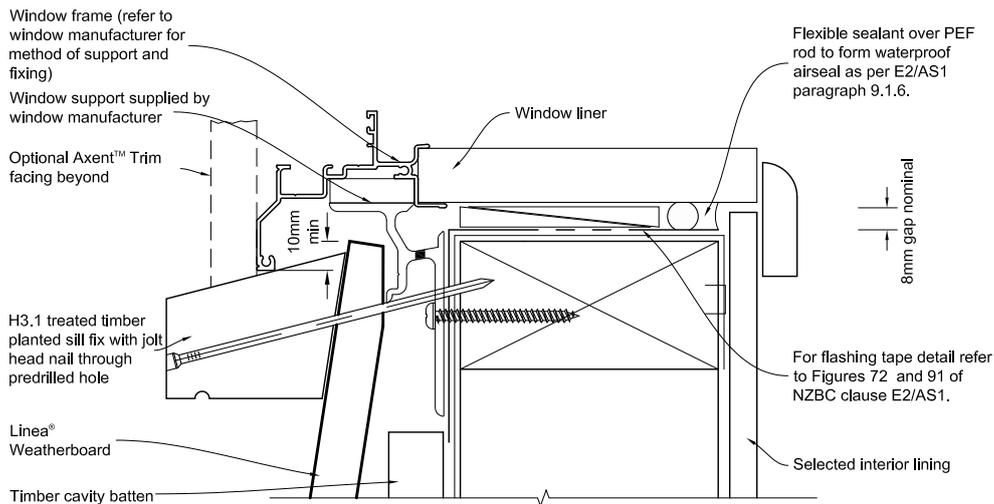
Note:
Aluminium extrusion must not be continuous over solid floor joists.

Figure 38: Timber cavity batten layout at window opening



The Intermediate support for Insulation between the studs could be a timber cavity batten, polypropylene tape or 75mm galvanised wire mesh. Refer to E2/AS1 Paragraph 9.1.8.5 Polypropylene tape must be fixed horizontally and drawn taut at 300mm centres.

Figure 39: Timber cavity window sill with facings



General notes for materials section

1. Flashing materials must be selected based on environmental exposure, refer to NZS 3604 and Table 20 of NZBC clause E2/AS1.
2. Flexible underlay must comply with acceptable solution E2/AS1.
3. Flashing tape must have proven compatibility with the selected flexible underlay / James Hardie rigid air barrier and other materials with which it comes into contact.

Refer to the manufacturer or supplier for technical information for these materials.

Figure 40: Timber cavity window and door head with facings

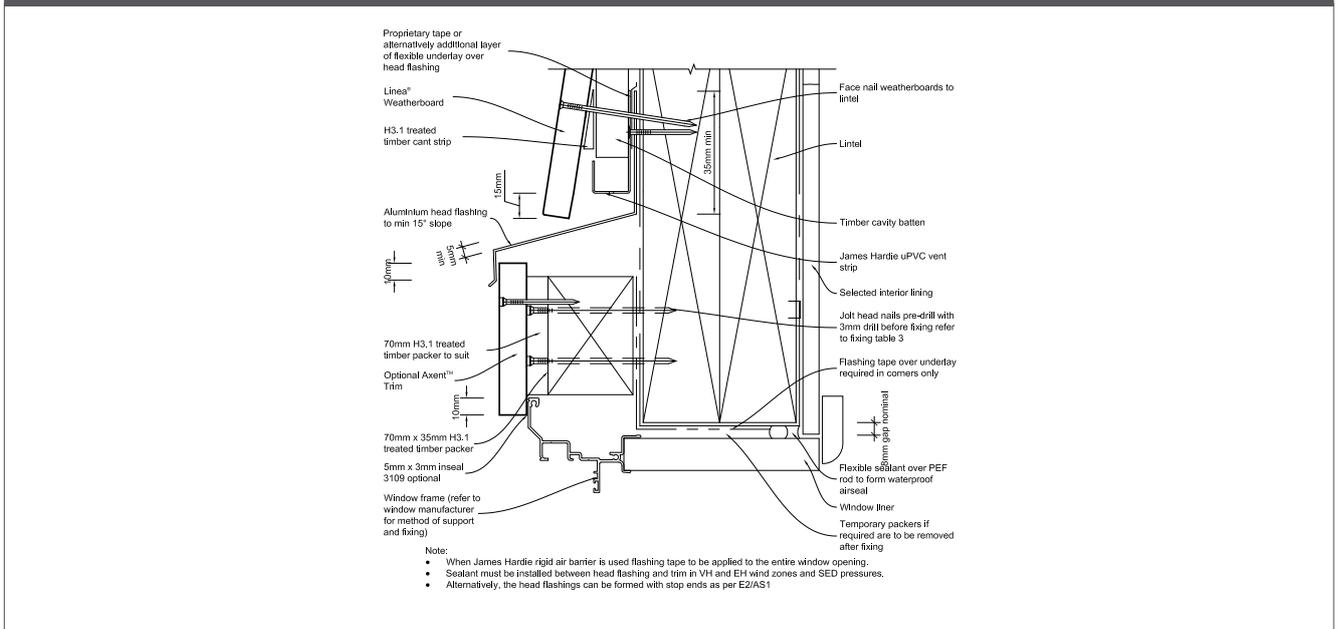


Figure 41: Timber cavity window and door jamb with facings

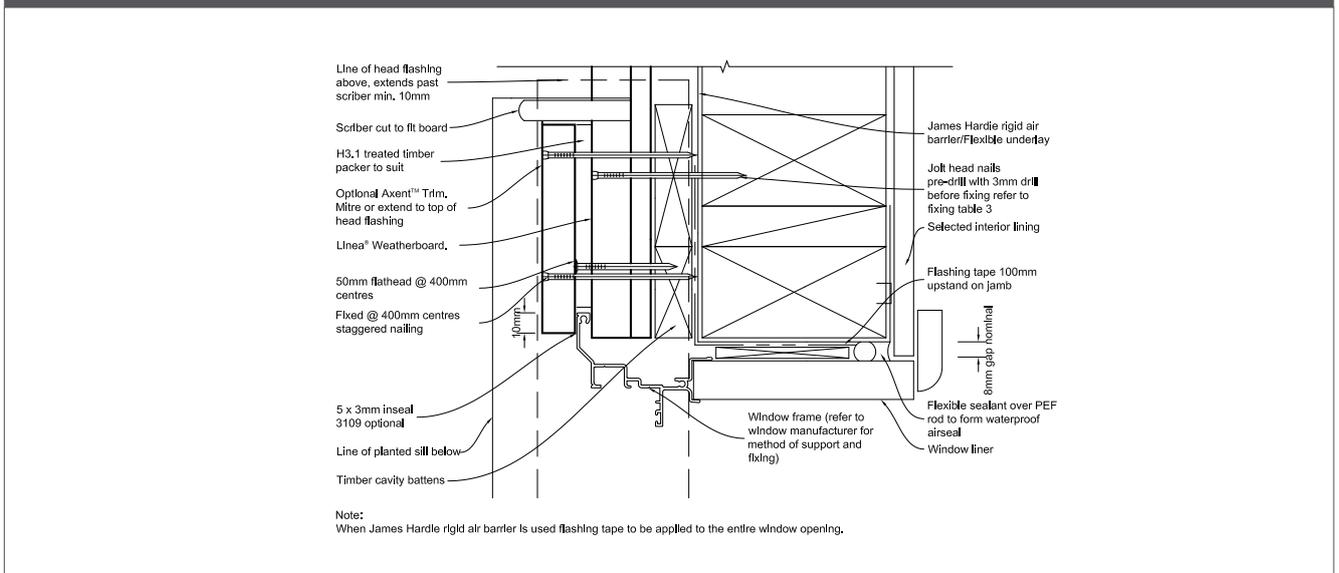


Figure 48: Timber cavity pipe penetration

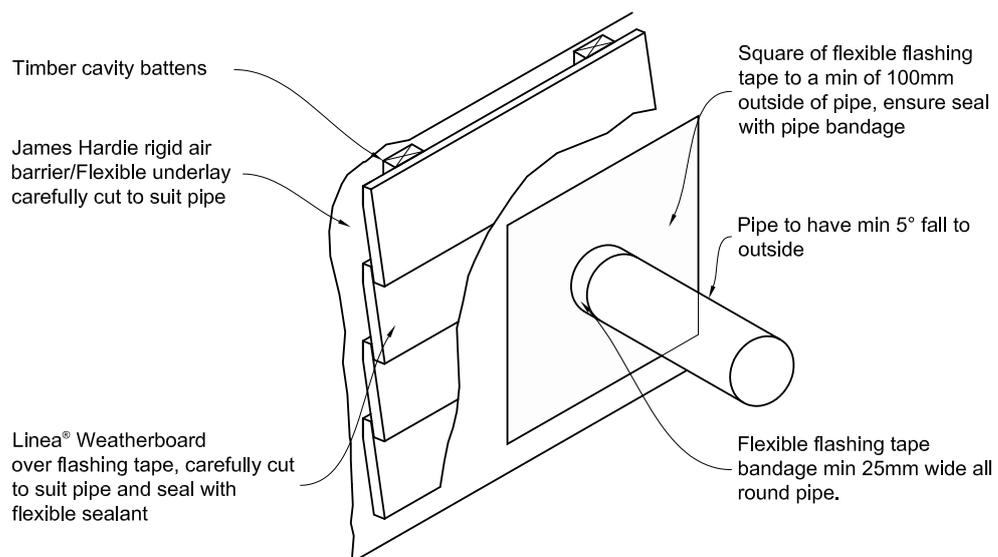
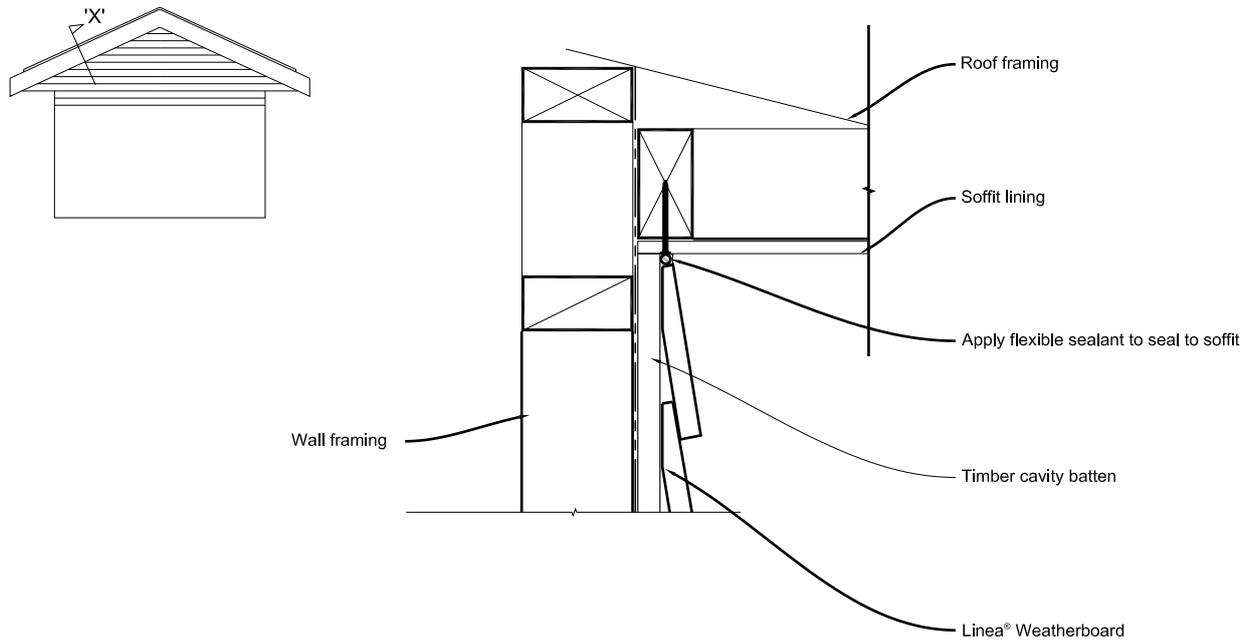
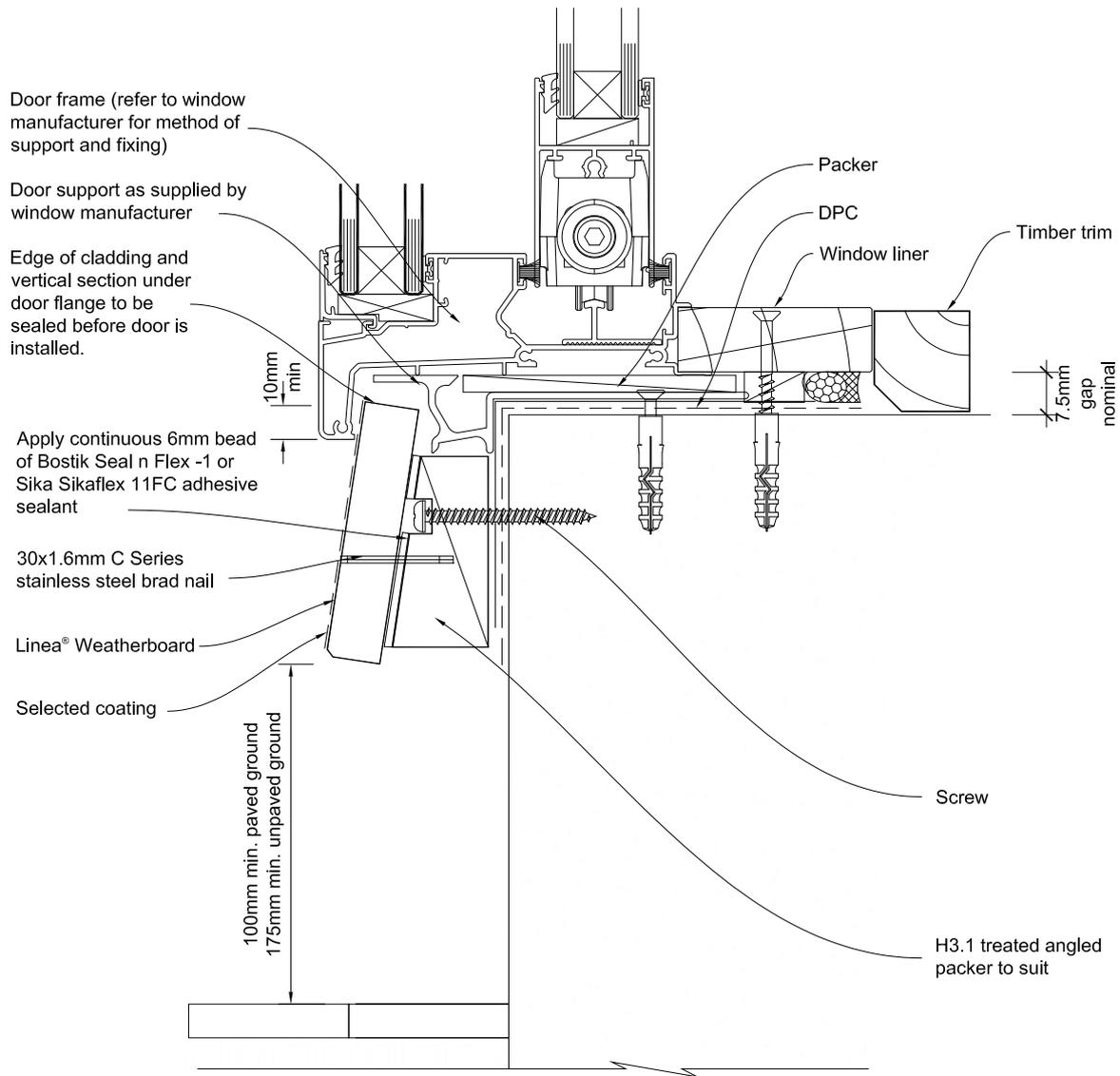


Figure 59: Linea® Weatherboard junction (section 'X') cavity to cable



The Linea® Weatherboard must be neat cut and silicone sealed to angle of soffit
Alternatively a scotia can be scribed and sealed to Linea® Weatherboard and the soffit lining

Figure 63: Door sill support detail



Refer to the manufacturer or supplier for technical information for these materials.

General notes for materials selection

1. Flashing materials must be selected based on environmental exposure, refer to NZS 3604 and Table 20 of the NZBC E2/AS1.
2. Building underlay must comply with acceptable solution E2/AS1.
3. Flashing tape must have proven compatibility with the selected flexible underlay and other materials with which it comes into contact.
4. Linea® Weatherboard to have sealed butt joint over batten at each corner of opening.

Product Warranty

Linea®
WEATHERBOARD

April 2016

Warranty: James Hardie New Zealand ("James Hardie") warrants for a period of 25 years from the date of purchase that the Linea® Weathrboard (the "Product"), will be free from defects due to defective factory workmanship or materials and, subject to compliance with the conditions below, will be resistant to cracking, rotting, fire and damage from termite attacks to the extent set out in James Hardie's relevant published literature current at the time of installation. James Hardie warrants for a period of 15 years from the date of purchase that the Axent™ Trim and accessories supplied by James Hardie will be free from defects due to defective factory workmanship or materials.

Nothing in this document shall exclude or modify any legal rights a customer may have under the Consumer Guarantees Act or otherwise which cannot be excluded or modified at law.

CONDITIONS OF WARRANTY:

The warranty is strictly subject to the following conditions:

- a) James Hardie will not be liable for breach of warranty unless the claimant provides proof of purchase and makes a written claim either within 30 days after the defect would have become reasonably apparent or, if the defect was reasonably apparent prior to installation, then the claim must be made prior to installation.
- b) This warranty is not transferable.
- c) The Product must be installed and maintained strictly in accordance with the relevant James Hardie literature current at the time of installation and must be installed in conjunction with the components or products specified in the literature. Further, all other products, including coating and jointing systems, applied to or used in conjunction with the Product must be applied or installed and maintained strictly in accordance with the relevant manufacturer's instructions and good trade practice.
- d) The project must be designed and constructed in strict compliance with all relevant provisions of the current New Zealand Building Code ("The NZBC"), regulations and standards.
- e) The claimant's sole remedy for breach of warranty is (at James Hardie's option) that James Hardie will either supply replacement product, rectify the affected product or pay for the cost of the replacement or rectification of the affected product.
- f) James Hardie will not be liable for any losses or damages (whether direct or indirect) including property damage or personal injury, consequential loss, economic loss or loss of profits, arising in contract or negligence or howsoever arising. Without limiting the foregoing James Hardie will not be liable for any claims, damages or defects arising from or in any way attributable to poor workmanship, poor design or detailing, settlement or structural movement and/or movement of materials to which the Product is attached, incorrect design of the structure, acts of God including but not limited to earthquakes, cyclones, floods or other severe weather conditions or unusual climatic conditions, efflorescence or performance of paint/coatings applied to the Product, normal wear and tear, growth of mould, mildew, fungi, bacteria, or any organism on any Product surface or Product (whether on the exposed or unexposed surfaces).
- g) All warranties, conditions, liabilities and obligations other than those specified in this warranty are excluded to the fullest extent allowed by law.
- h) If meeting a claim under this warranty involves re-coating of Products, there may be slight colour differences between the original and replacement Products due to the effects of weathering and variations in materials over time.

Disclaimer: The recommendations in James Hardie's literature are based on good building practice, but are not an exhaustive statement of all relevant information and are subject to conditions (c), (d), (f) and (g) above. James Hardie has tested the performance of Linea® Weathrboard when installed in accordance with the Linea® Weathrboard technical specification, in accordance with the standards and verification methods required by the NZBC and those test results demonstrate the product complies with the performance criteria established by the NZBC. However, as the successful performance of the relevant system depends on numerous factors outside the control of James Hardie (e.g. quality of workmanship and design) James Hardie shall not be liable for the recommendations made in its literature and the performance of the relevant system, including its suitability for any purpose or ability to satisfy the relevant provisions of the NZBC, regulations and standards, as it is the responsibility of the building designer to ensure that the details and recommendations provided in the relevant James Hardie installation manual are suitable for the intended project and that specific design is conducted where appropriate.

Copyright April 2016. © James Hardie New Zealand. TM and ® denotes a Trademark or Registered Mark owned by James Hardie Technology Limited.

Ask James Hardie™
Call 0800 808 868
www.jameshardie.co.nz

 **James Hardie**
a smarter way™



Ask James Hardie™ | Call 0800 808 868 | jameshardie.co.nz



MAINTENANCE SCHEDULE

The extent and nature of maintenance will depend on the geographical location and exposure of the building. It is the responsibility of the specifier to determine any site specific maintenance requirements to comply with the New Zealand Building Code.

As a guide, it is recommended that basic normal maintenance tasks shall include but not be limited to:

- Washing down exterior surfaces every 6-12 months*
- Re-applying exterior protective finishes**
- Maintaining the exterior envelope and connections including joints, penetrations, flashings and sealants that may provide a means of moisture entry beyond the exterior cladding to comply with the requirements of the New Zealand Building Code clause E2.
- Cleaning out gutters, blocked pipes and overflows as required.
- Pruning back vegetation which is close to or touching the building as well as ensuring the New Zealand Building Code ground clearance requirements are maintained especially where gardens are concerned.
- The clearance between the bottom edge of the Linea Weatherboard and the finished/unfinished ground must always be maintained.
- Stainless steel soakers used in extreme coastal conditions or in sea spray zones may show some signs of 'tea staining'. It is an aesthetic issue and to minimise staining soaker must be washed/polished frequently.

**Do not use a water blaster to wash down the cladding.*

**In extreme coastal conditions or sea spray zones, wash every 3-4 months*

***Refer to the paint manufacturer for washing down and recoating requirements related to paint performance.*

Date: _____

Project: _____

Address: _____

Customer Name: _____



Product Technical Statement

Product Description: Linea Weatherboard is a bevelbacked weatherboard wall cladding manufactured using low density fibre cement formulation.

Scope of Use: Linea Weatherboard is suitable for use as external wall cladding on residential buildings within the scope of E2/AS1 or light weight residential/commercial buildings with design wind pressure of 2.5kPa (uls) covered by a specific engineering design (SED). It can be installed direct fixed to the framing for residential buildings within or up to the risk score 12 calculated as per E2/AS1. Or, it can be fixed over a timber cavity batten that is nominal 20mm thick and used for buildings that are exposed to wind pressures up to 2.5kPa (uls).

Linea Weatherboard is also suitable for use in fire rated systems and bracing applications.

Limitations: Linea Weatherboard cladding must not be used in curved wall applications or in situations where it stays in contact with ground moisture.

Compliance with the NZBC: The following clauses of the NZBC are applicable to Linea Weatherboard cladding and it complies with these requirements as explained below;

Structure - B1: Uniform wind face load tests have been completed at BRANZ and the suitability of Linea Weatherboard and its fixings have been verified to meet wind pressure requirement in various wind zones classified in NZS 3604 and SED wind zone up to wind pressure of 2.5kPa and complies with the requirements of B1.3.1, B1.3.2 and B1.3.4.

Durability - B2: Linea Weatherboard has been tested at a NATA accredited James Hardie laboratory in accordance with AS/NZS 2908.2 and meets the durability performance requirements as per B2.3.1(a) and B2.3.2 of this clause.

Fire Performance - C: Linea Weatherboard has been tested and is classified as non-combustible material and is suitable for use on external walls close to boundaries.

External Moisture - E2: Linea Weatherboard cavity cladding as per its details has been tested for weathertightness as per E2/VM1 (as contained within NZBC Clause E2, Third Edition, Amendment 5).

Hazardous Building Materials - F2: Linea Weatherboard complies with the requirements of F2.3.1 and will not present a health hazard when handled as per its technical specifications.

Energy Efficiency - H1: Linea Weatherboard clad walls constructed using bulk insulation meets the construction R-Value requirements as per Table 1 of Clause H1.

Linea Weatherboard has a BRANZ appraisal for direct fixed and cavity construction method. Refer to BRANZ appraisal No. 446 and 447 at www.branz.co.nz

Linea Weatherboard has also been assessed under the product certification scheme by DBH and is covered under CodeMark. Refer to CodeMark certificate; www.dbh.govt.nz

Installation: Linea Weatherboard must be installed in accordance with the current Linea Weatherboard Technical Specification. The specification and details are available at James Hardie web site www.jameshardie.co.nz or Ask James Hardie™ at 0800 808 868 for further information.

Warranty: Linea Weatherboard has a product warranty of 25 years when installed and maintained as per the current technical specification.



INSTALLATION CHECKLIST

IMPORTANT NOTES:

- All sections of this checklist should be completed in full.
- Careful adherence to technical specification literature is critically important for completing Linea® Weatherboard cladding construction. The construction shall comply with requirements of building consent. Any variations made should be approved by the BCA prior to work being undertaken.
- If you have any queries please Ask James Hardie™ on 0800 808 868.

PROPERTY

Owner :

Address:

BUILDER/INSTALLER

Contact Name:

Company Name:

Company Address:

Telephone No:

Date Completed: / /

Installer type: LBP

(Circle applicable)

LBP No.

Member of Building Trade

Please specify

PAINTER FOR LINEA WEATHERBOARD

Contact Name:

Company Name:

Company Address:

Telephone No:

Date Completed: / /



January 2016



BUILDER / INSTALLER SECTION

SCOPE PRE-CHECK

i	Wind zone (per NZS 3604)	L	M	H	VH	EH
ii	Foundation type	Concrete		Timber		
iii	Floor Joist	Standard Joist		Engineered Joist (type)		
iv	Highest point of cladding above ground / No. of Storeys					
v	Areas of specific engineering design not covered by product literature.					
vi	DP number / Building Consent number	DP		Consent Number		
vii	BCA/Certifier Issuing Office	Office		Phone		

FRAMING

	ITEMS TO BE CHECKED	PLS TICK	NOTES
1	External timber framing is treated to min H1.2 treatment levels.		
2	H3.1 framing timbers used on walls which are exposed to the exterior on both sides.		
3	Timber framing set out.		
4	Moisture contents in Timber framing as per NZS 3602		
5	Framing straightness. Nogs flush with studs, and studs flush with top and bottom plates.		
6	Risk Score North Elevation / South Elevation East Elevation / West Elevation		
7	Cavity Construction - The cavity construction method is to be used where the risk score is 13 or higher to comply with the New Zealand Building Code. Intermediate Support installed in accordance with Linea Weatherboard technical specification.		
8	Check framing spacing and section as per technical literature		
9	Additional framing provided if required for Bracing Systems, and Fire and Acoustic systems.		



FLEXIBLE UNDERLAY

10	Which flexible underlay is used (only suitable up to VH wind zone) (flexible underlay should comply with E2/AS1)		
11	Flexible underlays to be lapped / installed as per E2/AS1.		
12	Flexible underlays to be cut and dressed into all sides of wall openings as per E2/AS1.		

HOMERAB PRE-CLADDING / RAB BOARD

	ITEMS TO BE CHECKED	PLS TICK	NOTES
13	HomeRAB Pre-Cladding/RAB Board to be kept dry and under cover		
14	Design wind pressures		
15	HomeRAB Pre-Cladding/RAB Board installed in accordance with James Hardie Rigid Air Barriers Installation Manual		
16	Joint tape installed over HomeRAB Pre-Cladding/RAB Board vertical joints and openings in accordance with James Hardie Rigid Air Barriers Installation Manual.		

FLASHINGS

	ITEMS TO BE CHECKED	PLS TICK	NOTES
17	Flexible flashing tapes to be applied to sill framing and head framing as per E2/AS1		
18	Head and sill flashings to be provided as per technical specification.		
19	Top of parapet walls must have cap flashings		

WEATHERBOARD FIXING AND SET OUT

20	Linea Weatherboard to be kept dry and under cover		
21	Moisture content in timber framing before installation of Linea Weatherboards must not exceed 20%.		
22	Linea Weatherboard to be installed dry.		
23	Fixing carried out as per Linea Weatherboard technical specification literature.		Combination conceal / face fix or all face fixed.
24	Fixings – Type - (Stainless steel / Galvanised Nails) Size - Nails		
25	Bracing systems and Fire and Acoustic systems fixing requirements followed as per relevant JH technical literature.		
26	Minimum clearance to paved or unprotected ground as required by NZS 3604 and E2/AS1		

27	The weatherboards overhang the bottom plate on a concrete slab by a minimum of 50mm as required by E2/AS1.		
28	Minimum 10mm cover under the window flange		
29	Minimum clearance of 50mm from the top of decks and 50mm from top of apron flashings etc.		

WINDOW AND DOOR INSTALLATION

30	Flashings required as per Linea Weatherboard technical specification.		
31	Scriber to be used to edge of all openings. Check any special requirement by window manufacturer.		
32	For claddings without a cavity, at the sill a gap of 5mm min must be left between the window flange and the sill flashing. For claddings fixed on a cavity, the window flange is sealed with the cladding.		
33	An air seal must be provided at the rear of the window reveal.		
34	Window and door penetrations must be treated as specified in standard details.		
35	Head flashings must extend past scriber 20mm each side		

Please ensure that the 'painter' is given this checklist on completion of the builders Section.
Coating Products must be applied in accordance with manufacturers instructions.

COATING APPLICATORS SECTION

FINISHING PRECHECK

	ITEMS TO BE CHECKED	PLS TICK	NOTES
36	Linea Weatherboards are dry prior to commencement of painting.		
37	Jolt Head nails finished 2mm below surface.		
38	Holes from Jolt head nails filled with exterior grade 2 part building filler Product used:		

FINISHING

39	Paint manufacturer (all components from same system)	
40	Colour	
41	Linea Weatherboard coated within 90 days of installation.	

DECLARATION

I / We have installed the Linea Weatherboard as per James Hardie Linea Weatherboard Technical Specification current at the time of construction.	
Signed by: <i>Print Name</i> <i>Signed Name</i>
Dated:	

Product Warranty

Linea®
WEATHERBOARD

March 2015

Warranty: James Hardie New Zealand ("James Hardie") warrants for a period of 25 years from the date of purchase that the Linea® Weath^{er}board (the "Product"), will be free from defects due to defective factory workmanship or materials and, subject to compliance with the conditions below, will be resistant to cracking, rotting, fire and damage from termite attacks to the extent set out in James Hardie's relevant published literature current at the time of installation. James Hardie warrants for a period of 15 years from the date of purchase that the Axent™ Trim and accessories supplied by James Hardie will be free from defects due to defective factory workmanship or materials.

Nothing in this document shall exclude or modify any legal rights a customer may have under the Consumer Guarantees Act or otherwise which cannot be excluded or modified at law.

CONDITIONS OF WARRANTY:

The warranty is strictly subject to the following conditions:

- a) James Hardie will not be liable for breach of warranty unless the claimant provides proof of purchase and makes a written claim either within 30 days after the defect would have become reasonably apparent or, if the defect was reasonably apparent prior to installation, then the claim must be made prior to installation.
- b) This warranty is not transferable.
- c) The Product must be installed and maintained strictly in accordance with the relevant James Hardie literature current at the time of installation and must be installed in conjunction with the components or products specified in the literature. Further, all other products, including coating and jointing systems, applied to or used in conjunction with the Product must be applied or installed and maintained strictly in accordance with the relevant manufacturer's instructions and good trade practice.
- d) The project must be designed and constructed in strict compliance with all relevant provisions of the current New Zealand Building Code ("NZBC"), regulations and standards.
- e) The claimant's sole remedy for breach of warranty is (at James Hardie's option) that James Hardie will either supply replacement product, rectify the affected product or pay for the cost of the replacement or rectification of the affected product.
- f) James Hardie will not be liable for any losses or damages (whether direct or indirect) including property damage or personal injury, consequential loss, economic loss or loss of profits, arising in contract or negligence or howsoever arising. Without limiting the foregoing James Hardie will not be liable for any claims, damages or defects arising from or in any way attributable to poor workmanship, poor design or detailing, settlement or structural movement and/or movement of materials to which the Product is attached, incorrect design of the structure, acts of God including but not limited to earthquakes, cyclones, floods or other severe weather conditions or unusual climatic conditions, efflorescence or performance of paint/coatings applied to the Product, normal wear and tear, growth of mould, mildew, fungi, bacteria, or any organism on any Product surface or Product (whether on the exposed or unexposed surfaces).
- g) All warranties, conditions, liabilities and obligations other than those specified in this warranty are excluded to the fullest extent allowed by law.
- h) If meeting a claim under this warranty involves re-coating of Products, there may be slight colour differences between the original and replacement Products due to the effects of weathering and variations in materials over time.

Disclaimer: The recommendations in James Hardie's literature are based on good building practice, but are not an exhaustive statement of all relevant information and are subject to conditions (c), (d), (f) and (g) above. James Hardie has tested the performance of Linea® Weath^{er}board when installed in accordance with the Linea® Weath^{er}board technical specification, in accordance with the standards and verification methods required by the NZBC and those test results demonstrate the product complies with the performance criteria established by the NZBC. However, as the successful performance of the relevant system depends on numerous factors outside the control of James Hardie (e.g. quality of workmanship and design) James Hardie shall not be liable for the recommendations made in its literature and the performance of the relevant system, including its suitability for any purpose or ability to satisfy the relevant provisions of the NZBC, regulations and standards, as it is the responsibility of the building designer to ensure that the details and recommendations provided in the relevant James Hardie installation manual are suitable for the intended project and that specific design is conducted where appropriate.

Copyright March 2015. © James Hardie New Zealand. TM and ® denotes a Trademark or Registered Mark owned by James Hardie Technology Limited.

Ask James Hardie™
Call 0800 808 868
www.jameshardie.co.nz

 **James Hardie**
a smarter way™

AUSTRAL BRICKS™

02. BRICK PROPERTIES AND BRICKLAYING PRACTICES

The technical information in this manual is aimed to provide guidance on the properties of bricks and on the selection of bricks for specific applications.

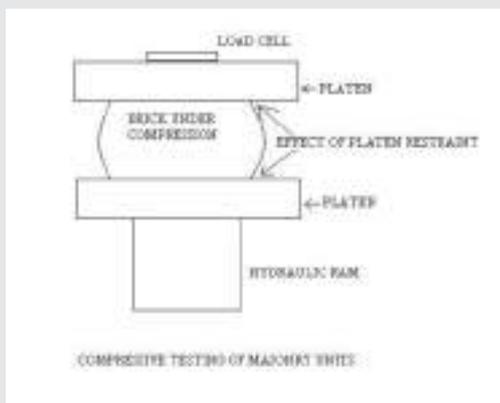
Austral Bricks Pty Ltd manufactures all products to Australian Standard AS/NZS 4455 (Masonry units and segmental pavers), unless otherwise specified in the technical data sheet made available for each product. Australian Standard AS/NZS 4456 (Masonry units and segmental pavers - methods of test) outlines the test methods required for the determination of the brick properties discussed. General information about bricklaying practices has also been provided to briefly explain some aspects of masonry construction.

BRICK PROPERTIES

Strength

Characteristic Unconfined Compressive Strength

Austral Bricks Pty Ltd makes available the characteristic unconfined compressive strength (f'_{uc}) of their products as required by Australian Standard AS/NZS 4455. The f'_{uc} values are determined using the test method detailed in AS/NZS 4456.4. The test method involves subjecting the masonry unit to increasing load by compressing it between two metal platens. The friction between the platens and the masonry unit acts to restrain the sideways spread of the unit, as shown in the diagram below.



The effect of this restraint is more pronounced in shorter specimens than in taller specimens of the same width. The incorporation of an aspect ratio (height to thickness ratio) factor, allows the results to be converted to an equivalent unconfined compressive strength value (f'_{uc}). That is, a correction factor, directly related to the dimensions of the unit, is used to compensate for the restraining effects of the platens during testing. The f'_{uc} allows direct comparison of all masonry units, regardless of the size.

The characteristic unconfined compressive strength (f'_{uc}) values now supplied for a traditional sized brick are approximately 60% of the previously used characteristic confined compressive strength values. It is important to note that this difference is due to the altered approach used when determining the values and not a reduction in strength.

Refer to CBPI Manual 2: The Properties of Clay Masonry Units for further information on compressive strength measurements.

BRICK DURABILITY

Definition

All products manufactured by Austral Bricks Pty Ltd are classified by their durability. The durability of a brick is a measure of its resistance to attack by soluble salts.

The test method used to determine the durability of bricks is given in AS/NZS 4456.10. The suitability of the units for use in a given environment determines their salt attack resistance category.

Salt Attack Resistance Categories

1. Exposure Grade: Suitable for use in external walls exposed to aggressive environments, such as:
 - in areas where walls are subjected to salts in the soil, adjacent material or ground water,
 - in coastal areas where walls are exposed to attack from windborne salt spray, or
 - retaining walls that may be subjected to fertilisers and ground salts.

In environments where exposure grade masonry is necessary, the minimum mortar classification required is M4 (refer to the section on mortar within this page for further details). In addition, exposure grade bricks may not be suitable for use in areas subject to cyclic freezing and thawing. For more information on the suitability of products contact Austral's Technical Department.

AUSTRAL BRICKS™

02. BRICK PROPERTIES AND BRICKLAYING PRACTICES

2. General Purpose: Suitable for use in an external wall under ordinary exposure conditions.
3. Protected: Suitable for use in internal and external walls only when above a sheet or membrane damp-proof course and protected by an adequate coping, eaves, roof or similar top covering. These units should not be directly exposed to saline environments.

Durability Required

The severity of the environmental conditions, such as the amount of moisture and the availability of soluble salts, determines the durability grade required. The Building Code of Australia (BCA) states that masonry units must be classified and used in the exposure conditions appropriate to their classification. Australian Standard AS 3700 (Masonry Structures) provides details of these classifications. The durability requirements set out in AS 3700 are summarised in the following table:

Exposure	Minimum Salt Attack Resistance Grade of Masonry Units	Minimum Mortar Classification	Minimum Durability Classification of Built-in Components
Marine Environment	General Purpose	M3	R3
Severe Marine Environment	Exposure	M4	R4
Below Damp Roof Course in Aggressive Soils	Exposure	M4	R4

AS 3700 classifies a marine environment as:

- 1km to 10km from a surf coast, or
- 100m to 1km from a non-surf coast.

AS 3700 classifies a severe marine environment as:

- within 1km of a surf coast, or
- within 100m of a non-surf coast.

It is important to take into consideration the given environment during the design and construction of brickwork buildings, to minimise the potential for salt attack. The most suitable mortar joints for aggressive environments are ironed or weather struck joints. The mortar classifications given in the table and the types of mortar joints possible are discussed in more detail in the mortar section of this manual. It should also be noted that raked mortar joints should not be used in severe marine environments.

The minimum durability classification of built-in components is particularly relevant to the use of wall ties in masonry constructions. AS /NZS 2699.1 classifies the durability of masonry wall ties as:

- R3 - galvanised to a coating weight of at least 470g/m² on both sides, in accordance with AS/NZS 4680
- R4 - stainless steel grade AS 1449/316 or AS 1449/316L

CBPI Manual 2, The Properties of Clay Masonry Units provides further information on the durability of bricks.

AUSTRAL BRICKS™

02. BRICK PROPERTIES AND BRICKLAYING PRACTICES

FRETTING OF BRICKWORK (SALT ATTACK)

Fretting of brickwork is linked to the durability of bricks and directly related to the exposure environment in which they are placed. The fretting (flaking or crumbling) of bricks can be prevented by the adequate maintenance of your wall structure. An extreme case of fretting is shown below.



Fretting is caused by the action of salt migration in the walling system. Water which has salt dissolved in it migrates through the brick to the brick surface. As the brick dries, the salt is left behind and forms a salt crystal. The salt crystals grow in the voids within the brick. As more salt is left behind by the evaporation of water, the salt crystal grows larger and larger. The strength of the growing salt crystal can be stronger than the elements that hold the brick together. If this occurs, the brick face begins to crumble and fall away. This is also true for mortar joints.

For salt attack to occur the following three conditions are required:

- There must be salts present
- There must be water entering the wall
- The water must evaporate from the wall

The absence of any of these conditions will prevent salt attack. The fretting of bricks can be exacerbated at specific locations around a house, which undergo increased wetting and drying cycles. The brickwork will continue to deteriorate unless moisture movement through the masonry is prevented.

When treating fretting, “prevention is the best cure”. The source of the salt may be airborne salt from sea spray or salts that are naturally present in the soil, or introduced by fertilizers and salt-water swimming pools. The use of bore water may also provide the source of the salt.

The first step in treating fretting is to identify the source of the salt and where the salt might be coming from. The best method of preventing fretting is to prevent the salt from being absorbed into the wall. This may be a physical barrier such as plastic sheeting, digging the soil away from the wall or rearranging the sprinklers so that they do not spray directly onto the wall.

Once fretting has begun it will not stop until the salt source is identified and removed. It could then take another 12-24 months before the fretting process comes to a complete halt. Once the fretting process has stopped the brickwork can then be repaired. Any repairs made to the brickwork while the fretting action is still occurring will generally fail.

Fretting brickwork may be treated using breathable sealers that penetrate the brickwork and consolidate loose particles. However, depending on the degree of fretting it may be necessary to render or replace the affected brickwork. For further information, contact Austral’s Technical Department.

EXPANSION

Brick Growth

Bricks undergo long-term permanent expansion over time. This expansion continues for the life of the brick, but the majority of the growth occurs early in its life. Most general purpose bricks have a coefficient of expansion in the range of 0.5-1.5mm/m (millimetres per metre) over fifteen years. Designers can use the values of the coefficient of expansion to accommodate for the growth of bricks by the size and spacing of the control joints.

- The coefficient of expansion, or ‘e’ value, of clay bricks is tested in accordance with AS/NZS 4456.11 and is an estimate of the amount of growth expected in the first fifteen years after the brick leaves the kiln. Typical values are given only as a guide as:
- there is no pattern in the coefficient of expansion based on brick colour or manufacturing methods, and

the coefficient of expansion can vary considerably between batches even within a single brick type, due to variations in the manufacturing process and raw materials used.

For these reasons, Austral Bricks Pty Ltd regularly tests its products to determine the coefficient of expansion in accordance with AS/NZS 4456.11. Recent test data is available from our NATA accredited laboratory.

AUSTRAL BRICKS™

02. BRICK PROPERTIES AND BRICKLAYING PRACTICES

Expansion Gaps

The provision of control gaps or articulation joints between parts of the structure during construction will accommodate movements within the structure over time. Numerous sources of movement exist and include:

- The change in size of building materials with temperature, loading conditions and moisture content
- The differential change in size of building materials (for example, cement products shrink over time, whilst clay bricks expand slowly over time)
- Foundation and footings movement
- Frame movement
- Frame shortening
- Temperature movement
- Internal horizontal and vertical movement

Design of Control Gaps

Typical control gaps should initially be about 20mm wide, clear of mortar dags or bridges, tied at appropriate intervals with flexible ties and sealed with a polyethylene rod or suitable compressible filler. The filler material should be positioned well back from the masonry surface to avoid the filler material becoming visible if the joint contracts.

Common Problems

The typical problems arising with expansion gaps include:

- Inadequate sealing
- Failure to ensure that the gaps are clean and that no hard materials such as mortar droppings are left before sealing
- The use of joint fillers that are too rigid, which have compressive strengths high enough to transfer forces across the joint.

However, these problems can be avoided by good workmanship during construction. Further information on expansion gaps is available in CBPI Manual 10; Construction Guidelines for Clay Masonry.

INITIAL RATE OF ABSORPTION

The initial rate of absorption (IRA) is a function of the size and extent of the porosity of the bricks. The IRA is a measure of how quickly a brick will absorb water. The test method for initial rate of absorption is given in AS/NZS 4456.17.

The ability of bricks to absorb water affects the bond formed between brick and mortar. A tug-of-war occurs between the bricks ability to absorb water and the capacity of the mortar to retain water. If either the brick or the mortar wins, a poor bond will result. Therefore, the water retentivity of the mortar needs to be matched to the IRA of the bricks to ensure that a strong bond forms.

High Suction Bricks

If the brick wins the tug-of-war and the water is absorbed too quickly from the mortar, the cement will not undergo proper hydration. Therefore, if the bricks have high suction the mortar will stiffen in the bed joint before the next course can be properly bedded. To accommodate high suction bricks, a high water retention mortar is required. It may also be necessary to shorten the bed joint or to wet the bricks prior to laying, in order to reduce their suction. However, wetting the bricks may lead to efflorescence in the brickwork (refer to Brick Manual 3 for an explanation of efflorescence). Dry press bricks often have high suction. Dry press bricks can be lightly sprayed with a hose and left until the water has spread throughout the brick before laying.

Low Suction Bricks

If the mortar wins the tug-of-war and retains too much water, the bricks will tend to float on the mortar bed. Low suction bricks may, therefore, make it difficult to lay plumb walls at a reasonable rate. To accommodate for low suction bricks a leaner mortar is required. A lean mortar can usually be obtained by increasing the proportion of washed sand to unwashed sand used in the mix.

For further information on the absorption of water by bricks refer to the CBPI Manual 2, The Properties of Clay Masonry.

AUSTRAL BRICKS™

02. BRICK PROPERTIES AND BRICKLAYING PRACTICES

LIME PITTING

Lime pitting is an imperfection occurring in the surface of a brick due to the expansion of large lime particles just below the surface. The lime originates from the raw materials used in the manufacture of the bricks.

Lime pitting is observed when the lime particles are present just below or on the surface of the brick. The volume expansion of the lime particle, resulting from the presence of moisture, can cause it to pop out of the brick or break the brick surface, generating a defect. An example of a large lime pit is shown below:



Lime pitting is defined in AS/NZS 4456 and the degree of lime pitting can be determined in accordance with AS/NZS 4456.13. Lime pitting is classified by the number and size of lime pits on the face or ends of the brick, as described below:

Nil	No Visible lime pits
Slight	Not more than 5 lime pits, none exceeding 8mm in diameter
Moderate	No pits exceeding 10mm diameter
Severe	Pit or pits in excess of 10mm diameter

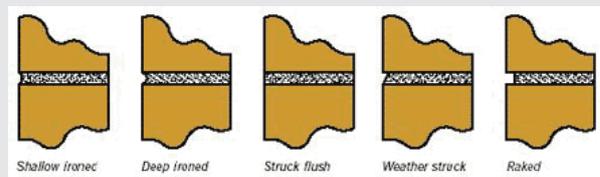
BRICKLAYING

Mortar - Colour and Style

The mortar used to bond bricks together so that the masonry can act as a structural element is no longer just a functional element. Today, the choice of mortar colour and style is just as important as the choice of brick. Mortar generally represents about 15% of the total visible area of brickwork and can dramatically change the look of a building. For example, mortar coloured to match the brick wall will give the impression of a

large area of one colour. Whereas, contrasting mortar colour will highlight the shape of individual bricks.

Mortar joint style also plays a major part in determining the overall appearance of a building. The different styles possible are shown below.



Properly filled and tooled joints improve the durability, weather proofness and sound performance of brickwork. Raked and ironed joints are used to achieve the 'character' look in a new home. Flush joints will increase the impact of the mortar colour when a contrasting colour is chosen. For bricks with a bevelled edge, it is recommended that a raked joint be used. It should be noted that raked or recessed joints should not be used in severe marine environments and should be avoided in applications where durability is critical. Examples of the effect of the choice of mortar colour and style are given below:



(a) Two different mortar colours with the same blend



(b) The effect of mortar joint style on the same brick - flush joint and raked joint respectively

AUSTRAL BRICKS™

02. BRICK PROPERTIES AND BRICKLAYING PRACTICES

Wet sponging of the mortar joints is a common practice with smooth face bricks. Although this creates a smoother joint finish it smears a cement rich mortar film over the brick face, which often develops into staining.

With the amount of mortar colours, brick colours and joints available, the combinations are almost limitless, which means that owners can proudly stamp their style and individuality onto their home. To make the choices easier, Austral Bricks™ has display walls at each selection centre to help show the effects of using different colours and styles of mortar.

Batching Mortar

Unless the proportions of sand, lime and cement that go into a mortar mix are measured with care, it is impossible to be sure if the correct mix has been achieved. In order to ensure that the correct proportion of materials has been used it is suggested that batching be carried out using buckets. A shovel should not be used as the measure during batching, as a shovel is able to hold more sand than cement (as shown in the images below).



(a) Cement

(b) Sand

Mortar Mixes

Mortar mixes are always specified as the proportion of cement to lime to sand. For example, a common mortar made from Portland cement has one part cement, to one part lime and 6 parts of sand is abbreviated C1:L1:S6 or 1:1:6 (the chief cementing agent will always be expressed as one).

The type of mortar mix is classified according to the Australian Standard AS 3700 as M1, M2, M3 or M4. The grade chosen by the masonry designer should match the requirements of the design. AS 3700 lists the deemed-to-satisfy proportions for the various grades. A brief description of the various mixes is given in the table below.

Grade	Mix	Properties	Applications
M4	1:0:4	Durable, low workability (which can be improved with the addition of lime or a water thickener)	Used in reinforced brickwork. (Must be used with Exposure Grade bricks in severe marine environments.)
M4	1:0:4	Durable, low workability (which can be improved with the addition of lime or a water thickener)	Used in reinforced brickwork. (Must be used with Exposure Grade bricks in severe marine environments.)
M4	1:0:4	Durable, low workability (which can be improved with the addition of lime or a water thickener)	Used in reinforced brickwork. (Must be used with Exposure Grade bricks in severe marine environments.)
M2	1:2:9	Quite forgiving and with a good balance between strength, flexibility and permeability. Prone to fading, so not suitable for colouring with pigments	Suitable for internal brickwork, brickwork above a damp-proof course, fireplaces and barbecues.
M1	1:3:12	Weakest of standard composition mortars. Combination of flexibility due to lime and early strength due to cement.	Should only be used for restoration work to match existing construction, e.g. for heritage masonry.
M1	1:3:12	Weakest of standard composition mortars. Combination of flexibility due to lime and early strength due to cement.	Should only be used for restoration work to match existing construction, e.g. for heritage masonry.

The compositions listed are based on the use of GP Portland Cement and GB cement. The use of other types of cement (such as masonry cement) will require different proportions, as the various types are not equivalent. For a more detailed description of the masonry mixes, grades and their applications refer to AS 3700 or to the CBPI Manual 10; Construction Guidelines for Clay Masonry.

AUSTRAL BRICKS™

02. BRICK PROPERTIES AND BRICKLAYING PRACTICES

Mixes for Different Mortar Colours

The table below shows the components required to give

Colour	Sand	Oxide	Cement
Red	Yellow	Red	Grey
Brown	Yellow	Brown	Grey
White	White Bush	-	White
Off White	White Bush	-	Off White
Black	Yellow	Black	Grey
Natural	Yellow	-	Grey
Cream	Yellow	-	Off White
Yellow	Yellow	Yellow	Off White

Weathering and cleaning can adversely affect the colour of the mortar. Pigmented mortars must be strong enough to retain the pigment particles on the face of the joint. In weak mortars, the pigment particles may be rapidly eroded from the face of the joint by wind and rain.

Acid cleaning of brickwork may also degrade pigment colour, leading to faded, patchy and unattractive mortar joints. For durable pigmented mortar always finish the joint by tooling even when a raked joint is required.

Other Mortar Components

The Importance of Lime

The addition of lime to mortar has the advantage of making the mortar workable in the wet state and may eliminate the need for plasticiser admixtures. Mortar containing lime will be less pervious, more durable and more 'forgiving' than a mortar without lime. There is no substitute for the benefits of lime.

Admixtures

The additives permitted by Australian standards (AS 3700) include:

- Plasticisers or workability agents, including air entraining agents complying with AS 1478
- Cellulose type chemical water thickeners
- Colouring pigments complying with BS EN 12878 (a British standard)
- Set-retarding chemical agents complying with AS 1478
- Bonding polymers

Other admixtures cannot be used unless they have demonstrated compliance with AS 3700.

BRICKLAYING PRACTICES

Wall Ties

Wall ties are used to connect the leaves of a cavity wall or to connect a masonry wall to a timber frame or steel stud. The failure of wall ties may result in the masonry falling during an earthquake or in high winds.

It is essential that the wall ties are chosen for the design requirements, as specified in AS/NZS 2699. The durability requirements of AS 3700 (as previously discussed in the durability section) should also be met when selecting the wall ties. For example, the classification R4 needs to be met by the wall ties in severe marine environments. In addition, the installation of the wall ties is critical to the integrity of the system.

The wall ties should be:

- installed at the correct embedment distance and strength in the mortar,
- aligned correctly to prevent water transfer into the building, and
- placed at the required spacings.

Horizontal and vertical spacing of wall ties should not exceed 600mm, whilst features such as openings, control joints and wall edges generally require spacings of less than 300mm. The spacing of the wall ties relies on the individual design. Australian Standard AS 3700 should be referred to for more details on the design and installation of wall ties. A more detailed description of placement of wall ties is available in CBPI Manual 10, Construction Guidelines for Clay Masonry.

Damp-Proof Courses (DPC)

Australian Standard AS 3700 requires that damp-proof courses and flashing be used to prevent the movement of moisture vertically in the masonry and from the exterior of the building to the interior. In addition, the moisture from a cavity should be shed to the outer course by the damp-proof course. A good description of damp-proof courses is available in CBPI Manual 10, Construction Guidelines for Clay Masonry.

AUSTRAL BRICKS™

02. BRICK PROPERTIES AND BRICKLAYING PRACTICES

It is important that the damp-proof course should not be bridged, thereby allowing moisture to travel above the DPC level. The DPC should be exposed out of the face of the brickwork to prevent any moisture paths up the brickwork.

Care should also be taken during the application of a render coating, to prevent the formation of a bridge. The DPC should also be considered during exterior landscaping.

Weepholes

A weephole acts as a drain hole through the brick wall. Weepholes are created during the construction of the brick wall. Weepholes are normally in the first or second brick course above ground level.

Weepholes are required at the head and sill flashing of windows over 1200mm wide and are commonly used for smaller windows also. CBPI Manual 10, Construction Guidelines for Clay Masonry provides descriptions of the different types of weepholes possible.

Prevention of Brickwork Stains

Good workmanship and correct storage of bricks during construction will ensure that a number of potential stains are avoided. In addition, the use of the correct cleaning methods will prevent further problems arising. It is also important that garden beds, paved, concrete or tiled areas should be below the level of the installed damp proof course and that they do not cover the weepholes in your brickwork.

Building any form of structure over your weepholes can restrict the drainage of moisture that penetrates your brickwork. Allowing moisture to enter the brickwork may result in efflorescence, as is discussed in Brick Manual 3.

AUSTRAL BRICKS™

03. BRICK CLEANING AND MAINTENANCE

CLEANING TECHNIQUES

The appearance of a brick building can be permanently spoilt by bad cleaning techniques or by the use of the wrong cleaning agent. For this reason, it is important to ensure that the correct cleaning methods are utilised for the best results and to help reduce the associated problems with brick cleaning.

It is important to remember, that the services of a professional cleaner should be sought if a stain is too large or too difficult to remove.

SAFETY PRECAUTIONS

The chemicals used during cleaning are highly corrosive (some are classified as S6 poisons). The manufacturer's instructions and safety precautions should always be followed when using acids and other proprietary cleaning chemicals. The few points below should be followed to avoid serious personal injury:

- Always wear protective clothing and protective equipment such as gloves, safety glasses, etc.
- Do NOT use high pressure cleaners to apply cleaning chemicals as it is dangerous to the operator and to those nearby.
- Store acid and acid solution in heavy duty plastic containers supplied by the manufacture and ensure that the containers are correctly stored (eg away from children)
- If the cleaning solution comes in contact with the body, irrigate the area with water immediately to remove all traces of the cleaning solution. If irritation continues seek medical advice immediately.

CLEANING MORTAR STAINS WITH HYDROCHLORIC ACID

Hydrochloric acid is only used to remove mortar stains from clay brickwork. Generally, hydrochloric acid **should not** be used to treat any other stains or at any other time during the life of your brickwork. If used incorrectly, it can cause unsightly staining that is more difficult to remove.

In particular, care should be taken to treat any **vanadium** stains prior to cleaning with hydrochloric acid. It is very important that protective clothing be worn and that the safety and chemical storage precautions necessary for working with hydrochloric acid are followed.

The following procedure is recommended when cleaning with hydrochloric acid:

1. All mortar dags should be removed using either a metal or wooden scraper.
2. Protect all areas which may come in contact with the cleaning agent as recommended by the manufacturer of the proprietary cleaner. Special care should be taken with window frames, aluminium dampcourses and gutters.
3. Saturate the area of brickwork to be cleaned and all adjacent areas below with water.
4. Use the correct ratio of hydrochloric acid and water:
 - Light coloured bricks - 1 part hydrochloric acid to 20 parts water
 - Dark coloured bricks - 1 part hydrochloric acid to 10 parts water
 - Under no circumstances should more than 1 part hydrochloric acid to 10 parts water be used. It is better to scrub more vigorously than to use more acid.
5. When cleaning, try not to work in direct sunlight.
6. Always begin at the highest point and work down the wall.
7. Only clean small areas at a time, for example one square metre, so as to allow adequate time to wash off the cleaning solution, to ensure no staining occurs.
8. Allow solution to remain on wall for 3-6 minutes before scrubbing. Be sure not to scrub the joints.
9. Rinse thoroughly, making sure all cleaning solution has been removed.

Note: light coloured bricks should be rinsed with a neutralising solution, such as bicarbonate of soda or washing soda, instead of water.

Note: Bricks manufactured in Queensland, especially light-coloured bricks, may be more susceptible to acid burn, due to large amounts of iron oxide present in the raw materials. The following ratio could be substituted into Step 4 when acid cleaning these bricks: 1 part hydrochloric acid, 1 part phosphoric acid and 10 parts water. Contact Austral's local technical department for further details.

Further details of the recommended cleaning procedure and the various techniques used are available in the CBPI Cleaning Clay Masonry Code of Practice.

AUSTRAL BRICKS™

03. BRICK CLEANING AND MAINTENANCE

Hand Cleaning

Hand cleaning is appropriate for small jobs or for when the use of a high pressure water jet is likely to cause damage. Dry press bricks should be generally cleaned by hand. The following procedure should be followed:

1. Allow mortar to harden (clean 24-36 hours after completion of masonry work) and remove any large mortar particles with hand tools.
2. Protect adjacent materials as recommended by the manufacturer of the proprietary cleaner.
3. Saturate the wall with clean water. Never let the wall dry out during cleaning; work on small areas.
4. Test a small unseen section prior to full-scale cleaning.
5. Apply the acid solution (as described previously) to the wall using a brush or spray.
6. Allow solution to remain on wall for 3-6 minutes before scrubbing vigorously.
7. Rinse thoroughly as small areas are cleaned.

High Pressure Water Jet Cleaning

High pressure water jet cleaning can be used on clay masonry, but precautions must be taken so that the bricks and the mortar joints are not damaged by the process. The following procedure should be followed:

1. Allow to mortar to harden (must be older than 3 days) and remove any large mortar dags with appropriate hand tools
2. Protect adjacent materials as recommended by the manufacturer of the proprietary cleaner.
3. Saturate the wall with clean water. Never let the wall dry out during cleaning; work on small areas.
4. Test a small unseen section prior to full-scale cleaning.
5. Apply acid solution (as described previously) by hand. **Applying chemicals with high pressure cleaners is dangerous and is NOT recommended for safe and successful cleaning.**
6. Wash the wall with high-pressure water after allowing the solution to remain on the wall for 3-6 minutes. When operating the equipment ensure to:
 - Keep pressure low - maximum 7000kPa (approximately 1000psi)
 - Use a wide fan spray nozzle (15°)

- Operate the nozzle at generally 500mm from the wall or never closer than 300mm
- Use 'runs' of approximately 1m in width and double clean to ensure the best clean
- Keep the gun moving constantly or surface abrasion in one spot will result

Warning: If the mortar joints or the bricks are being damaged, either the pressure is too high or the water jet is too close to the wall.

It is strongly recommended that a test area should be used to check the impact of the high pressure cleaning on the bricks and mortar. High pressure cleaning is NOT recommended for dry press bricks and increased care should be taken with slurry coated bricks. Examples of the damage that can be caused by high pressure cleaning dry press bricks are shown below.



(a) dry press brick damage due to high pressure cleaning

(b) damage resulting from the use of a turbo head

Cleaning Internal Brickwork

Extra care should be taken when using hydrochloric acid to clean mortar stains on internal masonry. Acid fumes produced during cleaning should be ventilated adequately. The likelihood that the acid fumes will persist into the period of occupation can be reduced by:

- Cleaning the internal masonry early in the construction period, thereby allowing the walls to be rinsed sufficiently
- Ensuring adequate ventilation apply a neutralising solution to the wall

AUSTRAL BRICKS™

03. BRICK CLEANING AND MAINTENANCE

EFFLORESCENCE

Efflorescence is a powdery deposit of salts which forms on the surface of bricks and mortar. It is usually white but efflorescence can be yellow, green or brown. A temporary efflorescence is particularly common on new brickwork as soluble salts are transported to the surface of the brickwork by water. The picture below shows efflorescence on brickwork.



Efflorescence can occur from a variety of sources. New bricks contain minimal, if any, soluble salts, but mortar and concrete have relatively high soluble salt contents. Ground waters that are naturally salt-bearing can be drawn into base brickwork. A faulty or bridged damp-proof course (refer to Brick Manual 2) will allow the salts to migrate up the wall. Render that has been applied over a damp-proof course can also allow salt to migrate up the face of the brickwork. Water allowed to enter uncovered cavity walls during construction is also likely to cause efflorescence, so brickwork must be protected from water entry during construction.

The amount of efflorescence that occurs is related to the amount of water in the bricks, and their drying time. The more water in the bricks, and the longer it is there, the more chance salts will have to dissolve and be brought to the surface as the bricks dry out.

Efflorescence on new brickwork may be unsightly, but it will not cause damage unless it persists for a long time. Persistent efflorescence should be taken as a warning that water is entering the wall through faulty copings, damp-proof courses or pipes. If allowed to continue unchecked, the salts carried to the face of the wall may eventually attack the bricks and cause deterioration (refer to fretting within this page).

Remedy

Laying dry bricks and providing good ventilation to speed up the drying process after the bricks have been laid can minimise efflorescence. Forced ventilation and heating of the premises may be necessary to ensure drying during cold winter months. The best removal method is simply to brush off the deposit with a stiff dry bristle brush after the wall has dried out.

Collect the removed salts with a dust pan or a vacuum cleaner to prevent the salts re-entering the brickwork. Alternatively, an absorbent cloth could be used to sponge down the surface. Use only a small amount of water and rinse the cloth in clean water regularly to remove the salts.

Wetting the wall by methods such as hosing usually dissolves efflorescence back into the brickwork, allowing it to reappear again when the wall dries out. Acid or alkaline treatments are not recommended as they do more harm than good because they add to the total salt content of the wall. The application of kerosene or oil does little or nothing to hide the efflorescent salts and prevents their subsequent removal by brushing and washing.

BRICKWORK STAINS

This manual gives a description of a number of typical stains. The CBPI Cleaning Clay Masonry Code of Practice can be referred to for a detailed description of the typical stains and techniques used to clean brickwork. Always wear protective clothing and take the safety measures recommended by the chemical supplier when using any chemicals to clean the stain.

Cleaning Procedure

1. Identify the type of stain. Make sure you know the type of stain you are trying to remove, to ensure you are using the most effective cleaning method.
2. Select the correct cleaning method. Once you have identified the stain, use the appropriate cleaning method to remove the stain.
3. Follow the procedures. Follow the written instructions as well as those shown on the labels of proprietary cleaners. A good tip is to clean a small test area first, this will ensure that the cleaning method is working and not causing further damage.

AUSTRAL BRICKS™

03. BRICK CLEANING AND MAINTENANCE

4. Safety precautions are essential. Make sure you thoroughly read the safety precautions for the chemicals used, which should be provided by the chemical company. Wear protective clothing and equipment and ensure that chemicals are stored safely (refer to the chemical company for details).

INSOLUBLE WHITE DEPOSITS (SCUM)

Insoluble white deposits appear almost as a milky film on the brickwork. The hard white deposits are insoluble in water and are invisible when wet. Do not confuse these deposits with efflorescence, which is soluble in water. An extreme example of insoluble white deposits is given below.



Most commonly this staining can arise from the products of the setting reaction of Portland cement, which are leached out of concrete elements such as sills, lintels, copings, cement render or from insufficiently-dense mortar. They combine with carbon dioxide from the atmosphere to form white deposits that are insoluble in water but soluble in dilute hydrochloric acid.

The combination of clay from the mortar with calcium and silica residues from the cement forms calcium silicate, which could also produce the insoluble white scum. Calcium silicate is highly insoluble in most acids and is white in colour. When wet these calcium deposits are invisible. Kaolin, a clay mineral present in most bricklaying sands, can also form a hard deposit. It is insoluble in most acids except hydrofluoric acid (which is a restricted product).

However, the main cause of these insoluble white deposits is bad cleaning practice; allowing mortar made with sand containing too much clay to remain too long on the surface of the bricks and then removing it with too much acid and/or too little water. Refer to the section on mortar stains within this page for details on the correct method of cleaning with acid.

When not enough water is used before and after the acid wash, the products of the reaction between the acid and the mortar can be absorbed into the face of the bricks instead of being washed off the wall.

Remedy

Apply full strength Noskum to stained bricks and allow the solution to stand for four to six minutes if the reaction is not immediate. Scrub vigorously and wash off with plenty of water whilst still scrubbing. There is no guarantee that this will resolve the problem in severe cases, as scum is extremely hard to remove.

AUSTRAL BRICKS™

03. BRICK CLEANING AND MAINTENANCE

IRON STAINS (ACID BURN)

Dark patches (usually yellow to deep brown in colour) of iron oxide staining can occur on the face of the brick or in the mortar joints. Iron stains are more noticeable on light coloured bricks and in the mortar joints of dark coloured bricks.



Iron Staining on Brick Faces



Iron Staining in Mortar Joints

'Acid burn' is caused by the use of an incorrect cleaning procedure when treating mortar stains with hydrochloric acid. The acid reacts with iron oxides in bricks or mortar to cause the stains. Common errors in the cleaning procedure include:

- Insufficient pre-wetting of the wall prior to applying hydrochloric acid
- The application of an acid solution that is too strong
- Insufficient rinsing of the brickwork following cleaning

Staining can also be caused by contact with rusting iron or steel such as lintels, nails and bolts, railings and packaging straps. Regular wetting from bore water used for irrigation and by welding splatter from welding near brickwork may also cause iron staining.

Remedy

Acid burn stains can be treated using a solution of phosphoric acid, in the ratio of one part acid to four parts water. The solution should be applied and allowed to stand. The stain will normally disappear in 30 minutes to 24 hours.

The treated area should be washed off and then neutralised. A solution of sodium bicarbonate should be applied to neutralise

the area and should not be washed off. Proprietary neutralisers such as Neutril are also available.

An oxalic acid solution of 20-40 grams per litre of water is another solution that could be used in the place of phosphoric acid. However, the substitution of oxalic acid for phosphoric acid is not commonly performed. After the application of either solution, the area should be neutralised as described previously. Proprietary cleaners, such as Noskum, could also be used to treat iron stains.

Phosphoric acid will bleach any iron oxides used as colouring pigments. For this reason pigmented mortars will fade, so the entire wall will need to be treated to maintain a uniform appearance. Alternatively keep the solution off the mortar.

VANADIUM STAINS

Vanadium stains are evident by a yellow-green discolouration on the face of a brick resulting from the vanadium salts naturally present in most clay materials used to produce light coloured bricks.

Vanadium stains are not powdery crystalline deposits and cannot be simply brushed off. They are often mistaken for moss or algae, which usually grows in damp areas across the whole face of the bricks and mortar. By contrast vanadium stains (as shown below) appear on dry walls, normally as patches on the brick only. Vanadium is a metallic salt present in most light coloured clays throughout the world. It is present in very small quantities.



Vanadium salts are put into solution by excess water migrating through the bricks and are brought to the surface as the bricks

AUSTRAL BRICKS™

03. BRICK CLEANING AND MAINTENANCE

dry out. As the water evaporates from the drying bricks the vanadium salts are left on the brick surface. The vanadium salt turns green when it crystallises in an acidic environment, such as after acid cleaning or upon exposure to rainwater (naturally acidic). Vanadium salts are colourless until they are exposed to an acidic environment.

This process can occur whenever the bricks are subjected to excessive water from rain either before or (more often) during the bricklaying process. If vanadium stains are not removed prior to cleaning with hydrochloric acid (for the removal of mortar stains), they may turn a darker colour and be more difficult to remove.

These stains are neither harmful, nor permanent and do not indicate any defect in the product. They are a thin film on the surface of the brick or paver and will weather away with time. However, the removal of the stains can be hastened by chemical treatment.

Remedy

Hydrochloric acid should not be used, as it will aggravate the problem. There are a number of different methods for removing vanadium stains, including:

- **Method 1:** Spray or brush on sodium hypochlorite (found in household bleach or pool chlorine) onto the stain without wetting the area initially. Allow the solution to stand until the stain disappears and then rinse with water.
- **Method 2:** Apply a solution of oxalic acid (20-40 grams per litre of hot water) to bricks that have not been pre-wetted. Finally, neutralise the acid with a solution of 15 grams per litre of washing soda (or suitable neutraliser). Do not wash off the neutralising agent. Neutralising is very important, as further staining could result if this step is omitted.
- **Method 3:** A solution of potassium or sodium hydroxide (150 grams per litre of water) could also be applied to the stain. Wash off the solution and any white residue formed once the stain has disappeared.

Proprietary cleaners, such as Noskum, could also be used to remove the vanadium stains. Apply Noskum to the dry bricks.

Wash off after the stain disappears and neutralise with a 15 grams per litre solution of washing soda (or suitable neutraliser).

OTHER COMMON STAINS

Most common stains can be removed by scrubbing with a stiff brush and an industrial strength detergent. High pressure water cleaning can be used, but there is the risk that you will remove the mortar or damage the surface of the bricks, especially with new masonry. If the stains persist there are a number of chemicals that can be used to treat and remove the stains. Some of the simpler, more effective chemical treatments are described below. The CBPI Cleaning Clay Masonry Code of Practice provides detailed descriptions of the cleaning techniques used for common stains. If staining persists after applying these chemicals, further options may be available by consulting Austral Bricks™.

Adhesive Tape

Wipe with a suitable solvent, such as petrol, or a paint stripper agent.

Bitumen and Tar

Scrape off the excess material and scrub the surface with scouring powder and water. Chilling the surface with ice or solid carbon dioxide (dry ice) can assist removal. These stains usually need two treatments with a commercial emulsifying agent (or degreaser). First, mix the emulsifier with kerosene to remove the stain. Then clean the kerosene off, with emulsifier mixed only with water.

Blood

Wet the stain with water then cover it with an even layer of hydrogen peroxide powder. Sprinkle with water or cover with a water soaked bandage and leave for five minutes. Scrub vigorously with clean water and then neutralise using a five percent solution of acetic acid (vinegar) and rinse with water at the end of the treatment.

Coffee Stains

Apply a cloth that has been saturated in a solution of one part glycerine to four parts water. When the stain is drawn into the cloth, rinse with water.

Egg

Wipe the stained area with acetone until the stain is removed.

AUSTRAL BRICKS™

03. BRICK CLEANING AND MAINTENANCE

Ink and Biro

Different inks require different treatments. Wipe with white spirits, acetone or apply an acetone poultice to help draw out the stain.

Marker Pens

Wipe off with acetone or a poultice made by mixing acetone and an inert material such as talc, whiting, kaolin or diatomaceous earth. The paste should be applied to the area to be cleaned and washed off when dry. It may be necessary to repeat the process until the marks are gone.

Mortar Stains

Cement stains arise from the presence of mortar residue left on the surface of the brickwork. Mortar stains and dags on bricks can be prevented by removing the mortar before it is set.

Old mortar can be acid treated using the same method as for new mortar. Hardened mortar needs to be scraped and rubbed off as much as possible, with sandpaper or a piece of the brick, before treatment.

The cement stains left by mortar can be removed by scrubbing with a solution of 100ml of hydrochloric acid in 1 litre of water. The brick masonry must be wet thoroughly ahead of the acid treatment and the wall must be hosed off immediately after treatment.

Work on small areas - no more than 1 square metre at a time. Start at the top of the wall and work your way down. Do not leave the acid on for extended periods - 3 to 6 minutes should be enough time. Then thoroughly wash the wall down to remove excess acid. A full description of this cleaning technique is available in the Cleaning Mortar Stains with Hydrochloric Acid section of this manual.

Oil, Grease and Animal Fats

Petrol and lubricating oil stains should be mopped up immediately with paper towels. Wiping should be avoided as it spreads the stain and tends to force oil into the masonry. Hardened oil must be scraped off. The area affected should then be covered with a dry absorbent material such as diatomaceous earth, fine white clay, kaolin or whiting then brushed off. The procedure should be repeated until no more improvement can be seen. Any residual stains can be treated with a commercial oil stain remover, or with a mixture of kerosene, detergent and hot water.

Organic Growths - Fungus, Mould and Moss

Porous masonry may provide an environment for organic growth when it is continuously moist, especially in light but shady conditions and when there are plenty of nutrients available. If brickwork is continuously moist, inspect the downpipes and the damp proof courses for possible sources of the problem. If the brickwork dries, organic growth should not occur.

Clean off the growth as much as possible with a dry bristle brush. Organic growths should be treated with liquid chlorine, or common household chemicals such as Exitmould and WhiteKing or a proprietary weed killer. The solution should be left for several days and then brushed off with hot water and detergent. Repeat as necessary.

Paint and Graffiti

These can be difficult stains to remove, particularly if they have aged. Therefore, it is best to treat them when fresh. Specialty graffiti removal products are also available to assist in the removal of these stains.

Wax Crayon: can usually be removed with acetone. It should be applied with a rag or tissue on smooth surfaces or with a small brush on textured surfaces. If it tends to spread, try using a poultice and brush off when dry.

Acrylic Paint: a commercial paint remover should be used.

Oil-Based Paints or Enamels: burn off and follow with scraping and wire brushing.

Fresh Aerosol Paint: a commercial paint remover should be used.

Dried Paint: flood the stained area for a few minutes with a paint remover of the methylene dichloride type. Scrub to loosen the paint film. Flush with water to wash away the loosened paint. Scrub with scouring powder until the stain is removed. Flush with water.

If these methods do not remove the paint a poultice of a strong solution of sodium hydroxide in an inert base should be applied. The poultice should be about 5mm deep and should be left for a day before hosing off.

AUSTRAL BRICKS™

03. BRICK CLEANING AND MAINTENANCE

Soils Mix a strong detergent solution of one cup detergent to five litres hot water. Saturate the area with water and scrub with a bristle brush. Rinse well after cleaning.

Soot and Smoke

Minor stains can be removed with sugar soap. Mix 500g sugar soap with 2 litres hot water and apply liberally with a brush. After stains disappear, scrub with a mixture of detergent and a household scouring powder containing sodium hypochlorite. For stubborn stains treat the area with undiluted sodium hypochlorite for 10 minutes before scrubbing and hosing.

A poultice of sodium hypochlorite solution in an inert base (such as diatomaceous earth) could be used for severely affected areas. The poultice should be left for 1 to 2 days before scrubbing and removing.

Timber Stains

Avoid leaving timber resting against the brickwork as the tannin may leach from the timber and cause staining. Wipe timber stains off with a solution of 120 grams oxalic acid per 4 litres of hot water. Neutralise the wall after this treatment.

CHEMICAL DISTRIBUTORS

Some of the chemicals recommended may be available in a hardware store. There may also be a chemical distributor in your local area who can supply the chemicals required for cleaning brickwork stains. Some of the chemical distributors available include:

- **Marld Ph:** (02) 9736 2233 or (02) 9809 7184
- **APS Chemicals Ph:** (02) 9839 4000
- **Glendale Chemicals Ph:** (02) 9756 2300
- **Deschem Ph:** (03) 9889 4278
- **Calmarc Ph:** (08) 9378 2022

NB: Noskum is available from the chemical supplier Marld.



PLASTERBOARD

INSTALLATION MANUAL

NEW ZEALAND



PREFACE

USG Boral Building Products is a plasterboard and ceilings Joint Venture between USG Corporation and Boral Limited, and is one of the leading players in this field.

Operating throughout Asia, Australasia and in the Middle East, USG Boral Building Products combines USG's innovative building products technologies with Boral's extensive plasterboard manufacturing and distribution footprint in Asia and Australia.

USG Boral Building Products is well positioned to service the Australasian market through its manufacturing facilities in New South Wales, Queensland, Victoria and Auckland.

For more information on USG Boral Building Products refer to www.usgboral.com

INTRODUCTION

This manual is intended for use by specifiers, plastering contractors and builders. It outlines recommended methods for installation, jointing and finishing of USG Boral plasterboard linings in non-fire rated residential construction including general areas, wet areas, garage ceilings and protected external ceilings.

Refer USG Boral relevant system publications for fire rated and acoustic construction details.

While this manual outlines plasterboard installation specification for timber framed construction, similar installation, jointing and finishing details apply to steel framed buildings. Refer relevant USG Boral publications for steel framed plasterboard construction details.

Installation specifications outlined in this manual apply to Level 4 finish, unless noted otherwise (see Levels of Finish).

TecASSIST®

USG Boral's Product and Systems Development (PSD) team boasts expertise in lightweight fire rated and acoustic systems, and routinely works with customers to select and, if required, tailor solutions for specific projects.

Together with the TecASSIST® customer help line, USG Boral's PSD team is well positioned to provide technical support to projects of any size and complexity.

For expert advice on lightweight Building Systems, contact USG Boral TecASSIST® by calling 0800 USGBORAL (0800 874 267).

STANDARDS

The following Australian, New Zealand and other Standards are referenced in this publication:

- AS/NZS 2588 *Gypsum plasterboard*
- AS/NZS 2589 *Gypsum linings – Application and finishing*
- AS 3740 *Waterproofing of domestic wet areas*
- AS/NZS 4858 *Wet area membranes*
- NZS 3604 *Timber framed buildings*
- NZS 1170.5 *Earthquake actions*
- AS/NZS 1170.2 *Wind actions*
- AS 1397 *Steel sheet and strip – hot dipped, zinc coated or aluminium/zinc coated*
- AS 3700 *Masonry structures*
- AS/NZS 2918 *Domestic solid-fuel burning appliances – Installation*
- AS/NZS 5601 *Gas installations*
- *National Association of steel-framed housing (NASH) standard for residential and low-rise steel framing*
- AS 3566 *Self-drilling screws for the building and construction industries*
- AS 1145.3 *Determination of tensile properties of plastic materials Part 3: Test conditions for films and sheets*
- AS/NZS 1716 *Respiratory protective devices*
- ISO 9001 *Quality systems – Model for quality assurance in production, installation and servicing*
- AS/NZS 2311 *The painting of buildings*
- AS/NZS 4600 *Cold-formed steel structures.*

NZBC COMPLIANCE

USG Boral has all the necessary evidence to support its Plasterboard complies with the relevant provisions of the New Zealand Building Code (NZBC).

USG Boral Plasterboard complies with NZBC:

- Structure B1
- Durability B2
- Spread of Fire C3
- Internal Moisture E3
- Hazardous Building Mat F2
- Ventilation G4
- Airborne/Impact Sound G6

CONTENTS

Plasterboard Linings	4	Masonry Walls	38
Design Considerations	7	Wet Areas	41
Materials	13	Curves and Arches	54
Framing	18	Cornices	56
Linings Layout	19	Jointing	58
Plasterboard Fixing	20	Tools and Accessories	65
Internal Ceilings	21	Decorating Plasterboard Linings	67
Garage and External Ceilings	28	Contacts and Further Information	68
Framed Walls	32		



Figure 1: USG Boral Operations

PLASTERBOARD LININGS

GENERAL

Invented by USG more than 100 years ago, plasterboard has become the most common dry lining material for walls and ceilings in modern building construction.

Manufactured on a continuous production line, plasterboard is comprised of a specially formulated gypsum core encased between heavy duty paper liners. Manufactured in Australia, USG Boral plasterboard products utilise naturally occurring gypsum and 100% recycled paper.

Plasterboard sheets are commonly available in 1200mm and 1350mm widths and have recessed longitudinal edges facilitating a smooth, seamless joint finish.

USG Boral plasterboard products meet the requirements of AS/NZS 2588 *Gypsum plasterboard*.



Figure 2: **Plasterboard Line**

PLASTERBOARD FEATURES AND BENEFITS

- Lightweight
- Cost effective
- Versatile
- Easy to install to timber, steel and masonry substrates
- Provides smooth, stable base for paint and other decorative finishes.

PLASTERBOARD TYPES AND APPLICATIONS

USG Boral supplies a number of plasterboard types to suit various applications:

TABLE 1: USG BORAL PLASTERBOARD PRODUCTS		
PLASTERBOARD TYPE*	THICKNESS	APPLICATIONS
SHEETROCK® Brand Ceiling and Wall Board	10mm	Lightweight ceiling and wall linings
SHEETROCK® Brand Standard	13mm	Lightweight wall and ceiling linings
Wet Area Board™	10mm, 13mm	Tiling substrate in wet areas
Soundstop®	10mm, 13mm	Sound isolation between rooms
Echostop®	12.5mm	Sound absorption within a room
Firestop®	13mm, 16mm	Fire resistant linings
Wet Area Firestop®	13mm, 16mm	Fire resistant linings in tiled wet areas
Multistop™	13mm	Fire and impact resistant linings (moisture and mold resistant options are available)
Flexiboard®	6.5mm	Curved walls and ceilings
Shaftliner™	25mm	Shaft enclosures, separating walls and intertenancy walls
Fiberock® (paperless gypsum board)	10/13/16mm	Fire, impact, acoustic, moisture and mold resistant linings

*Not all board types may be available in all geographic areas

» PLASTERBOARD LININGS

PLASTERBOARD PROPERTIES

DIMENSIONAL STABILITY

Under normal ambient temperature and humidity conditions, plasterboard has the following expansion properties:

Thermal Coefficient of Linear Expansion:

16.2 x 10⁻⁶ mm / (mm°C) at temperature range 4 to 38°C

Hygrometric Coefficient of Expansion:

7.2 x 10⁻⁶ mm / mm%RH (5 to 90%RH)

THERMAL RESISTANCE

The R-values of some USG Boral products are provided in the following table:

PLASTERBOARD TYPE	R-VALUE
10mm Regular plasterboard	0.056m ² K/W ±10%
13mm Regular plasterboard	0.073m ² K/W ±10%
10mm Fiberock®	0.038m ² K/W ±10%
13mm Fiberock®	0.049m ² K/W ±10%

FIRE RESISTANCE

Plasterboard is deemed to be a non-combustible material for the purposes of the New Zealand Building Code.

While plasterboard inherently possesses a certain degree of fire resistance due to the chemical composition of the gypsum core, the following USG Boral products have enhanced fire resistance properties and are specifically formulated for use in fire rated construction:

- Firestop®
- Wet Area Firestop®
- Multistop™
- Fiberock®
- Shaftliner™

FIRE HAZARD PROPERTIES

Wall and ceiling lining materials in certain types of buildings must comply with the Fire Hazard Properties requirements of the NZBC.

All USG Boral plasterboard lining products are classified as Group 1-S (least hazardous) materials and have a smoke growth rate index less than 100 and average specific extinction area less than 250 m²/kg when tested in accordance with ISO 5660.

IMPACT RESISTANCE

USG Boral offers a number of lining products specifically developed for applications requiring enhanced impact resistance:

PRODUCT	RELATIVE IMPACT RESISTANCE
Multistop™	Moderate
Fiberock®	Very high

MOISTURE RESISTANCE

Although plasterboard is not a waterproof material, USG Boral offers a number of lining products classified as moisture resistant under the NZBC requirements for domestic wet areas. These products include:

- Wet Area Board™
- Wet Area Firestop®
- Fiberock®
- Certain types of Multistop™

» PLASTERBOARD LININGS

SUSTAINABILITY

RAW MATERIALS

Gypsum used in USG Boral plasterboard products is mined from abundant resources at Kevin in South Australia. The mine has in place a rehabilitation and revegetation strategy aimed at creating a landscape with natural appearance and native local vegetation.

Plasterboard paper liner is manufactured from 100% recycled waste paper fibre and contains no virgin paper fibre.

Fiberock® gypsum board contains 95% recycled content.

PLASTERBOARD MANUFACTURE

Apart from natural gypsum and recycled paper, the key inputs in the plasterboard manufacturing process are natural gas and potable water.

All USG Boral plasterboard production facilities are certified under ISO 9001 *Quality systems – Model for quality assurance in production, installation and servicing.*

USG Boral aims at exceeding the local Environment Protection requirements and at maximising the use of recycled water at its manufacturing facilities.

EMBODIED ENERGY

As shown in the following table, embodied energy per kg of plasterboard compares favourably with other lining materials:

TABLE 4: EMBODIED ENERGY OF LINING MATERIALS	
MATERIAL	PER* EMBODIED ENERGY (MJ/kg)
Plasterboard	4.4
Fibre cement	4.8
Particleboard	8.0
Plywood	10.4
MDF	11.3
Hardboard	24.2

* PER - Process Energy Requirements.

Source: Building Materials Energy and the Environment, Bill Lawson, The Royal Australian Institute of Architects, 1996.

SAFETY

The following precautions are recommended when installing and finishing plasterboard:

- Avoid creating dust when handling plasterboard or mixing jointing compounds.
- When sanding, minimise the effects of dust by:
 - providing adequate ventilation
 - wearing eye protection
 - wearing a respiratory mask conforming to AS/NZS 1716 *Respiratory protective devices*
 - using mechanical sanding tools fitted with dust extractor and storage bag.
- Keep tools and materials out of reach of children.

In addition, the users should observe Occupational Health and Safety tips contained on the packaging labels for USG Boral products as well as safe manual handling practices.

FIRST AID

- If plaster compound or dust comes into contact with the eyes, wash eyes thoroughly with clean potable water.
- If plaster compound or dust comes into contact with skin, wash skin thoroughly with soap and water.
- If dust is inhaled, move to a fresh air environment.
- If plastering compound or dust is ingested, drink plenty of water.

Material Safety Data Sheets for USG Boral products can be downloaded from www.usgboral.com

In emergencies call **0800 874 267 (USG Boral NZ)**

For poison assistance call **0800 764 766**
New Zealand National Poison Centre

DESIGN CONSIDERATIONS

When designing a house, a number of factors need to be considered to ensure satisfactory long term performance of plasterboard linings:

CONDENSATION

Condensation occurs when warm and humid air comes into contact with cold surfaces.

Condensation on internal building surfaces is more likely to occur where there are large temperature fluctuations and the moisture content inside a house (often generated in a bathroom, laundry or kitchen) is high.

Repeat or prolonged condensation may lead to; nail-popping, sagging ceiling linings, rotting, mould growth, joint and corner cracking and deterioration of internal air quality. If left untreated, condensation may result in structural damage to the building and health concerns for the building occupants.

The following precautions can help minimise internal condensation:

- Keep air spaces well ventilated to promote moisture dissipation, especially in the roof and sub-floor spaces.
- In rooms such as bathrooms, kitchens and laundries exhaust moisture-laden air to the outside of the building and not into the roof or ceiling space.
- Use vapour barriers in conjunction with insulation around the building envelope. Place vapour barrier on the warm side of insulation.
- Use thermal breaks on steel framing members.
- Limit use of unflued gas heaters.

VENTILATION

Roof spaces and building sub-floors should be well ventilated in order to prevent condensation and heat build up (especially in steel framed buildings and dark coloured roofs).

Refer NZBC G4 for ventilation requirements.

Ample air space is necessary for good ventilation in ceiling areas, particularly below metal roofs and skillion roof construction.

USG Boral recommends ventilating unheated roof spaces above ceilings in cold or moderate climates by:

- Using louvres or other approved devices to cross-ventilate roof spaces.
- Ensuring any attic space suitable for use as a habitable room, or walled-off storage area has at least 50% of the required ventilating area located in the upper part of the ventilated space.
- Restricting the unheated space to as near the high point of the roof as possible and above the anticipated level of any future ceilings.

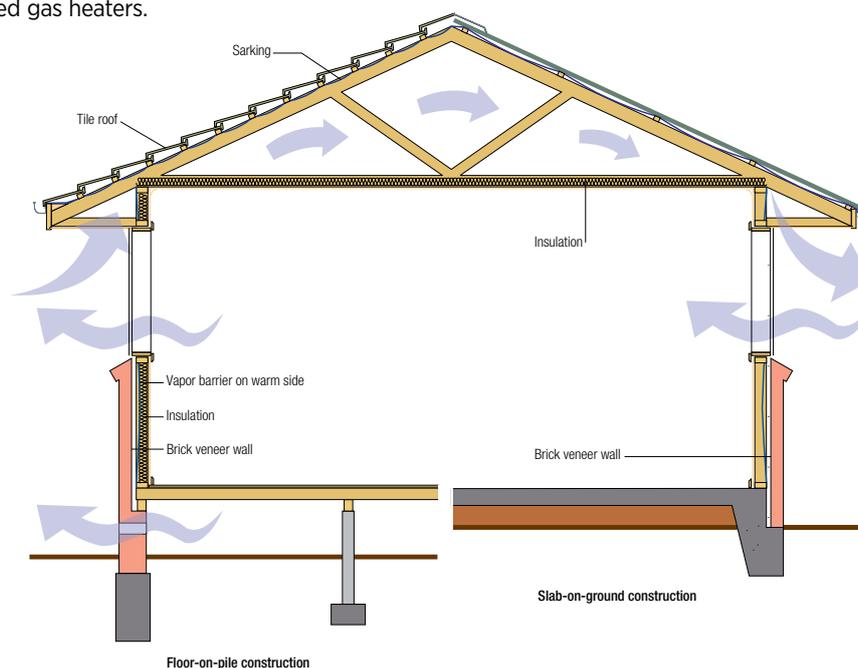


Figure 3: House Ventilation

» DESIGN CONSIDERATIONS

DEVICES GENERATING HEAT

USG Boral Plasterboard does not recommend the use of radiant heating systems continuously subjecting plasterboard ceilings to temperatures in excess of 42°C.

Prolonged exposure to temperatures higher than 42°C may cause changes in the chemical composition of the gypsum core and loss of plasterboard integrity over time.

The following requirements must be followed in order to prevent plasterboard deterioration due to excessive temperatures from heat generating devices:

- NZBC provisions for installation of heating appliances, fireplaces, chimneys and flues
- AS/NZS 2918 *Domestic solid-fuel burning appliances – Installation*
- AS/NZS 5601 *Gas installations*.

In accordance with AS/NZS 5601, gypsum based wall boards within 200mm of the edge of the nearest burner must be protected to a height of not less than 150mm above the periphery of that burner and for the full length of the cooking surface area with a fire resistant facing material. In no case the periphery of the burner should be closer than 140mm to wall linings.

ROOF SARKING

Roof sarking can reduce the risk of condensation and also provides protection from the elements such as wind, dust and rain.

Sarking is strongly recommended under tiled roofs in order to prevent ceiling damage due to rain blowback.

ACOUSTICS

Effective sound isolation is an essential element of functional house design.

Unwanted noise may emanate from external sources such as traffic or neighbouring properties, or from internal sources such as home entertainment systems or plumbing.

Common design factors that can influence the level of noise within a house include:

- House orientation
- Internal layout
- Location of doors and windows
- Placement of power points, downlights and other services penetrations
- Placement of plumbing and heating/air conditioning services
- Location of appliances and audio visual equipment.

The diagram below shows acoustic performance of some USG Boral wall systems:

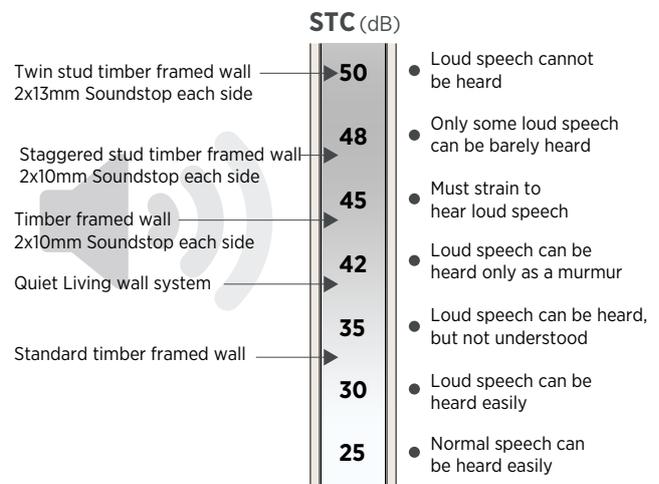


Figure 4: Noise Levels

NOTE:

Acoustic performance of timber or steel framed wall systems can be improved by adding cavity insulation.

» DESIGN CONSIDERATIONS

ATTACHMENTS

A wide range of proprietary fixings are available for attaching light fixtures directly to plasterboard linings. Fixings should be used in accordance with manufacturers' instructions to support the intended loads.

Heavy loads must be fixed directly into the studs or noggings with appropriate fasteners.

The following point loads can be supported directly by Fiberock® linings:

FIBEROCK® THICKNESS	MAXIMUM POINT LOAD PARALLEL TO THE BOARD*
10mm	10kg
13mm	13kg
16mm	16kg

* Loads applied at the head of a single 8 gauge high thread screw inserted sufficiently to allow the parallel thread section of the screw to be in contact with the full depth of the Fiberock® lining.

NOTE:

Wall framing must be checked for its capacity to carry attached loads.

WALLS ON BOUNDARY

According to NZBC, external walls on or in close proximity to the boundary are required to be fire rated (refer NZBC C3.7-3.9 for fire rating requirements). USG Boral OutRwall® lightweight external wall systems have been specifically designed for this application and are available in fire ratings up to FRR 90/90/90.

For more information refer to www.usgboral.com/outrwall

ATTACHED DWELLINGS

Separating walls between attached dwellings must satisfy NZBC fire rating and acoustic requirements.

USG Boral Partiwall® lightweight separating wall systems have been specifically designed to suit New Zealand construction methods and are available in fire ratings up to FRR 90/90/90 and acoustic ratings up to STC 66.

For more information refer to www.usgboral.com/partiwall

CONTROL JOINTS

Apart from bracing walls specifically engineered, plasterboard linings are not designed to withstand stresses due to structural movements or excessive changes in temperature or humidity.

Potential stress build up and cracking can be minimised by incorporating control joints as follows:

- Provide control joints in walls and ceilings at maximum 12m intervals in both directions (max 6m intervals in external ceilings) and at every change of lining material.
- Provide horizontal control joints at mid-floors in stairwells in multi-storey buildings.
- Place plasterboard control joints over movement joints in the substrate or structural elements and at every change of substrate material.
- Utilise floor to ceiling openings as control joints.
- Fit double studs or joists, spaced slightly apart, in the frame at control joint locations (refer Framed Walls – Control Joints on page 35).

» DESIGN CONSIDERATIONS

LEVELS OF FINISH

The term 'Level of Finish' applies to plasterboard linings prior to decoration.

AS/NZS 2589 *Gypsum linings – Application and finishing* defines three levels of finish: 3, 4 and 5. Level 4 is the default level of finish for plasterboard linings, unless specified otherwise.

It is essential that the level of finish is determined at the design stage since each level has specific requirements for substrate tolerances and plasterboard installation, jointing and finishing. The desired level of finish may not be achieved unless all of these requirements are met through various stages of construction.

Levels of finish recommended for various lighting conditions and surface decorations are shown in Figure 5.

For the full description of levels of finish refer AS/NZS 2589. A summary of various levels of finish is provided below:

LEVEL 3

This level of finish is used in areas that do not require decoration or where finish is not important (for example, above ceiling level or inside service shafts and the like).

All joints and interior angles must have tape embedded in the joint compound and one separate coat of joint compound applied over all joints and fastener heads.

Butt joints and recessed joints in walls and ceilings can be on framing members.

LEVEL 4

This is the default and generally accepted level of plasterboard finish. All joints and interior angles must have tape embedded in the jointing compound and a minimum of two separate coats of joint compound applied over all joints, angles, fastener heads and accessories.

Butt joints in walls and ceilings must be between framing members and in certain cases back-blocked. Recessed joints in the ceilings must be back-blocked in any area containing three or more recessed joints.

If Level 4 surface is to be exposed to critical light (see Glancing Light on page 12), it should be covered with textured finishes or wall coverings. Smooth textured finishes and flat/matt or low sheen paints can be used when Level 4 finish is illuminated by non-critical lighting. Flat paints in this situation tend to conceal joints better.

Weight, texture and sheen level of wall coverings and finishes should be carefully evaluated and joints should be adequately concealed if wall-covering material is lightweight, glossy or lightly patterned.

NOTES:

- In critical lighting conditions, surface variations may still be apparent in a Level 4 surface finish.
- Gloss, semi-gloss or deep tone paints are not recommended for Level 4 finish, as they accentuate surface variations.

LEVEL 5

Level 5 finish should be used where gloss or semi-gloss paints are specified or where lining surfaces will be exposed to critical lighting conditions.

Level 5 finish is characterised by a parity of surface texture and porosity. All joints and interior angles must have tape embedded in the jointing compound and a minimum of two separate coats of jointing compound applied over all joints, angles, fastener heads and accessories.

Butt joints in walls and ceilings must be between framing members and back-blocked. Recessed joints in the ceilings must be back-blocked.

The work is finished with proprietary surface preparations or skim coating to remove differential surface textures and porosity. A suitable paint or plaster material (eg USG Boral Tuff-Hide® primer surfacer or Diamond Veneer Finish) is sprayed, rolled or trowelled over the defined area. The surface texture must be random and monolithic, concealing joints and fixing points.

NOTES:

- If Level 5 finish is desired for a decorated plasterboard surface, this must be specified at the design stage.
- Level 5 finish is difficult to achieve and always requires the cooperation of the framer, plasterer and painter in establishing suitable work practices that deliver the agreed painted finish for the given project.
- Some minor surface variations may still be visible in Level 5 finish, however, these will be minimised.
- The surface of the defined area may require sanding to be suitable for decoration.

» DESIGN CONSIDERATIONS

FRAMING TOLERANCES

Maximum deviations in the bearing surface of the finished framing prior to installation of plasterboard linings are as follows:

TABLE 6: FRAMING TOLERANCES* (mm)			
FRAMING AREA	LEVEL 3	LEVEL 4	LEVEL 5
90% of area	4	4	3
Remaining area	5	5	4

* Deviation at any point of the bearing surface of the finished framing when measured with 1.8m straight edge (refer AS 2589).

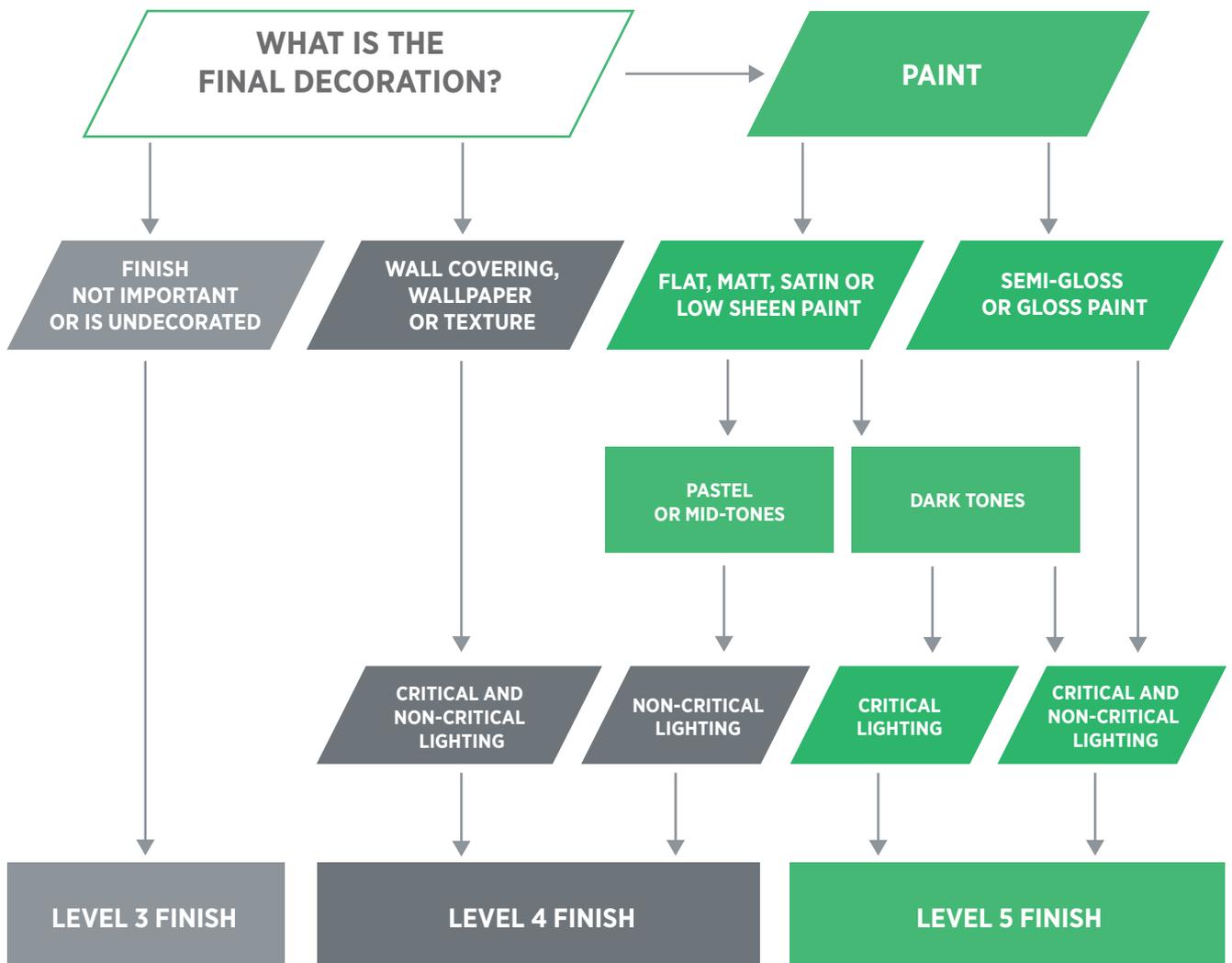


Figure 5: Levels of Finish

» DESIGN CONSIDERATIONS

GLANCING LIGHT

Glancing light is the light that shines across a surface rather than directly at it. Glancing light casts shadows from minute undulations that would not normally be visible in diffuse (non-directional) lighting.

While minor surface variations can always be expected (even with a Level 5 finish) the appearance of flatness will depend predominantly on the amount of glancing light the surface receives and to some degree its intensity and direction.

Some of the worst instances of glancing light occur with ceiling-mounted unshaded light globes and where windows are located close to ceilings or walls allowing sunlight to shine across adjacent surfaces.

In order to avoid the effects of glancing light, it is important to carefully plan selection and placement of windows and lighting during the design phase.

ARTIFICIAL LIGHT

It is recommended that artificial lighting should either be hung below the ceiling surface and fitted with shades, or recessed into the ceiling (ie. downlights).

Positioning of feature lighting, such as spot and flood lights needs to be planned so that light shining across wall or ceiling surfaces is minimised.

Wall mounted lights, shining up on the ceiling, tend to accentuate wall surface variations.

High output lights are more severe in their effect because they create deeper shadows. Similarly, the whiter the light, the stronger the contrast and the greater the perceived surface variations.

Soft, low wattage, diffused lighting provides the most favourable lighting conditions for wall and ceiling surfaces.



Figure 6: Plasterboard surface under normal lighting conditions

NATURAL LIGHT

The effects of natural glancing light can be exaggerated by late afternoon or early morning sunlight as well as reflections from adjacent walls, roofs and water features such as swimming pools, canals and waterways.

Wall surfaces abutting tall, narrow windows facing the sun (or a reflecting surface) are likely to be affected, as will raked ceilings abutting clerestory windows and flat ceilings abutting window heads.

Where a building design cannot be changed, the effects of glancing light can be minimised by using window shades, soft furnishings, curtains, blinds and pelmets.

Avoid using dark, high-gloss paint finishes as they highlight glancing light problems; instead, use light, matt finishes to minimise the effect.

NOTES:

- USG Boral publication *Guide to Lighting and Decoration of Plasterboard* provides further guidance to good lighting and decoration practice.
- High intensity halogen floodlights or fluorescent lights should not be used for visual inspection of interior surfaces as they create unfavourable glancing light conditions.

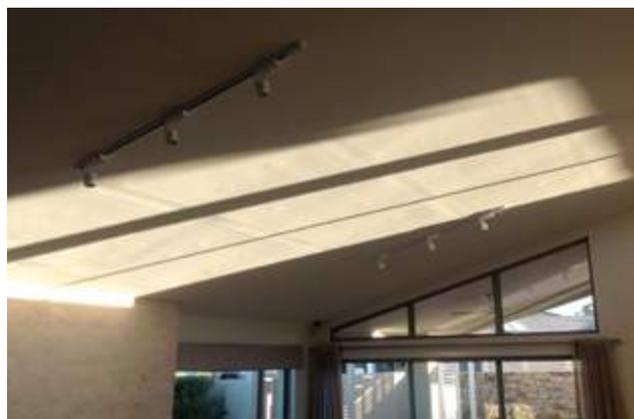


Figure 7: Same plasterboard surface under glancing light

MATERIALS

The following USG Boral products are commonly used in residential construction:

PLASTERBOARD



10mm/13mm SHEETROCK® CEILING & WALL BOARD



13mm/16mm WET AREA FIRESTOP®



10mm/13mm WET AREA BOARD™



13mm MULTISTOP™



10mm/13mm SOUNDSTOP®



6mm FLEXIBOARD®



13mm/16mm FIRESTOP®



10mm/13mm/16mm FIBEROCK®

Figure 8: USG Boral Plasterboards

» MATERIALS

PLASTERBOARD SIZE AND AVAILABILITY

Standard sizes and availability of select USG Boral plasterboard products are shown in the following table:

TABLE 7: SIZE AND AVAILABILITY OF PLASTERBOARD											
PLASTERBOARD TYPE	EDGE PROFILE	THICKNESS (mm)	WIDTH (mm)	LENGTH (m)							MASS. (kg/m ²)
				6.0	4.8	4.2	3.6	3.0	2.7	2.4	
Flexiboard®	RE	6	1200				✓				4.1
SHEETROCK® Ceiling & Wall Board	RE	10	1200	✓	✓	✓	✓	✓	✓	✓	5.9
	RE/SE	10	1350	✓	✓		✓				
SHEETROCK® Ceiling & Wall Board	RE	13	1200	✓	✓	✓	✓	✓	✓	✓	6.9
	RE/SE	13	1350		✓		✓				
Wet Area Board™	RE	10	1200				✓	✓	✓	✓	7.4
	RE/SE	10	1350				✓				
Wet Area Firestop®	RE	13/16	1200				✓				9.6
Firestop®	RE	13	1200					✓	✓	✓	8.2
		16	1200					✓	✓	✓	11.8
Fiberock®	RE	10	1200					✓	✓	✓	10
		13	1200					✓	✓	✓	12

LEGEND:

Edge Profile RE=Recessed Edge, SE=Square Edge

NOTES:

- Not all board types may be available in all geographic areas.
- Size and availability correct as at date of publication.
- Product availability should be checked with the local USG Boral Sales Office as certain products and sizes may only be available on order or in pack lots.
- Refer www.usgboral.com for the full range of USG Boral plasterboard products.

» MATERIALS

DECORATIVE CORNICES



Linear (75mm)



Cairo 2 Step (50mm)



Cairo 3 step (75mm)



Cairo 4 Step (100mm)



Manly (75mm)



Sydney Cove (90mm)



New York (90mm)



Cove (55mm)



Cove (75mm)



Cove (90mm)

Figure 9: **USG Boral Cornices**

» MATERIALS

MATERIAL QUANTITIES

Plasterboard coverage areas and approximate fixing and compound requirements are given in the following tables:

TABLE 8: FIXING AND JOINTING COMPOUNDS PER 100m ² of PLASTERBOARD				
FRAME SPACING	WALLS		CEILING	
	600mm	450mm	600mm	450mm
FIXING METHOD				
Nails only	1250	1490	N/A	N/A
Nails and Adhesives	840 2.9kg stud adhesive	870 4.3kg stud adhesive	N/A	N/A
Screws only	910	1050	1010	1210
Screws and Adhesives	700 2.9kg stud adhesive	750 4.3kg stud adhesive	800* 2.9kg stud adhesive	900* 4.3kg stud adhesive
JOINTING MATERIALS				
Tape	75m			
Base Compounds	16kg			
Finishing Compounds	8kg			

* Conventional fixing method

TABLE 9: BOARD COVERAGE AREA m ²																
WIDTH mm	LENGTH mm	NUMBER OF SHEETS														
		1	2	3	4	5	6	7	8	9	10	20	30	40	50	60
1200	2400	2.88	5.76	8.64	11.52	14.40	17.28	20.16	23.04	25.92	28.80	57.60	86.40	115.20	144.00	172.80
	2700	3.24	6.48	9.72	12.96	16.20	19.44	22.68	25.92	29.16	32.40	64.80	97.20	129.60	162.00	194.40
	3000	3.60	7.20	10.80	14.40	18.00	21.60	25.20	28.80	32.40	36.00	72.00	108.00	144.00	180.00	216.00
	3600	4.32	8.64	12.96	17.28	21.60	25.92	30.24	34.56	38.88	43.20	86.40	129.60	172.80	216.00	259.20
	4200	5.04	10.08	15.12	20.16	25.20	30.24	35.28	40.32	45.36	50.40	100.80	151.20	201.60	252.00	302.40
	4800	5.76	11.52	17.28	23.04	28.80	34.56	40.32	46.08	51.84	57.60	115.20	172.80	230.40	288.00	345.60
	5400	6.48	12.96	19.44	25.92	32.40	38.88	45.36	51.84	58.32	64.80	129.60	194.40	259.20	324.00	388.80
	6000	7.20	14.40	21.60	28.80	36.00	43.20	50.40	57.60	64.80	72.00	144.00	216.00	288.00	360.00	432.00
1350	2400	3.24	6.48	9.72	12.96	16.20	19.44	22.68	25.92	29.16	32.40	64.80	97.20	129.60	162.00	194.40
	2700	3.65	7.29	10.94	14.58	18.23	21.87	25.52	29.16	32.81	36.45	72.90	109.35	145.80	182.25	218.70
	3000	4.05	8.10	12.15	16.20	20.25	24.30	28.35	32.40	36.45	40.50	81.00	121.50	162.00	202.50	243.00
	3600	4.86	9.72	14.58	19.44	24.30	29.16	34.02	38.88	43.74	48.60	97.20	145.80	194.40	243.00	291.60
	4200	5.67	11.34	17.01	22.68	28.35	34.02	39.69	45.36	51.03	56.70	113.40	170.10	226.80	283.50	340.20
	4800	6.48	12.96	19.44	25.92	32.40	38.88	45.36	51.84	58.32	64.80	129.60	194.40	259.20	324.00	388.80
	5400	7.29	14.58	21.87	29.16	36.45	43.74	51.03	58.32	65.61	72.90	145.80	218.70	291.60	364.50	437.40
	6000	8.10	16.20	24.30	32.40	40.50	48.60	56.70	64.80	72.90	81.00	162.00	243.00	324.00	405.00	486.00

» MATERIALS

DELIVERY, HANDLING AND STORAGE

To reduce the risk of damage, plasterboard should be delivered to site just prior to installation.

During handling, sheets should be carried in an 'upright' position with particular care taken to protect the edges.

Plasterboard should be stored in neat, flat stacks off the ground/floor in a dry covered area. This will prevent sagging and minimise damage to board edges and surfaces.

If storing outdoors, stack sheets on a level, moisture-free platform, and keep fully protected from the weather. Ensure the platform can support a load up to 800kg/m³ density.

Plasterboard stacking supports should be spaced at no more than 600mm centres (400mm centres for 6.5mm Flexiboard®).

HOW TO POSITION A LOAD

- Billet width and height should be uniform
- Billet length should correspond to plasterboard width, eg.
 - 1200mm long billets for 1200mm wide plasterboard
 - 1350mm long billets for 1350mm wide plasterboard.

PLACING BILLETS

All billets are to be placed in proper vertical alignment so each tier is evenly supported. If billets are not spaced evenly or in vertical alignment, cumulative pressure on unsupported lower units may cause plasterboard to sag.

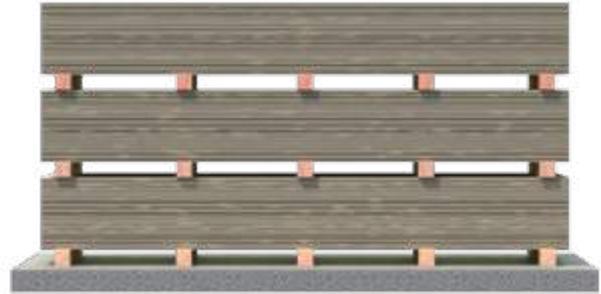


Figure 10: **Correct placement of billets**

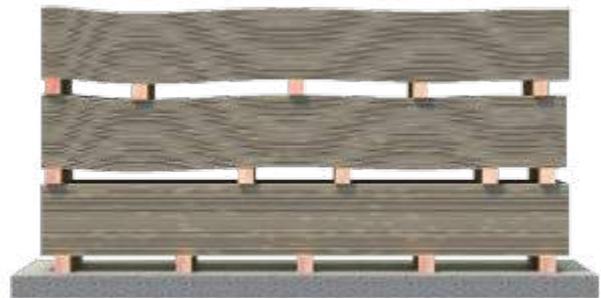


Figure 11: **Incorrect placement of billets**



Figure 12: **How to position a load**

FRAMING

FRAMING CHECK

Prior to installation of plasterboard, framing should be thoroughly checked by builder to ensure that:

- It is plumb, level and square
- Spacing of studs, joists and battens does not exceed the limits specified in the relevant sections of this Manual
- Maximum deviations in the bearing surface of the finished framing do not exceed the maximum tolerances allowed for the required Level of Finish (refer Table 6 Framing Tolerances). Where these tolerances are exceeded, a suitable levelling system should be used
- Noggings supporting services such as taps and cisterns do not protrude beyond the face of the framing
- All openings are framed and ceiling perimeter battens are installed where required
- Trimmers are installed where primary ceiling support members such as girders, trusses and joists, change direction within a room
- All contact surfaces are dry (moisture content <18%), clean and free from foreign materials such as oil, grease and dirt
- Plumbing and electrical services have been installed and do not protrude beyond the face of the framing
- The area is weatherproof.

FIXING FACE REQUIREMENTS

Minimum widths of framing member fixing faces are as follows:

TABLE 10: MINIMUM WIDTHS OF FIXING FACES (mm)		
FIXING FACE TYPE	TIMBER FRAMING	STEEL FRAMING
Supporting a joint	35	32
Other	30	30

Plasterboard can be installed directly over existing linings if they are firm, sound and sufficiently flat for the required level of finish (ensure fixings are of sufficient length by allowing for the thickness of existing linings).

TIMBER FRAMING

Timber framing substrates for plasterboard linings must comply with the current NZS 3604, Timber Framed Buildings.

Roof trusses must comply with NZS3604 and AS/NZS 1170.

- Plasterboard is not to be installed to timber with a moisture content greater than 18% at the time of lining. Generally seasoned or kiln dried timbers such as Radiata Pine meet this criteria.
- Both mechanical fastener only or combination adhesive/ fastener fixing methods can be used for low shrinkage timbers.

STEEL FRAMING

Steel framed plasterboard substrates must comply with AS/NZS 4600 *Cold-formed steel structures*, National Association of Steel-framed Housing (NASH) *Standard for Residential and low-rise steel framing* and AS 1397 *Steel Sheet and Strip – hot dipped, zinc coated or aluminium/zinc coated*.

The framing must be assembled and installed in accordance with the manufacturer’s instructions.

LININGS LAYOUT

- Carefully plan installation. Sheets should be set out to ensure best coverage and to minimise butt joints and waste.
- Wall sheets should be applied horizontally if a level of finish of 4 or 5 is required. Sheeting may be vertical if it covers the whole wall.
- Where possible, sheets should run across doors and windows and be cut out after fixing. The cut-outs can be used to cover small areas.
- Full length sheets should be used where possible to eliminate the need for sheet-end butt joints.
- Where sheet-end butt joints are necessary, they must be positioned between supports.
- Stagger butt joints on adjoining sheets and with those on opposite sides of the wall.
- Vertical joints should be kept a minimum of 200mm from the edge of openings.
- Ceiling sheets should be installed with the long edge at right angles to the direction of the support members.
- Provide control joints in walls and ceilings at:
 - maximum 12m intervals in both directions (max 6m for external ceilings)
 - at every change of lining material
 - over construction joints in the substrate
 - at every change of substrate material.

NOTES:

- Horizontal fixing is the preferred wall sheet orientation for a Level 4 finish as it minimises the effects of glancing light, reduces jointing and places joints at a convenient height for stopping.
 - Noggings are not required behind recessed joints in horizontal applications.
 - The use of panel lifters will assist in placement and fixing of ceiling sheets.
- Where linings are to be used as a bracing element, refer to USG Boral Plasterboard Bracing Manual - NZ for specific layouts and fastening requirements.



Figure 13: Room Layout Option 1

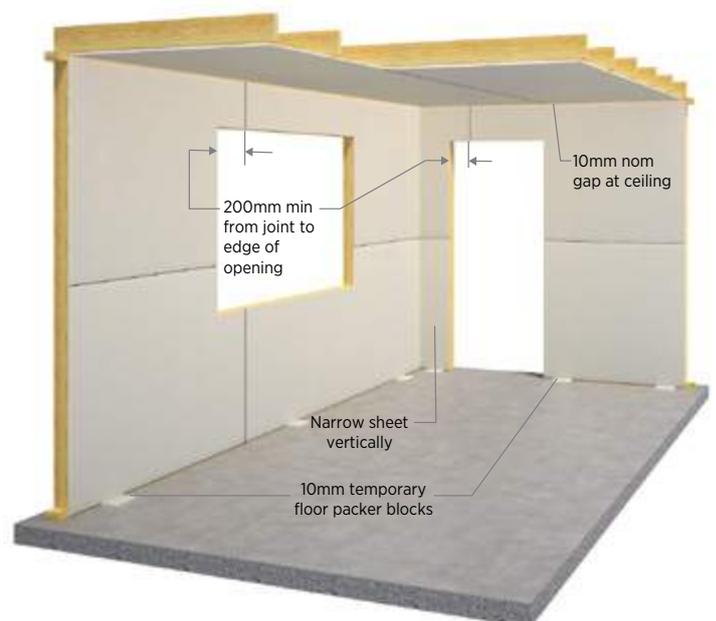


Figure 14: Room Layout Option 2

PLASTERBOARD FIXING

Plasterboard should preferably be applied to ceilings first and then to walls. This will minimise sheet handling and damage.

FASTENING SYSTEMS

Plasterboard should be fixed to framing using one of the following fastening systems:

- Combination of adhesive and fasteners
- Screw fixed only
- Nail fixed only.

NOTES:

- The combination adhesive and fastener system is the preferred option for general applications.
- Use a fastener-only system on walls that are to be tiled or that may carry surface-mounted items such as mirrors – do not use adhesive.
- Stud adhesive does not constitute a fixing system on its own and must be used in conjunction with screws or nails.
- Avoid fixing plasterboard linings before the installation of ridge capping and the enclosure of gable ends.

GENERAL SCREW AND NAIL FIXING

- Plasterboard sheets must be held firm against framing while driving fasteners
- Screws and nails should be slightly overdriven to allow for stopping but should not break the face paper
- Screws and nails should be positioned 10–16mm from sheet edges and ends
- Screws should be selected from Tables 11 and 12
- Nails should be selected from Tables 13 and 14
- Screws used for plasterboard fixing must comply with AS 3566 *Self-drilling screws for the building and construction industries. Part 2: Corrosion resistance requirements*.
- For bracing fixing, refer to USG Boral Plasterboard Bracing Manual - NZ for specific layouts and fastening requirements

PLASTERBOARD FASTENERS

SCREWS

TABLE 11: PLASTERBOARD SCREWS

SCREW TYPE	APPLICATION
W 	Wood/timber only
S 	Steel BMT* up to 0.75mm
D 	Steel BMT* 0.75 - 2.00mm
L 	Plasterboard laminating

* BMT - Base Metal Thickness

TABLE 12: SCREW LENGTH (mm)

PLASTERBOARD LINING	TIMBER	METAL
1x10mm	25*	25
1x13mm	30	25
2x10mm	40	30
2x13mm	50	40

* Min 30mm W screws must be used for ceilings direct fixed to timber framing

NAILS

TABLE 13: PLASTERBOARD NAILS

NAIL TYPE	APPLICATION*
Gold Passivated LH Smooth Shank 	Softwood Wall framing
Gold Passivated LH Ring Shank 	Softwood Wall framing
Galvanised LH Smooth Shank 	Hardwood Wall framing
Galvanised LH Ring Shank 	Softwood Wall framing

* USG Boral does not recommend nail fixing of ceiling linings

TABLE 14: NAIL LENGTH (mm)

PLASTERBOARD LINING	SMOOTH SHANKED NAILS		ANNULAR RING SHANKED NAILS	
	SOFTWOOD	HARDWOOD	SOFTWOOD	HARDWOOD
1x10mm	40	30	30	-
1x13mm	40	30	30	-
2x10mm	50	50	-	-
2x13mm	65	50	-	-

INTERNAL CEILINGS

CEILING LOADS AND SPANS

Plasterboard spans and loads directly supported on ceiling linings must not exceed the maximum values indicated in the following table:

TABLE 15: MAXIMUM LOADS AND SPANS FOR INTERNAL CEILINGS					
PLASTERBOARD TYPE	SPAN (mm)	MAXIMUM TOTAL LOAD* FOR GIVEN WIND SPEED (kg/m ²)			
		LOW	MEDIUM	HIGH	VERY HIGH
10mm SHEETROCK® Brand Ceiling & Wall Board	600 (max)	2.6**	2.6**	2.0	2.0
13mm SHEETROCK® Brand Standard	450	2.6**			
10mm Wet Area Board™	450 (max)	2.0			

* Total Load includes weight of insulation and any fixtures directly supported on ceiling linings.

** 1/3 Fixing method must be used if directly supported load exceeds 2.0kg/m² (maximum load 2.6kg/m²).

NOTE:

Loads in excess of the above must be supported independently from a roof or ceiling structure.



Figure 15: Finished internal ceiling

» INTERNAL CEILINGS

CEILING SUPPORT OPTIONS

There are two general support options for ceiling linings:

1. Direct fixed, where sheets are fixed directly to structural ceiling members. If plasterboard is direct fixed to structural ceiling members, trimmers are to be installed by the builder where primary ceiling support members such as girder trusses and joists change direction within a room.
2. Furred or battened fixing, where sheets are fixed to secondary framing members, such as metal or timber battens or metal furring channels installed in the opposite direction to structural members.

NOTES:

- Experience has shown that metal battens or furring channels will generally produce a superior ceiling and it is the recommended method for use under trussed roofs subject to significant structural movements and for ceilings with square set finish.
- Ceiling battens and furring channels should stop at least 10mm clear of non-load bearing internal walls as not to impede truss or floor joist deflection.
- End-to-end joints in USG Boral battens should be made using appropriate details (ref page 23). Stagger adjacent end-to-end joints between different framing members.
- For ceiling diaphragms refer to USG Boral Plasterboard Bracing Manual - NZ.

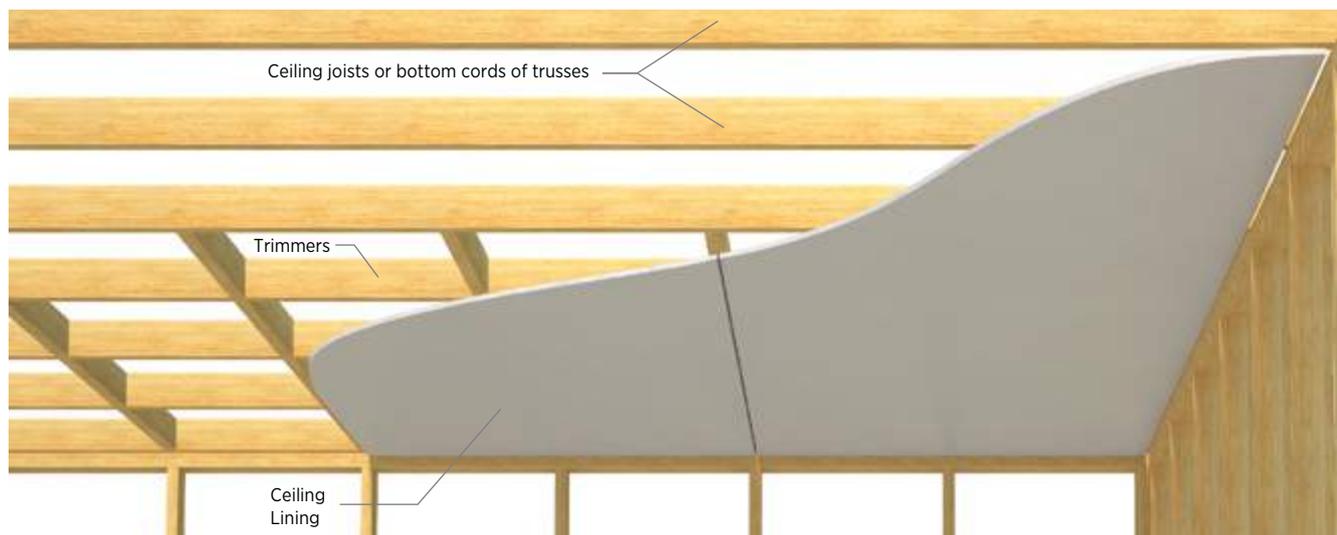


Figure 16: **Direct Fixed Ceiling**



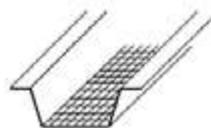
Figure 17: **Furred Ceiling Direct Fixed**

» INTERNAL CEILINGS

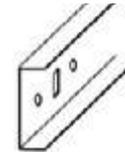
METAL SUSPENDED OR DIRECT FIXED SYSTEMS

USG Boral recommends the following metal components and systems for plasterboard ceilings:

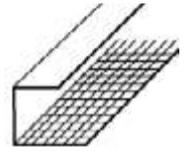
ScrewFix® Furring Channel System



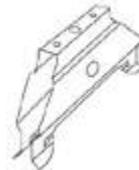
FC37 Furring Channel



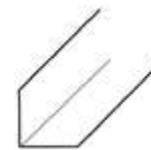
DJ38 Strongback



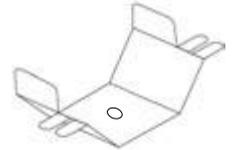
PC24 Perimeter Channel



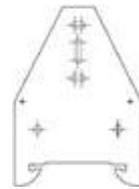
SC37 SnapFix Clip



DJ4040 Angle



FS37 Furring Strap

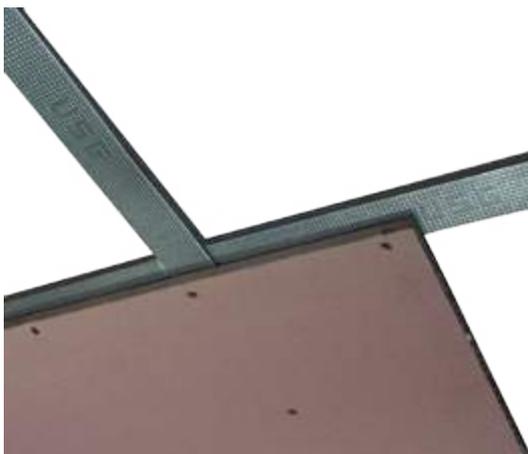


DF37-S Direct Fix Clip



DF37-L Direct Fix Clip

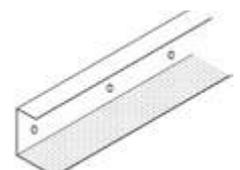
USG Boral Drywall Grid System



DGL40D-3600 Main Tee
DGLW40D-3600 Main Tee



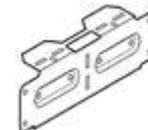
DGW40D-600/1200
Cross Tee



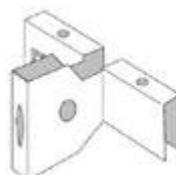
PC40 Perimeter Channel



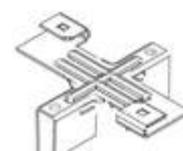
DGTG-90 Transition Clip



DGSC-90 Splice Clip



DG-DX Transition Clip



DGMT Strongback Clip



DFS - 200 Direct Fix Clip

Figure 18: USG Boral Ceiling Components

» INTERNAL CEILINGS

CONTROL JOINTS

- Control joints must be provided in internal ceilings at max 12m centres in both directions.
- Ceiling battens should be discontinued at control joint locations.
- Control joints can be formed by fitting USG Boral Zinc Control Joint #093 or plastic expansion beads that leave a neat, clean and flexible joint (see Control Joint installation instructions on page 35).

NOTE:

Proprietary control joint sections are designed to accommodate normal expansion/contraction movements in plasterboard linings and substrates, and not significant structural movements. Other solutions may be required in such situations.

FIXING TO CEILINGS

FIXING WITH COMBINATION OF ADHESIVE AND SCREW FASTENERS

General Fixing Notes

- Framing members should be clean and free from dust, dirt, grease and surface moisture.
- Refer to *General Screw and Nail Fixing* on page 20.
- Stud adhesive daubs should be approx 25mm diameter x 15mm high.
- Do not use adhesive at sheet ends.
- Keep daubs 200mm (nom) from sheet edges.
- Keep daubs 200mm (nom) from screw points.
- It is recommended that at sheet ends screws are spaced at 300mm maximum centres for cornices and 150mm maximum centres for square set finish.

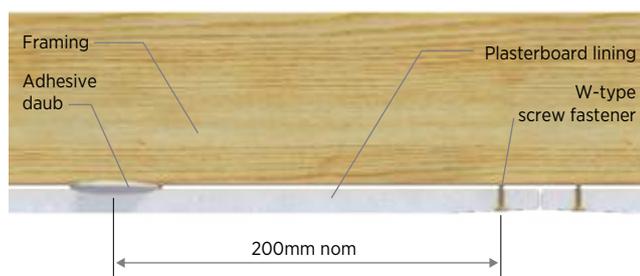


Figure 19: Adhesives and screw fasteners at sheet edges

ADHESIVE AND FASTENER LAYOUT

1/3 Fixing Method (Preferred)

Space fasteners at 1/3 points across the width of the sheet and daubs half way between fasteners.

Conventional Method (non-braced linings)

Use double fasteners along the sheet centreline and space daubs between the fasteners at 230mm maximum centres.

Ceiling fastener and adhesive layouts for both methods are shown in the table below.

SHEET WIDTH	CONVENTIONAL FIXING	1/3 FIXING
900mm	FAF/FAF	FAFAF
1200mm	FAAF/FAAF	FAFAFAF
1350mm	FAAF/FAAF	FAFAFAF

Legend: F = screw F/F = double screws A = adhesive

NOTES:

- USG Boral plasterboard has lines printed on the face of the sheet to guide fixing.
- When using conventional method, temporary fasteners (nails or screws driven through plasterboard blocks to hold sheets in place while adhesive cures) should be installed at every second framing member and remain for at least 24 hours.

FIXING WITH SCREWS ONLY

- Space screws at maximum 300mm centres across the width of the sheet.
- At sheet ends space screws at 300mm maximum for cornices and 150mm maximum for square set finish.
- Refer to *General Screw and Nail Fixing* on page 20.
- Refer Table 21 and Figure 22 for the number of screwing points across the sheet width.

SHEET WIDTH	SCREW POINTS
900mm	4
1200mm	5
1350mm	6

Note: Screw points should be equally spaced

» INTERNAL CEILINGS

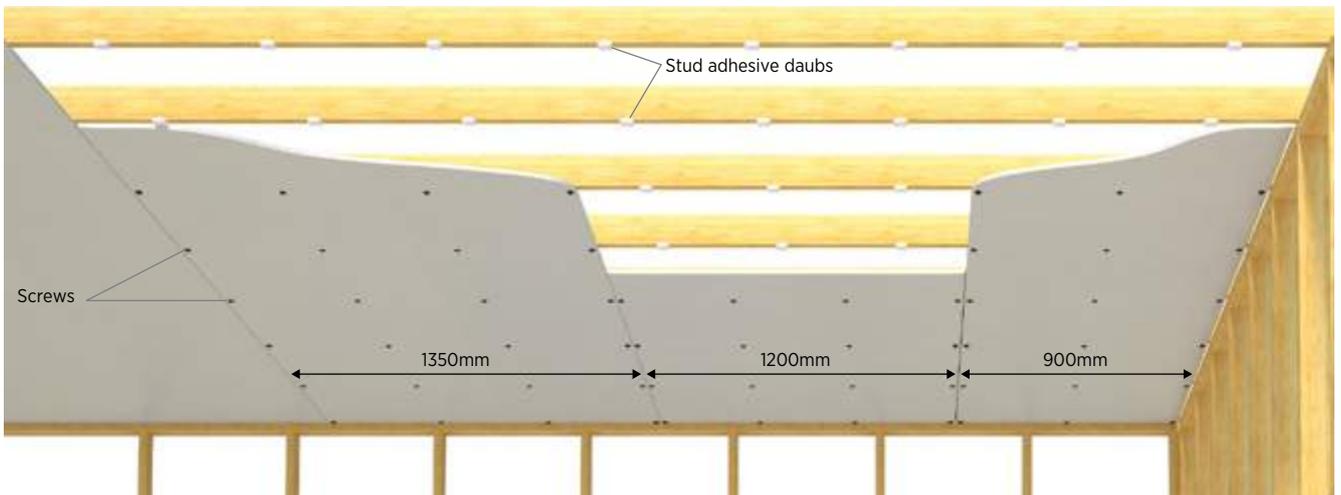


Figure 20: **Combination adhesive and screw fixing to ceilings - 1/3 fixing method**

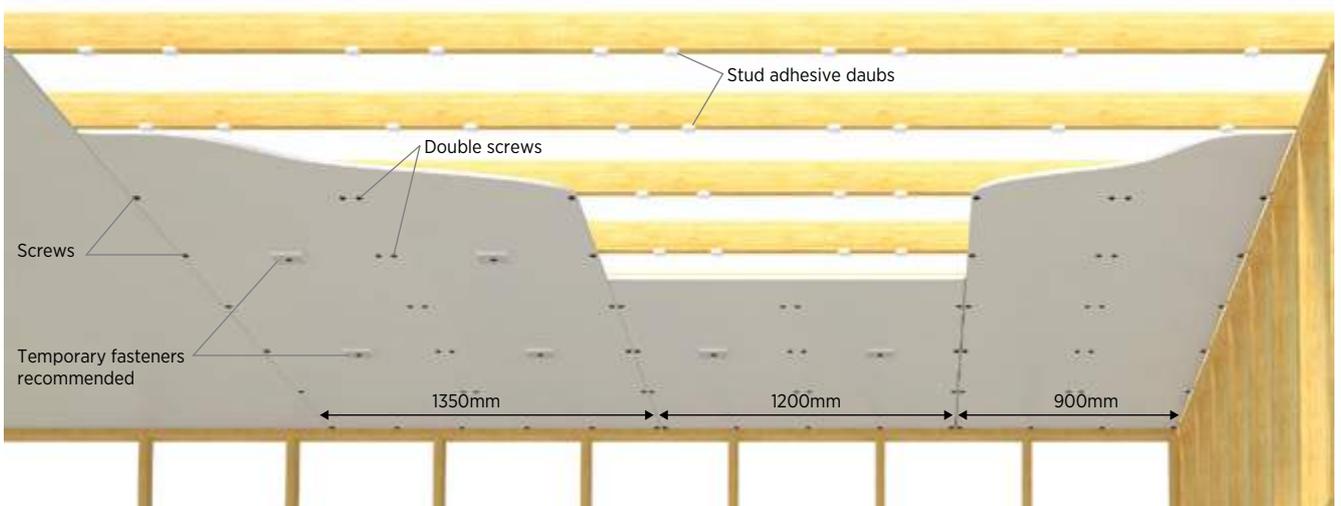


Figure 21: **Combination adhesive and screw fixing to ceilings - conventional method**

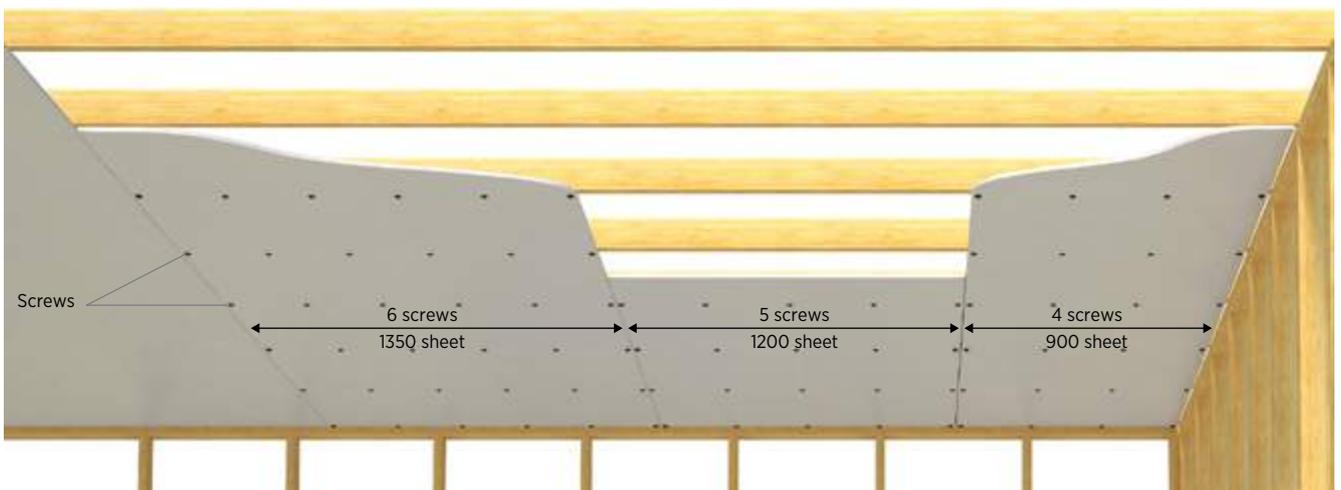


Figure 22: **Screw fixing (only) layout for ceilings**

» INTERNAL CEILINGS

BACK-BLOCKING

Back-blocking is a reinforcing system designed to minimise cracking and deformation along recessed edge and butt joints.

Back-blocking consists of plasterboard panels adhered to the back of sheet joints. Boral recommends the use of USG Boral Back-Blocking Adhesive, Cornice Adhesive, Easy Sand™ or Durabond®.

Australian Standard AS/NZS 2589 *Gypsum Lining – Application and Finishings* requires back-blocking of:

- all butt joints in ceilings
- recessed joints in Level 4 finish ceilings in any room containing three or more recessed joints
- all recessed joints in Level 5 finish ceilings.

NOTE:

USG Boral recommends that all ceiling joints should be back-blocked.

BUTT JOINTS IN CEILINGS

Wherever possible, avoid the need for butt joints by using full length sheets.

If sheets must be joined 'end-to-end' then the joints must fall mid-span between framing members and be supported by back-blocking panels (nom 400mm wide) for the length of the joint or between USG Boral BackBlock™ battens (see below).

Back-Blocking Butt Joints

Butt joints can be back-blocked by forming a recess in the plasterboard face, where the sheet ends meet, using the BackBlock™ Batten or temporary wooden battens and packers.



Figure 23: **BackBlock™ Batten**

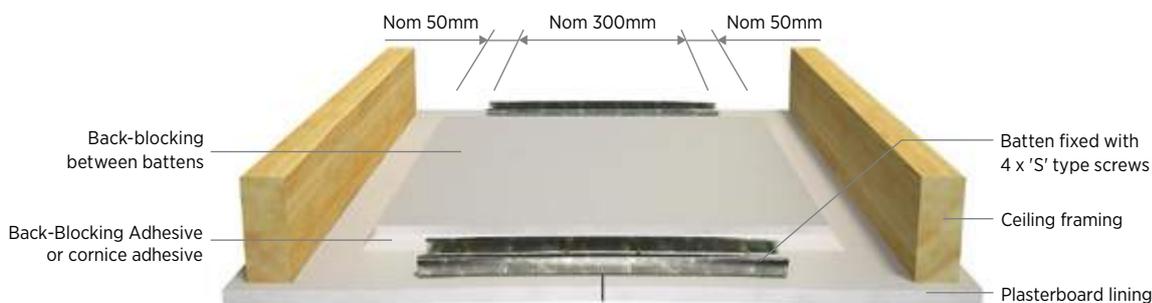


Figure 24: **Back-blocking using BackBlock™ batten**

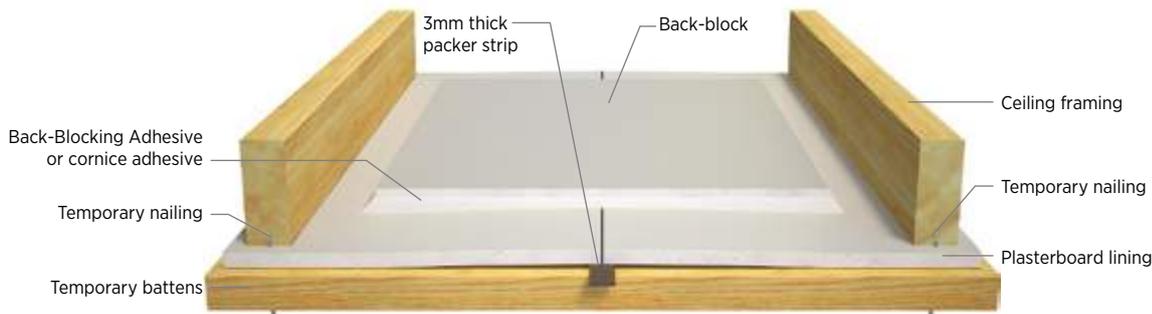


Figure 25: **Back-blocking using temporary batten and packer**

» INTERNAL CEILINGS

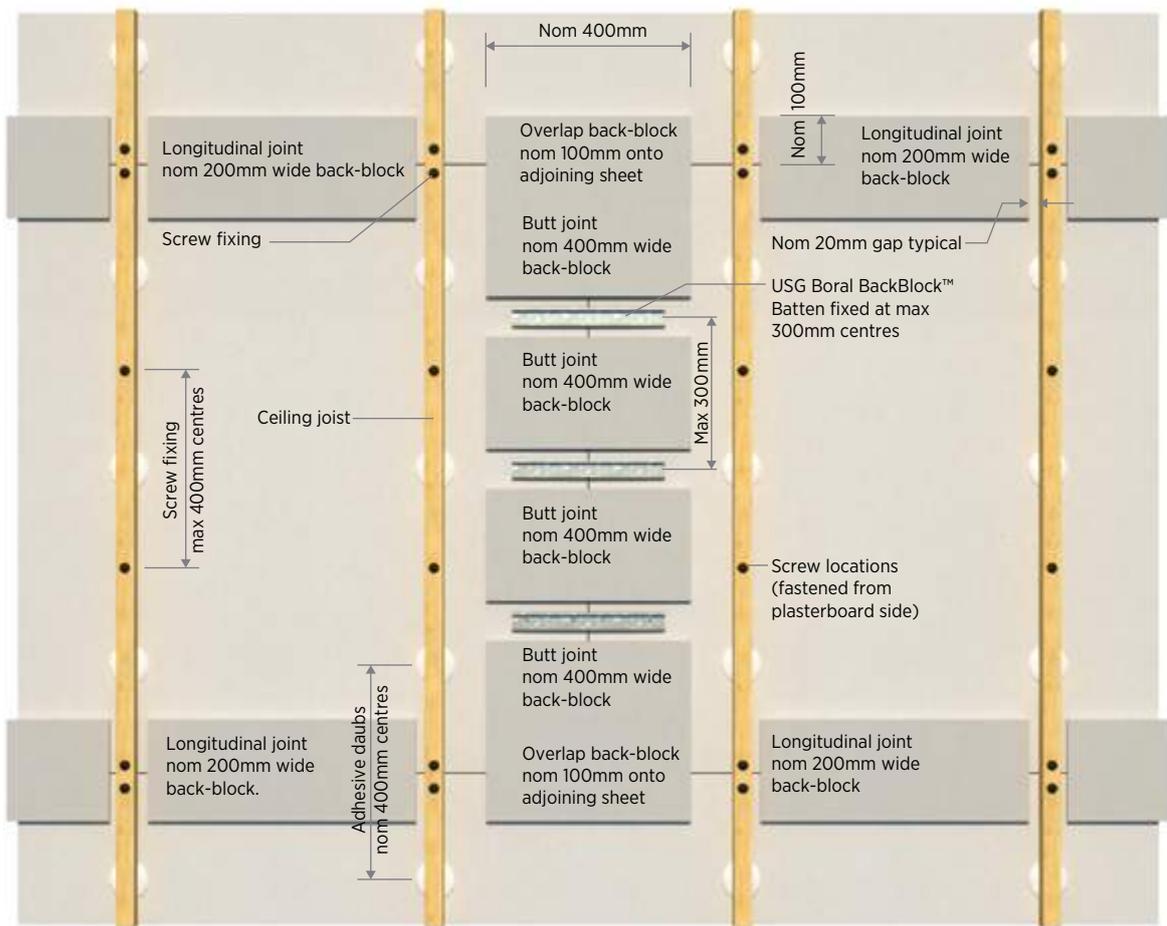


Figure 26: Back-blocking using BackBlock™ battens — Plan view

GARAGE AND EXTERNAL CEILINGS

GENERAL

Ceilings in garages, carports, verandahs and alfresco areas are subject to more extreme loads and conditions than normal internal ceilings and require special attention to their fixing and detailing.

Some factors contributing to these extra loads include:

- Wind loads
- Condensation
- Roller door vibrations
- Insufficient perimeter support
- Exposure to atmospheric variations (ie humidity, temperature, etc).

NOTES:

- External ceilings left unpainted for prolonged periods of time should be covered with a sealer coat to reduce the risk of board and compound deterioration.
- All Purpose compounds are not recommended for external applications.
- Consideration should be given to the use of proprietary plastic external angles in highly corrosive environments.

DESIGN NOTES

- The following USG Boral products are recommended for lining of garage ceilings, alfresco areas and other external protected ceilings:
 - 10mm SHEETROCK® Brand Ceiling Board
 - 13mm SHEETROCK® Brand Standard
 - 13mm Wet Area Board™
 - 13mm Multistop™
 - 10mm Fiberock®.
- Refer to Table 22 for maximum frame and screw spacings for external ceilings.
- Provide foil sarking and good ventilation to prevent heat build up and condensation pooling on the top of plasterboard.
- Provide a min 6mm wide gap between the edges of ceiling linings and adjacent walls, beams, columns and fascias.
- Fascia boards and perimeter beams should extend a min 25mm below plasterboard to provide a drip edge.
- Screws used for fixing of external ceiling linings must comply with *AS 3566 Self-drilling screws for the building and construction industries. Part 2: Corrosion resistance requirements.*

» GARAGE CEILINGS

INSTALLATION OF GARAGE CEILINGS

- Ensure there are adequate perimeter noggings
- Use the 1/3 Fixing Method as illustrated in Figure 20
- Fasten along the perimeter lines @ 300mm max centres as illustrated in Figure 27
- It is recommended that the lower portion of the cornice is fastened to perimeter timber beams
- A USG Boral DJ4040 metal angle, could also be fastened to the beam to provide concealed added support to the ceiling at the rear of the cornice
- Thicken cornice adhesive to avoid dribble on brick wall face
- When adhering cornice to masonry wall, apply Cornice Adhesive to the back of cornice so that it does not squeeze out under the bottom edge.

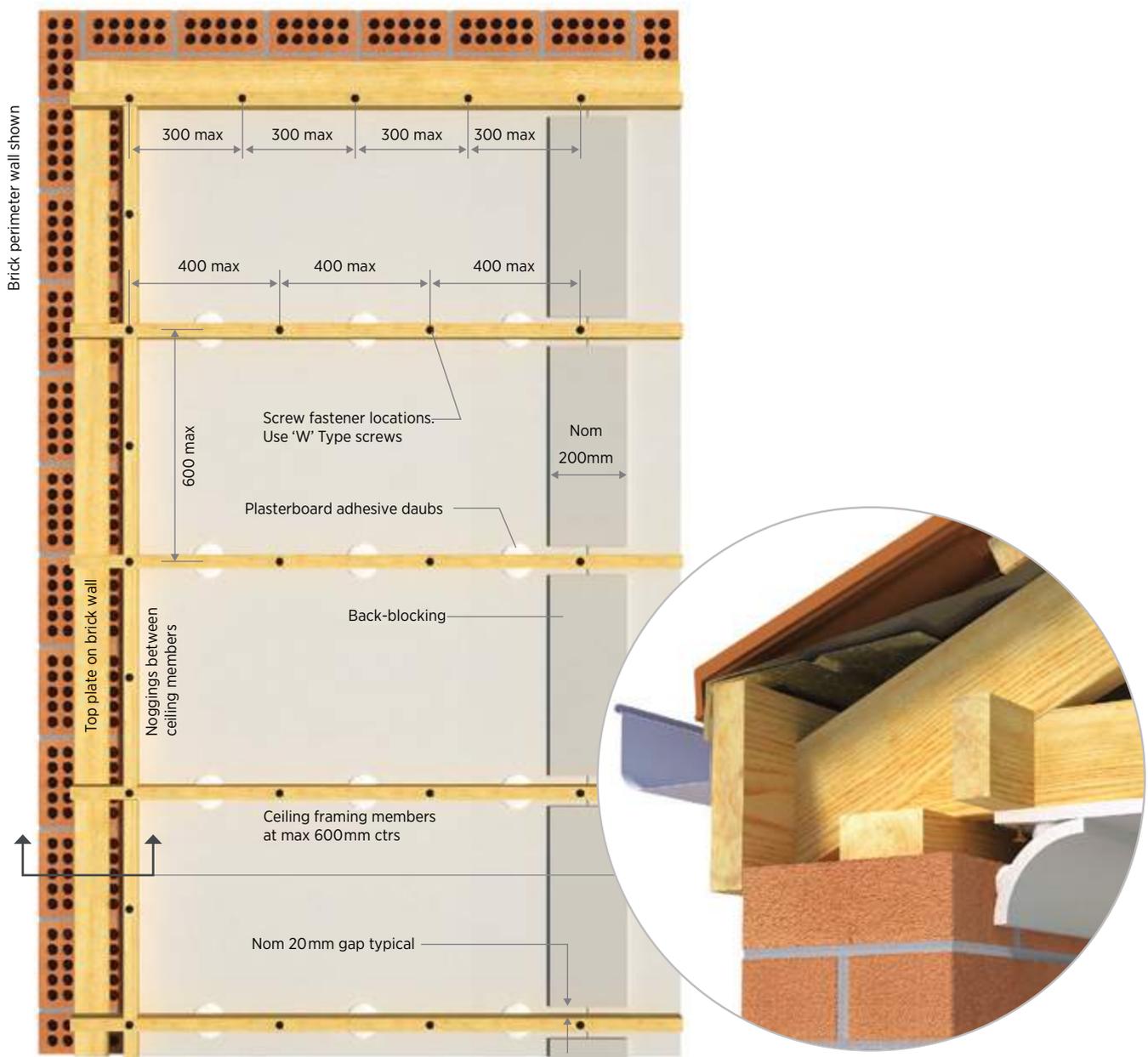


Figure 27: **Garage ceiling fixing layout** (1200mm wide plasterboard sheets shown)

Perimeter Detail

» EXTERNAL CEILINGS

INSTALLATION OF EXTERNAL CEILINGS

- Spacing between framing members should not exceed the maximum values indicated in Table 22. In areas where these values are exceeded, suitable ceiling battens or furring channels should be provided at required spacings. Metal ceiling battens and furring channels should be installed in accordance with USG Boral specifications.
- Ceiling linings should be fully screw fixed at maximum spacings indicated in Table 22. Refer Table 11 and 12 for screw types.
- Run plasterboard sheets at right angles to framing members.
- Back-block all joints in ceiling linings as per USG Boral back-blocking specifications.
- Control joints must be provided in external ceilings at max 6m centres in both directions.
- External ceilings should be painted with a three coat exterior paint system including a sealer undercoat and applied in accordance with manufacturer’s recommendations.

TABLE 22: MAXIMUM FRAMING AND FIXING SPACINGS FOR EXTERNAL CEILINGS

CEILING LINING		WIND SPEED			
		Low	Medium	High	Very High
10mm Fiberock® 13mm Fiberock®	Max Framing Spacing (mm)	450	450	300	300
	Max Screw Spacing (mm)	300	300	250	200

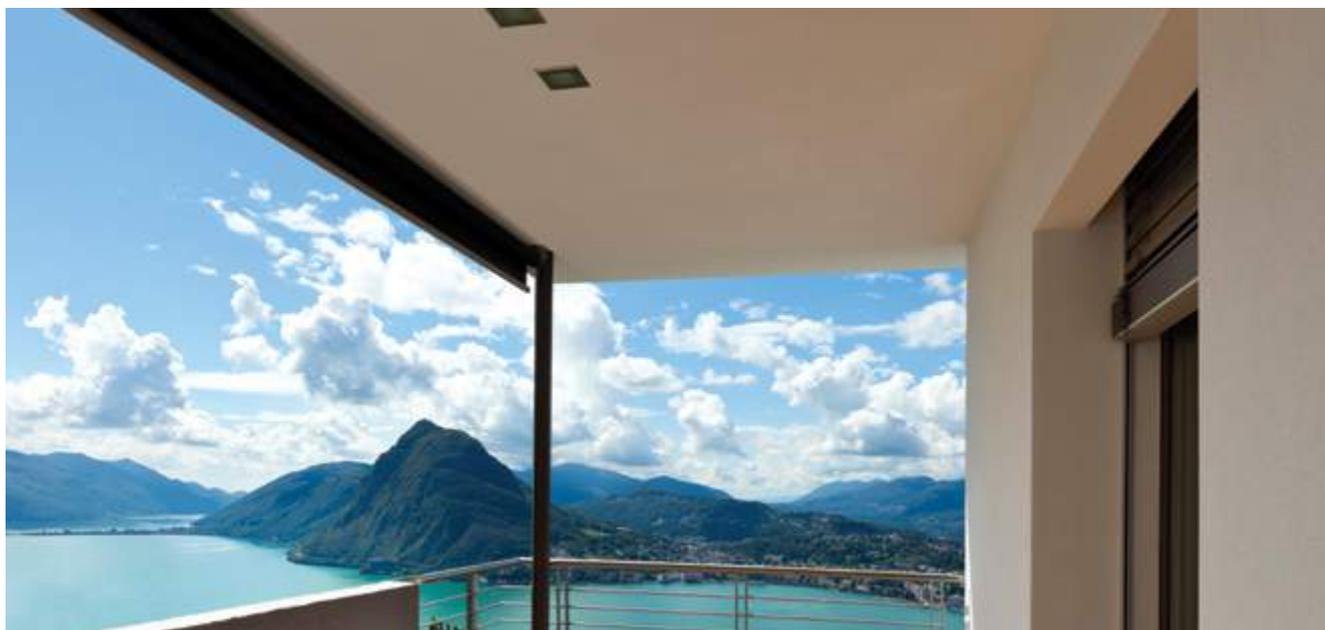


Figure 28: USG Boral Fiberock® is the ideal lining for high traffic areas, wet areas and alfresco ceilings.

» EXTERNAL CEILINGS

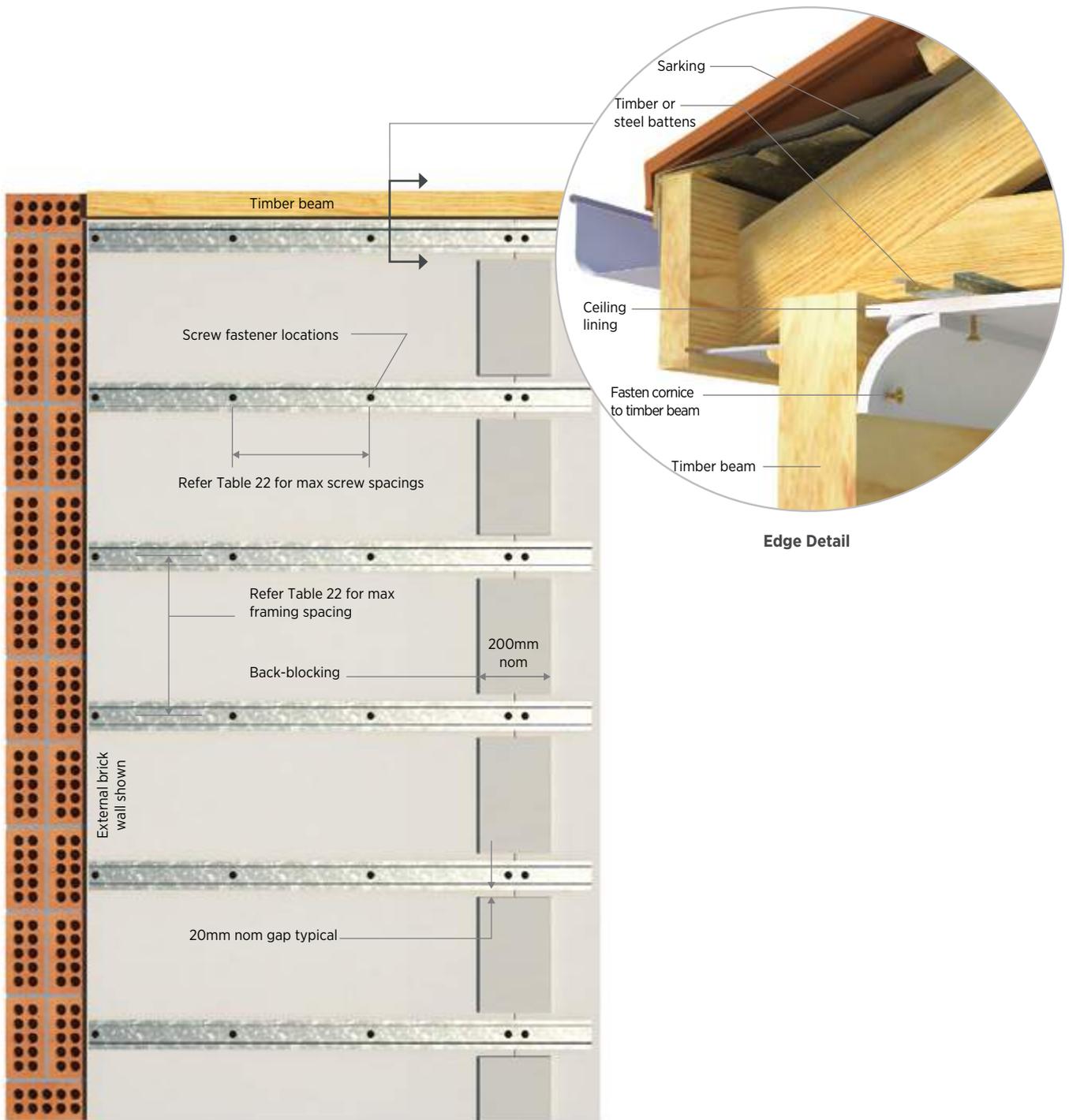


Figure 29 : **External Ceiling Fixing Layout** (1200mm wide plasterboard sheets)

FRAMED WALLS

FIXING WITH COMBINATION OF ADHESIVE AND FASTENERS

- Space daubs at 300mm max centres along the studs.
- Space screws or nails at 300mm max centres at sheet ends (corners).
- Space nails at 150mm max centres or screws at 200mm max centres where butt joints are allowed on a framing member (Level 3 finish only).
- Refer to *General Screw and Nail Fixing* on page 20.

TEMPORARY FASTENERS

Under normal drying conditions, temporary fasteners (nails or screws driven through plasterboard blocks to hold sheets in place while adhesive cures) must be installed at every second stud and remain for at least 24 hours.

FIXING WITH SCREWS ONLY

- Space screws at 300mm max centres at internal and external corners and around door and window openings.
- Space screws at 200mm max centres where butt joints fall on a framing member (Level 3 finish only).
- Refer Table 23 and Figure 31 for wall fastener layout.
- Refer to *General Screw and Nail Fixing* on page 20.

NOTE:

Continuous fastening around door and window penetrations is optional as differential movement of wall framing, plasterboard linings and architraves is recommended for maintenance reduction.

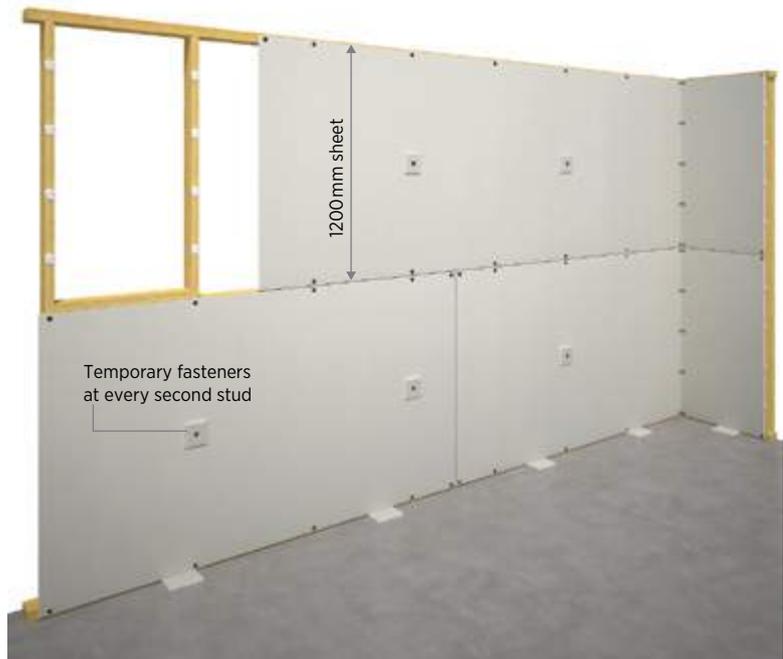


Figure 30: **Combination adhesive and screw fixing on walls**

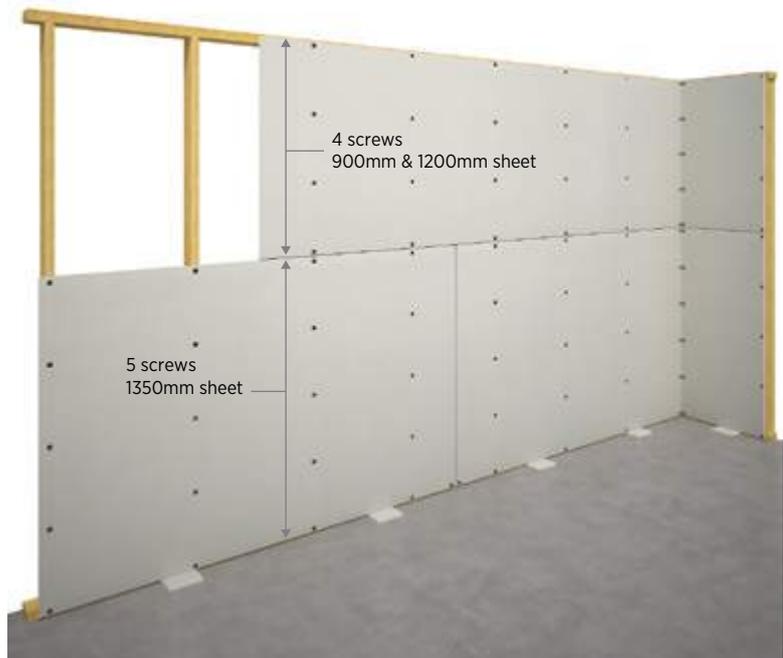


Figure 31: **Screw fixing to walls**

TABLE 23: SCREW FIXING (ONLY) LAYOUT FOR WALLS		
SHEET WIDTH	SCREW POINTS - FIELD	SCREW POINTS - SHEET END
900mm	4	4
1200mm	4	5
1350mm	5	6

Note: Screw points should be equally spaced.

» FRAMED WALLS

FIXING WITH NAILS ONLY

(Level 3 finish only)

- Space single nails at 240mm and double nails at 300mm max centres at sheet ends (corners).
- Space nails at 150mm max centres where butt joints are allowed on a framing member (Level 3 finish only).
- Double nails should be 50–75mm apart.
- Refer Table 24 and Figure 32 for min number of nailing points per framing member.
- Refer to *General Screw and Nail Fixing* on page 20.

BUTT JOINTS IN WALLS

Wherever possible, avoid the need for butt joints by using full length plasterboard sheets.

If sheets must be joined 'end-to-end', the joints should fall within 50mm of the mid-span between framing members. Butt joints greater than 400mm in length and less than 2m above floor must be back-blocked with nom 400mm wide back-blocking panels for the length of the joint. Butt joints on opposite sides of the wall should fall between different framing members.

NOTE:

Butt joints in walls may be made on a framing member only if Level 3 finish is required.

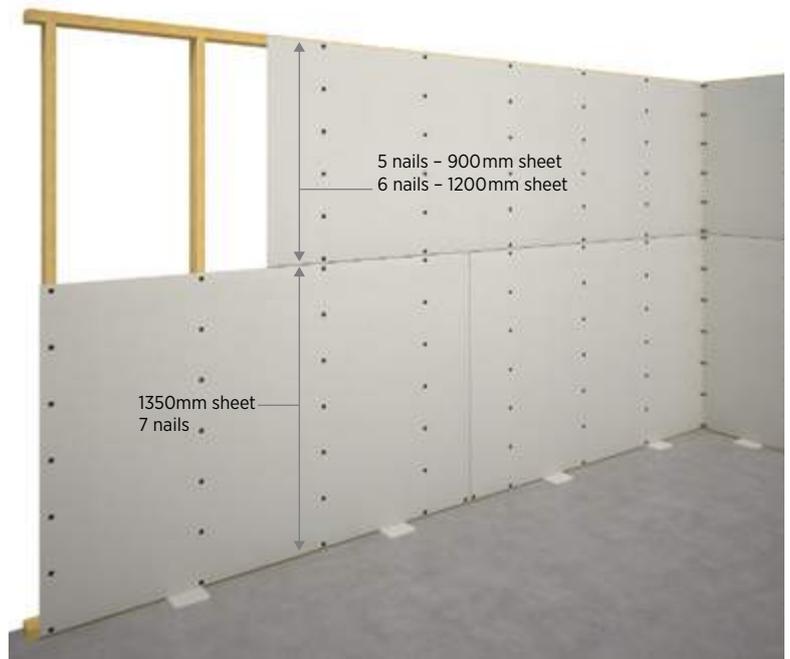


Figure 32: Nail fixing to walls (single nails)

TABLE 24: NAIL FIXING (ONLY) LAYOUT FOR WALLS

SINGLE NAILS		
SHEET WIDTH	NAIL POINTS IN FIELD	NAIL POINTS AT SHEET END
900mm	5	5
1200mm	6	6
1350mm	7	7
DOUBLE NAILS		
SHEET WIDTH	NAIL POINTS IN FIELD	NAIL POINTS AT SHEET END
900mm	4	4
1200mm	4	5
1350mm	5	6

Note: Nail points should be equally spaced.

» FRAMED WALLS

INTERNAL CORNERS

The ends of plasterboard sheets at internal corners may be supported by one of two methods described below.

Where High Shrinkage timber is used (refer page 18) the sheets must not be nailed/screwed on either side of the corner and only Method 2 (both sheets floating) may be used. Use a metal angle to support sheet ends at internal angles with only one stud.

METHOD 1 – BOTH SHEETS FIXED

(Internal Corner with 2 studs illustrated).

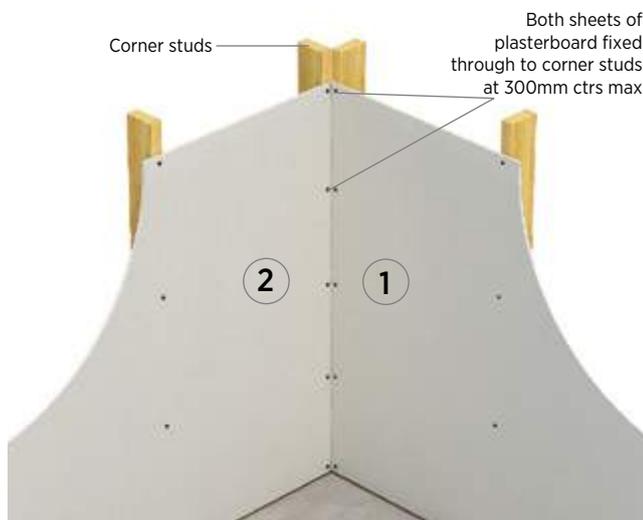


Figure 33: **Internal Corner – both sheets fixed**

- Fit the underlying sheet (1) firmly into corner and fasten along the edge at 300mm max centres
- Fit the overlapping sheet (2) with the edge firmly against the first sheet and fasten at 300mm max centres.

METHOD 2 – BOTH SHEETS FLOATING

(Internal Corner with 1 stud and metal angle illustrated).

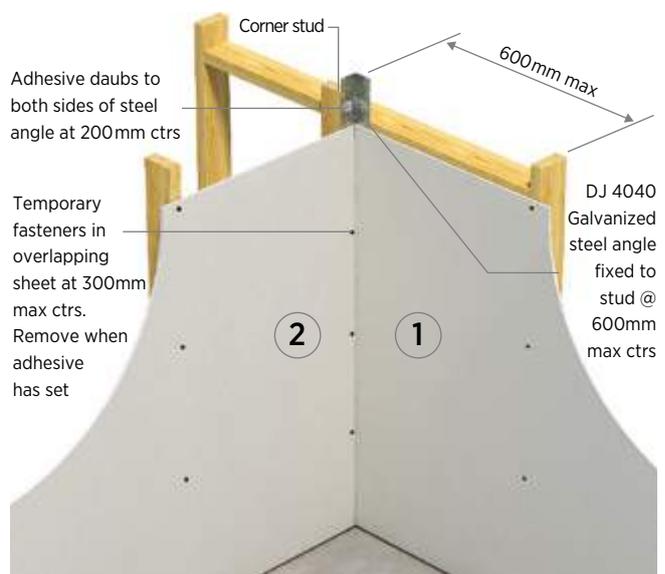


Figure 34: **Internal Corner – both sheets floating**

- Cut the metal angle 10mm shorter than the wall height and fix the angle to the stud @ 600mm centres
- Apply stud adhesive daubs at 200mm max centres to both sides of the angle
- Fit the underlying sheet (1) fully into the steel angle
- Fit the overlapping sheet (2) hard up against the underlying sheet.

Apply temporary fasteners or surface blocks for 24 hours until adhesive has cured.



Figure 35: **DJ 4040 Angle**

» FRAMED WALLS

CONTROL JOINTS

Control or expansion joints are used to minimise potential stress and cracking in wall and ceiling linings due to structural movements or changes in temperature and humidity. They can be formed by fitting the Zinc Control Joint #093 to leave a neat, clean and flexible joint.

Control joints should be installed:

- In walls and ceilings at maximum 12m intervals in both directions (max 6m intervals in external ceilings)
- At every change of lining material
- Over movement joints in the substrate
- At every change in substrate material
- Provide horizontal control joints at mid-floors in stairwells in multi-storey buildings.

Full height floor to ceiling openings can also form effective control joints.

Control joints should extend through cornice.

Installation (Control Joint):

- Leave gap of 13mm (nominal) between the ends of plasterboard sheets
- Insert the surface mounted #093 Control Joint in the gap and fix by stapling on to the board at 150mm centres
- Stop and finish the joint
- When dry, remove the filament tape, protecting the centre of the #093, to leave a clean, neat joint.

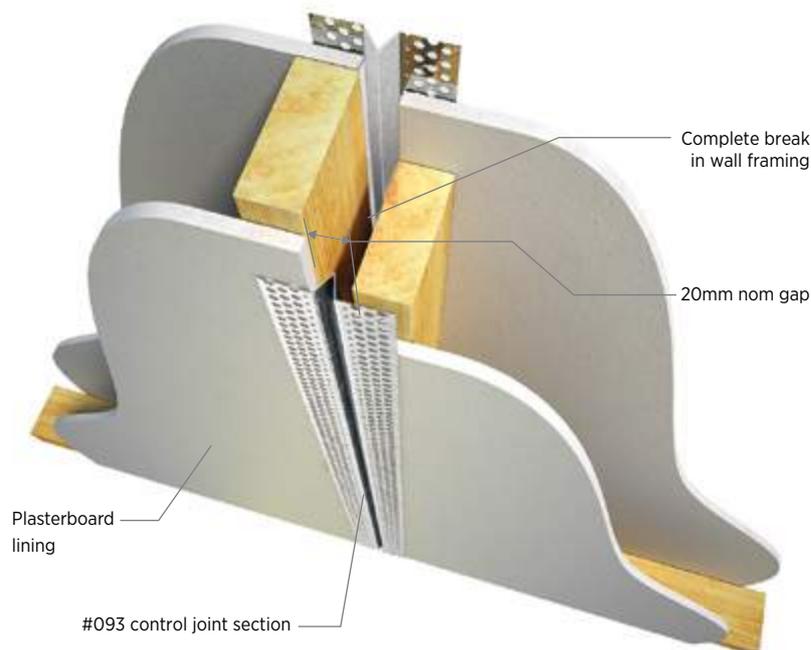


Figure 36: Control joint in timber stud wall



Figure 37: Zinc Control Joint Section #093

» FRAMED WALLS

DOOR JAMBS

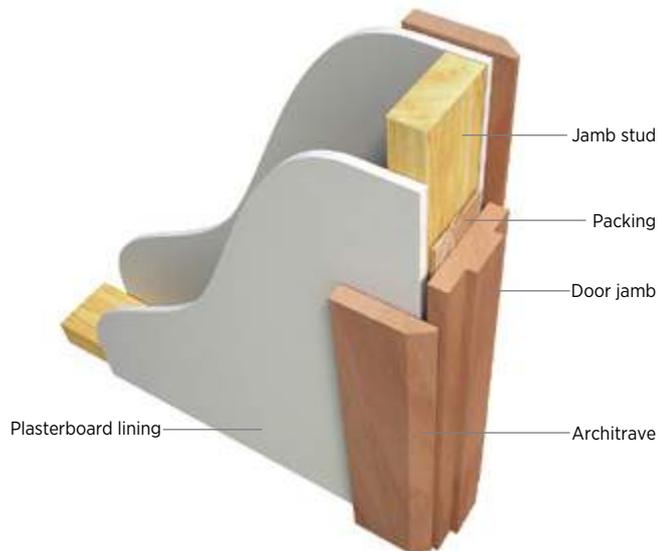


Figure 38: **Door Jamb With Architraves**

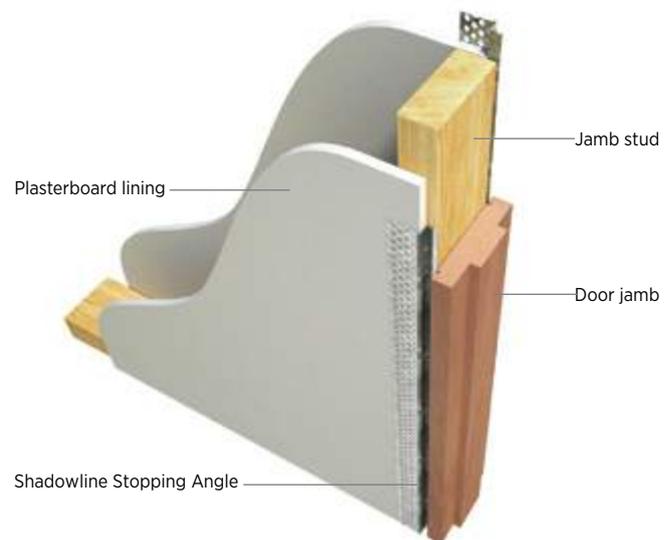


Figure 39: **Door Jamb With Shadowline Stopping Angle**

SHADOWLINE STOPPING ANGLE

A Shadowline Stopping Angle can be used to neatly finish plasterboard where:

- a set joint or internal corner is not possible
- cracking may occur
- a shadowline effect is required such as:
 - plasterboard and masonry wall junctions
 - ceiling and wall junctions
 - door and window jambs.



Figure 40: **Shadowline Stopping Angle**

» FRAMED WALLS

WALL-CEILING JUNCTIONS

Common treatments of timber framed plasterboard wall-ceiling junctions include the following:

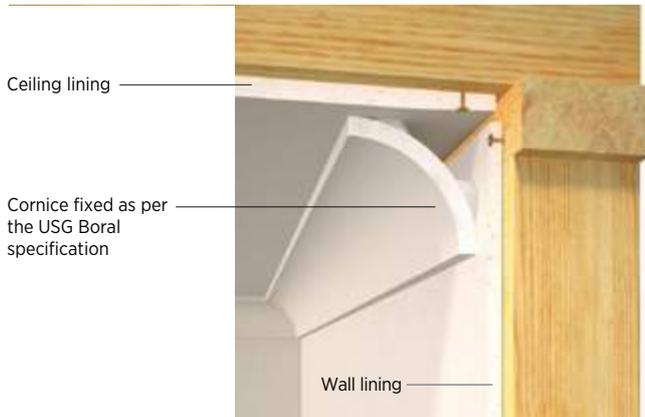


Figure 41: **Cornice Detail 1** (unsupported)



Figure 44: **Shadowline Angle 1**

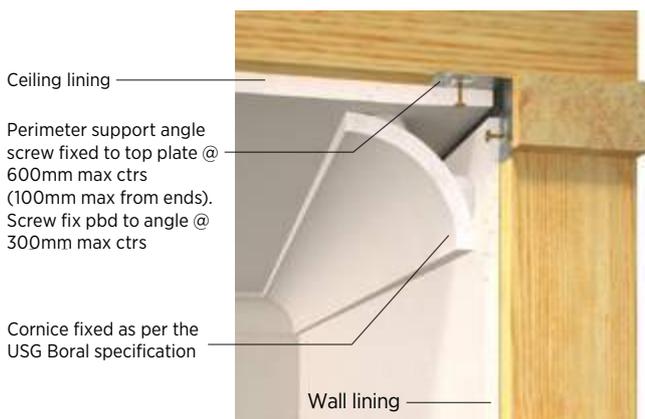


Figure 42: **Cornice Detail 2** (perimeter supporting angle)

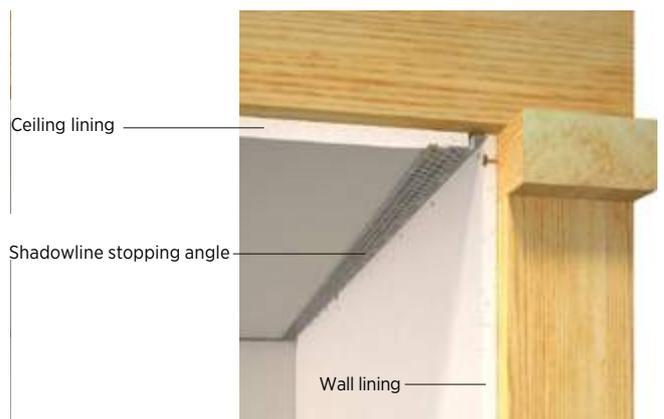


Figure 45: **Shadowline Angle 2**



Figure 43: **Cornice Detail 3** (perimeter trimmers)

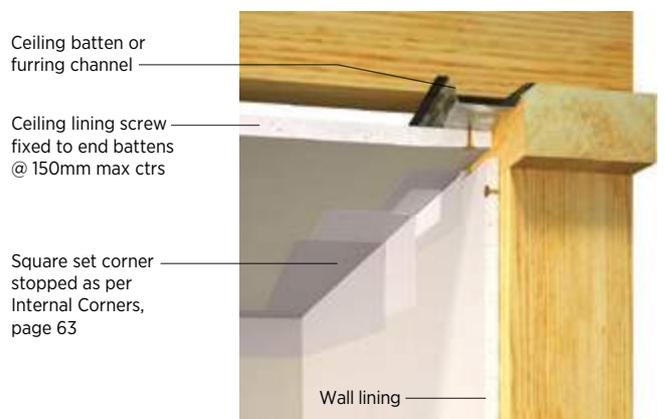


Figure 46: **Square Set**

NOTE:

Ceiling battens or furring channels are recommended for square set finish to minimise the risk of localised cracking.

MASONRY WALLS

GENERAL

USG Boral plasterboard provides a dry alternative to cement render and solid plaster finishes over masonry walls.

Two common installation methods are:

- Fixing sheets directly to masonry using USG Boral Masonry Adhesive
- Fixing sheets over timber battens or metal furring channels fastened to masonry.

The batten/furring channel method will allow a cavity space for services to run between the masonry wall and plasterboard as well as providing a true fixing surface and air flow ventilation.

It is essential that all new masonry surfaces be allowed to dry to normal levels before installing USG Boral plasterboards.

Masonry walls in wet areas, such as bathrooms and laundries may be lined with Wet Area Board™ or Fiberock® as per the wet area installation requirements (refer page 41).

NOTE:

Linings in tiled areas must be mechanically fastened to furring channels or timber battens.

Masonry walls should be checked for flatness and level using a straight edge or string line before determining the fixing method.

Masonry adhesive method should not be used for walls over 3m high or where the wall surface requires more than 25mm of packing to bring it back to a true line.

All services should be in place prior to plasterboard installation. Butt joints, control joints, jointing and finishing should be as per standard practice.

INSTALLATION USING MASONRY ADHESIVE METHOD

Masonry walls must be dry and free from dust, oil, flaking paint, efflorescence, release agents, or any other material or treatment that could adversely affect bonding of masonry adhesive.

Adhesion can also be affected by the porosity and/or previous surface treatment of a wall. Surfaces that are particularly dry or porous may need to be dampened. For best results masonry walls should be coated with a bonding agent before applying masonry adhesive.

NOTE:

It is important that plasterboard sheets for masonry applications are stacked flat as misaligned boards can hinder bonding process.

Masonry adhesive may be applied to either a wall or to the back of a sheet. (If gluing plasterboard to Autoclaved Aerated Concrete – AAC – then masonry adhesive should only be applied to the back of the sheet).

It is important to:

- Mix only enough masonry adhesive as can be used before it starts to set.
- Do not use masonry adhesive once it has started to set.

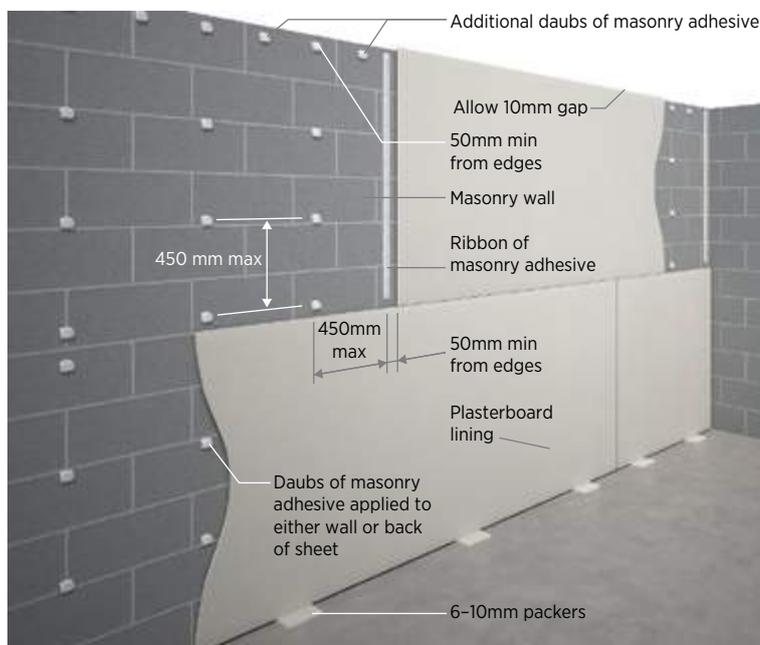


Figure 47: Fixing to a true wall surface

» MASONRY WALLS

MASONRY ADHESIVE METHOD INSTALLATION NOTES

- Strike chalk lines on the floor and ceiling as a guide for positioning sheets. Allow for board and daub thicknesses.
- Mark lines on the wall to assist in positioning the masonry adhesive daubs.
- Masonry adhesive daubs should be about 50mm diameter by 15mm thickness.
- Space adhesive daubs at maximum 450mm centres vertically and horizontally and 50mm from free edges and ends of sheets.
- Ribbons or additional daubs of masonry adhesive must be applied at sheet ends and at cornice and skirting lines. Additional daubs of masonry adhesive are also required at external angles, fixtures and around services penetrations, doors and windows.
- Alternatively, a 'solid wall' effect can be achieved by applying cornice or masonry adhesive to the entire back face of the sheets, using a 15mm x 15mm notched trowel.
- Keep sheets 6-10mm off the floor.
- Place plasterboard and press firmly into position using a long straight edge to level the sheets vertically and horizontally.
- Hold the sheets in position with props or temporary fasteners until masonry adhesive sets.
- Once initial contact has been made, boards should not be pulled back from the wall.
- Once installed, boards should not be disturbed for 48 hours (ie no drumming or rattling of walls, cutting of light switches or power points).
- Avoid skinning of masonry adhesive in windy weather.
- Avoid early removal of bottom packers.

NOTE:

All fixtures must be fastened directly into masonry wall.

FIXING TO IRREGULAR WALL SURFACES

Wall surfaces with high/low spots over 15mm or out of plumb by more than 15mm will need to be straightened with a series of levelling pads or by using furring channels.

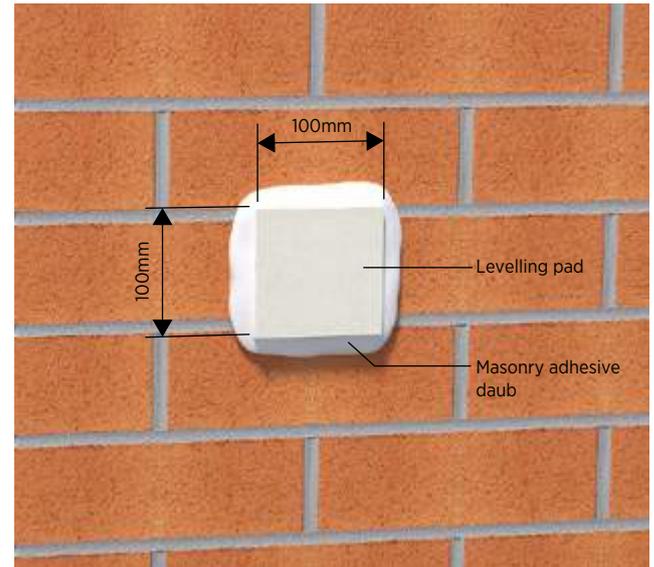


Figure 48: Levelling pads

» MASONRY WALLS

INSTALLATION USING FURRING CHANNELS

This installation method is particularly recommended for fixing to precast concrete panels.

Metal furring channels can either be direct fixed or clipped:

DIRECT FIXED CHANNELS

- Use one of the following:
 - USG Boral Furring Channel FC37
 - 42 x 19mm (min) timber battens.
- Pack where required to achieve a true surface
- Fix to masonry with suitable fasteners.

CLIPPED CHANNELS

- Use one of the following furring channels and fixing clips:
 - USG Boral FC37 Furring Channel
 - MC37, TR37 or WF37 Fixing Clips
- Set out fixing clips for vertical channels spaced at maximum 600mm centres and for top and bottom horizontal channels
- Pack clips where required to achieve a true surface
- Fix clips to masonry with suitable fasteners.

Fix plasterboard to furring channels using an appropriate method (adhesive and fasteners or fasteners only) then joint and finish in the normal manner.

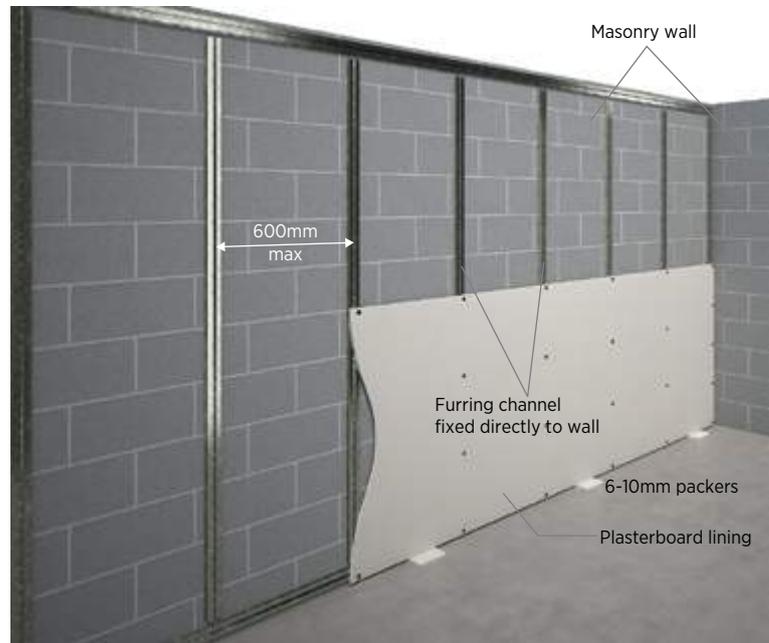


Figure 50: Fixing to furring channels fastened direct to wall

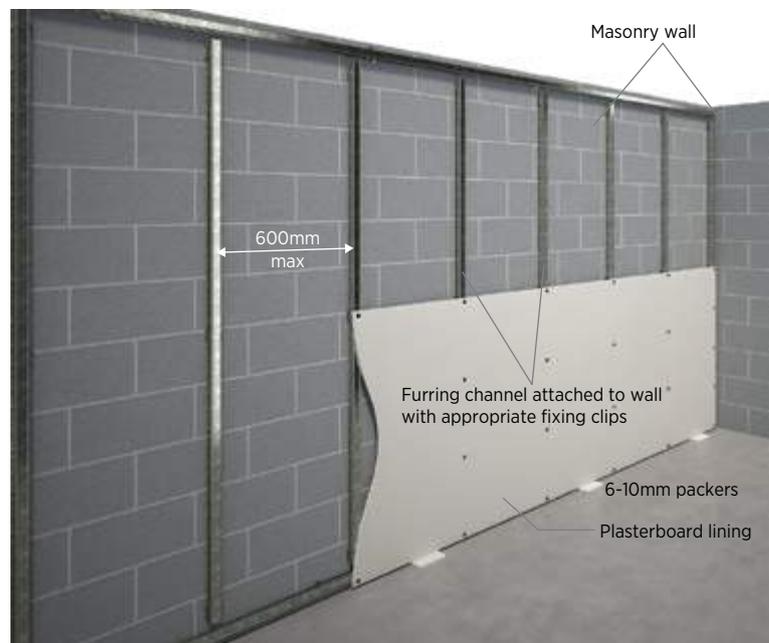


Figure 51: Fixing to furring channels clipped to wall

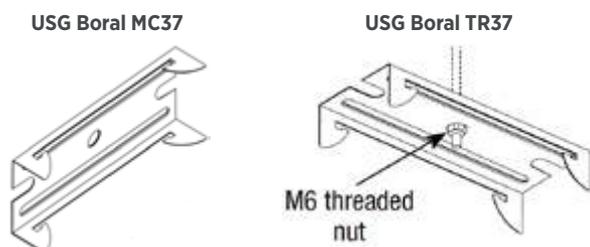


Figure 49: Masonry fixing clips

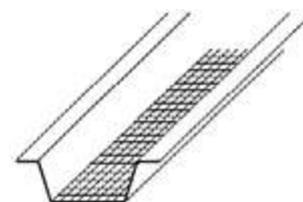


Figure 52: USG Boral Furring Channel FC37

WET AREAS

REGULATORY REQUIREMENTS

DEFINITION AND STANDARDS

Minimum waterproofing and water-resistance requirements for walls in wet areas are outlined in NZBC CLAUSE E3/AS1 and are summarised in Table 26 and Figures 53 to 58.

E3/AS1 and AS/NZS 4858 set out minimum material, design and installation requirements for waterproofing of wet areas within residential buildings and other buildings with similar usage intensity. It also outlines typical wet area construction materials and methods.

Water-resistant plasterboard manufactured to AS/NZS 2588 *Gypsum Plasterboard* constitutes a water resistant substrate for tiles or other nominated water resistant surface materials.

Waterproofing membranes used in wet areas must comply with AS/NZS 4858 *Wet Area Membranes*.

WATERPROOFING OF WET AREAS

Where wall to wall junction is required to be waterproof, waterproofing must extent a min 40mm either side of the junction.

For water resistant plasterboard sheeting all cut edges that have the potential to be affected by moisture must be waterproofed, including the bottom edge over a preformed shower base.

All penetrations through wall linings in shower areas (including penetrations of mechanical fasteners) must be waterproofed.

NOTE:

USG Boral Wet Area system requires waterproofing of all plasterboard joints in wet areas unless a waterproofing membrane complying with AS/NZS 4858 *Wet area membranes* or a Codemark approved product is applied by a specialist contractor over the whole face of wet area walls.

WATERPROOFING MEMBRANES

Waterproofing membranes complying with AS/NZS 4858 Wet Area Membranes are deemed to be a waterproof material when used as part of a waterproofing system as outlined in E3/AS1.

Bond breaker must be installed at all wall/floor, hob/wall junctions and at movement joints where the waterproofing membrane is bonded to substrate. Bond breaker must be compatible with the flexibility of waterproofing membrane.

Types of waterproofing membranes and corresponding bond breaker widths are shown in the following table:

TABLE 25: WATERPROOFING MEMBRANES			
MEMBRANE CLASS	EXTENSIBILITY	ELONGATION AT BREAK	MIN BOND BREAKER WIDTH TO BRIDGE JOINTS OPENING UP TO 5mm
I	Low	10-59%	75mm tape with backing rod
II	Medium	60-299%	35mm
III	High	= > 300%	12mm

CEILINGS OVER WET AREAS

As NZBC does not require the use of water resistant ceiling linings over wet areas, SHEETROCK® Brand plasterboard provides an adequate solution for this application. Wet Area Board™ or Fiberock® can be used in wet area ceilings if water resistant linings are desirable.

Ceiling linings over wet areas in residential buildings can be fixed as per the standard internal ceiling installation specification (refer to page 21).

Fiberock® gypsum board must be fixed using screws only fixing method.

NOTE:

USG Boral recommends that ceiling paint in wet areas should be impervious to moisture.

» WET AREAS

TABLE 26: WATERPROOFING OF WALLS IN WET AREAS

VESSELS OR AREA WHERE THE FIXTURE IS INSTALLED	WATERPROOFING OF WALLS	WATERPROOFING OF JUNCTIONS	WATERPROOFING OF WALL PENETRATIONS
Enclosed Showers (with or without hob or step down)	Waterproof to 150mm min above the shower floor substrate or 25mm min above the max retained water level and the remainder to be water resistant to a height of 1800mm min from finished floor level, and 300mm above shower rose.	Waterproof wall to wall junctions to a height of 1800mm min above finished floor level, 40mm min either side of junction. Waterproof wall/floor junctions within shower area.	Waterproof penetrations in shower area.
Enclosed Showers (preformed showerbase)	Water resistant to a height of 1800mm min from finished floor level, and 300mm above shower rose.	Waterproof wall to wall junctions to a height of 1800mm min above finished floor level, 40mm min either side of junction. Waterproof wall/floor junctions within shower area.	Waterproof penetrations in shower area.
Unenclosed Showers	Waterproof to 150mm min above the shower floor substrate or 25mm min above the max retained water level and the remainder to be water resistant to a height of 1800mm min from finished floor level within 1500mm from shower connection to the wall, and 300mm above shower rose.	Waterproof wall to wall junctions to a height of 1800mm min above finished floor level, 40mm min either side of junction. Waterproof wall/floor junctions within 1500mm from shower connection to the wall.	Waterproof penetrations in shower area.
Areas adjacent to baths and spas*	Water resistant to a height of 150mm min above vessel for the extent of the vessel, where vessel is within 75mm of a wall, and exposed surfaces below vessel lip. Water resistant all exposed surfaces below vessel lip.	Water resistant junctions within 150mm above a vessel for the extent of the vessel. Water resistant wall/floor junctions for the extent of the vessel.	Waterproof tap and spout penetrations where they occur in a horizontal surface.
Insert baths*	Waterproof to 150mm min above lip of bath.	Waterproof entire shelf area supporting the bath lip, incorporating a waterstop under the bath lip and project a min 5mm above tile surface. Waterproof junctions within 150mm above bath or spa.	Waterproof tap and spout penetrations where they occur in a horizontal surface.
Walls adjoining other vessels (ie sink, basin or laundry tub)	Water resistant to a height of 150mm min above vessel, for the extent of the vessel, if the vessel is within 75mm of the wall.	Where vessel is fixed to a wall waterproof wall junctions for the extent of vessel.	Waterproof penetrations where they occur in surfaces required to be waterproof or water resistant.
Laundries and WCs	N/A	Waterproof wall/floor junctions.	Waterproof penetrations where they occur in surfaces required to be waterproof.
Bathrooms and laundries requiring a floor waste	N/A	Waterproof wall/floor junctions.	N/A

* If a shower is included in a bath refer to the requirements for shower area walls and penetrations.

NOTE:

Refer E3/AS1 for further design guidelines for floor waterproofing and perimeter flashing requirements.

» WET AREAS (E3/AS1)



Figure 53: **Waterproofing of enclosed shower over bath**

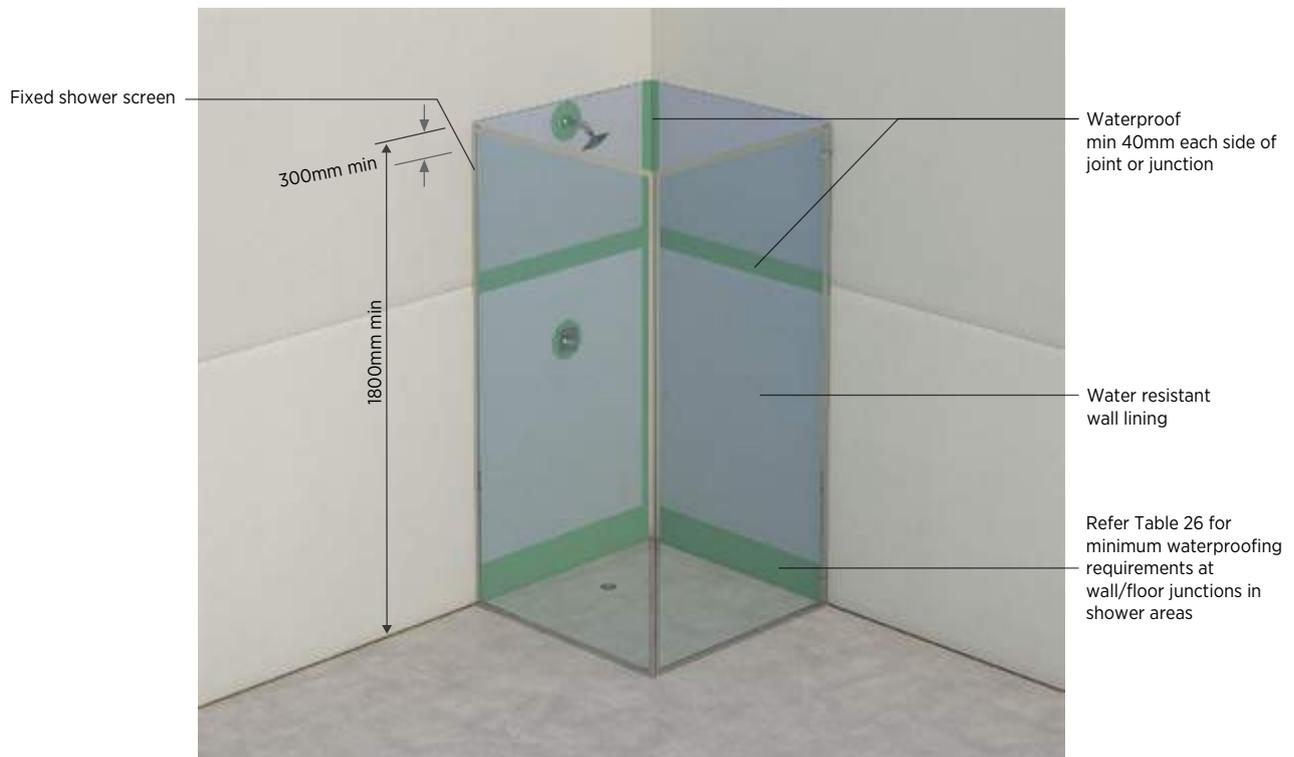


Figure 54: **Waterproofing of enclosed shower**

» WET AREAS (E3/AS1)

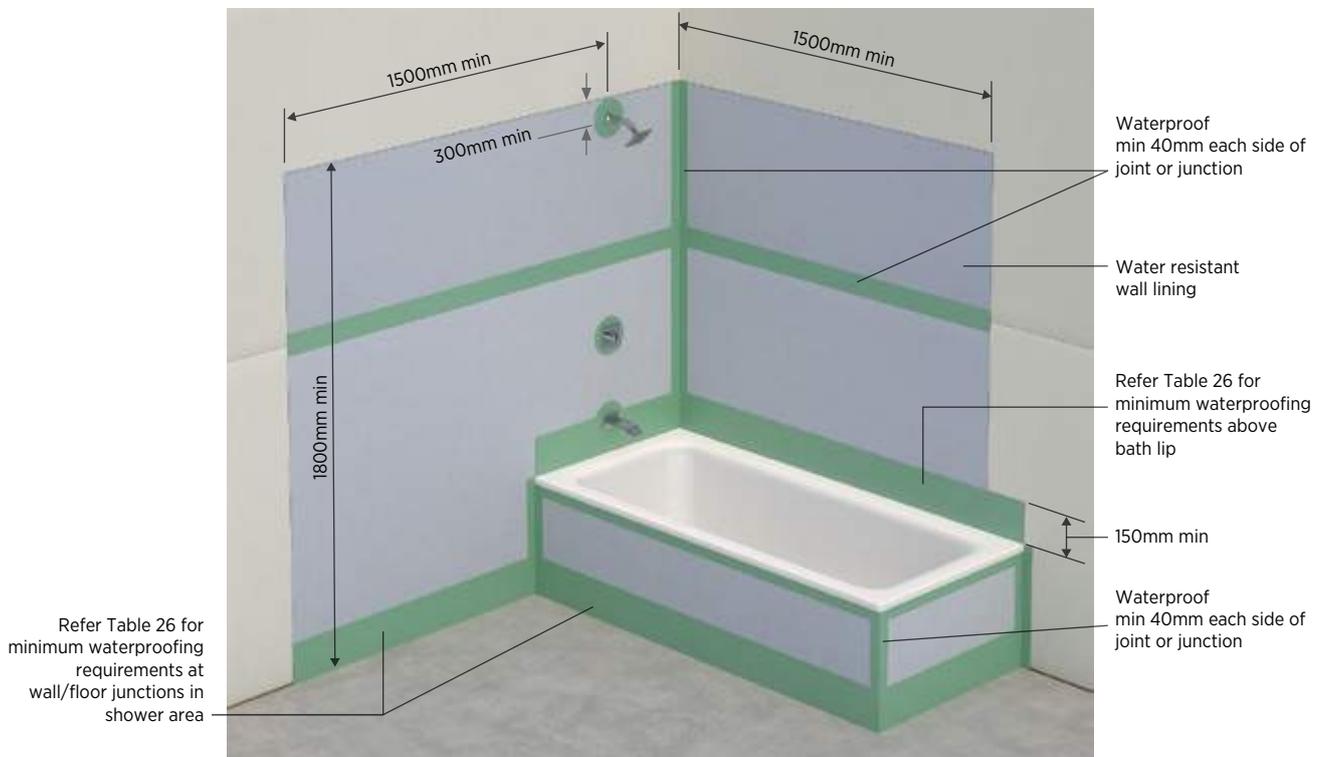


Figure 55: **Waterproofing of unenclosed shower over bath**

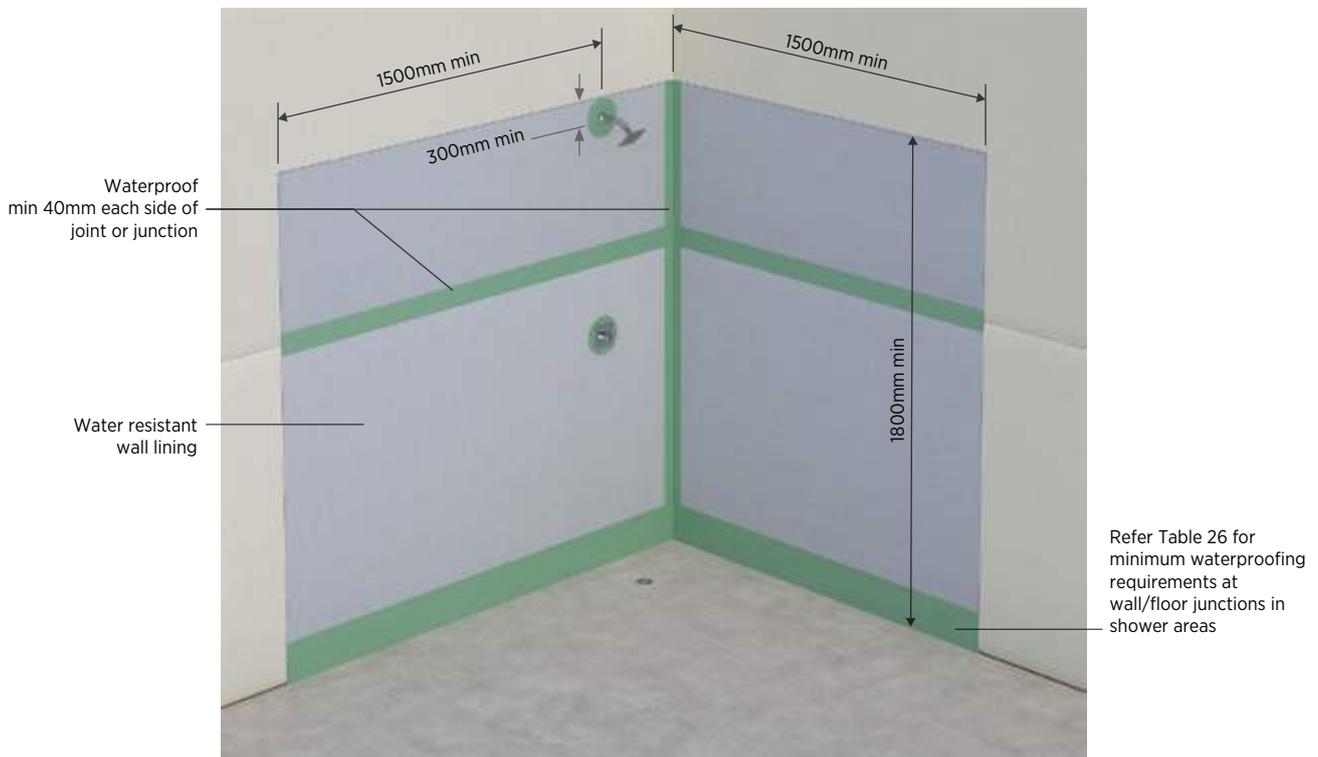


Figure 56: **Waterproofing of unenclosed shower**

» WET AREAS (E3/AS1)

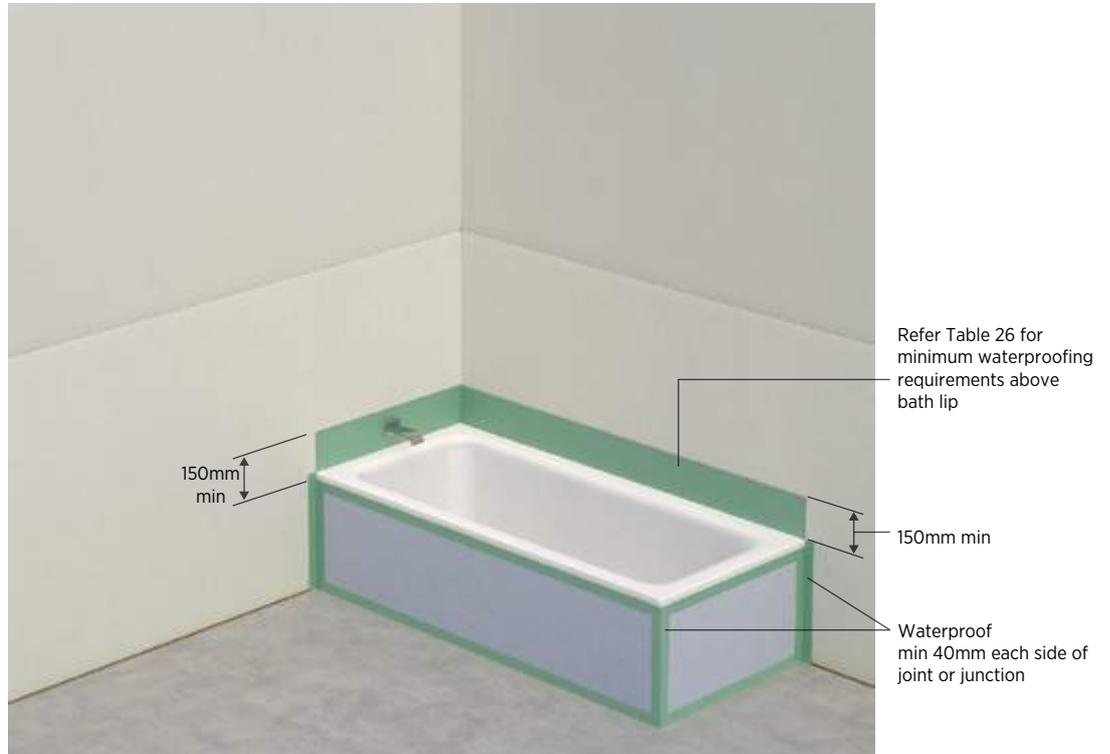


Figure 57: **Waterproofing of bath**



Figure 58: **Waterproofing of basin**

» WET AREAS

USG BORAL WET AREA

USG Boral Wet Area comprises materials and installation details outlined in this manual and must be installed in accordance with USG Boral specification to achieve the required performance.

USG Boral Wet Area complies with the requirements of E3/AS1 and is thus suitable for use in residential buildings and other buildings with a similar usage pattern.

USG Boral Wet Area is not suitable for use in high exposure applications such as group shower rooms, steam rooms, etc.

WET AREA MATERIALS

Wet Area Board™

USG Boral Wet Area Board™ is manufactured with a moisture resistant core that stops water wicking up the board causing damage to the board itself or to surface finish.

Wet Area Board™ can be recognised by its blue-grey face liner and is manufactured with recessed edges for flush jointing within and outside of tiled areas.

Wet Area Board™ complies with water resistance requirements of AS 3740.

Wet Area Board™ is available in 10mm and 13mm thicknesses.

Fiberock®

Fiberock® is a water resistant paperless gypsum board offering additional benefits of mold resistance and high impact resistance. Fiberock® contains 95% recycled materials.

Manufactured with recessed edges for flush jointing, Fiberock® can be used as an alternative wall lining in USG Boral Wet Area and can be installed using the same fixing, jointing and waterproofing materials and details as specified for Wet Area Board™.

Fiberock® is available in 10mm, 13mm and 16mm thicknesses.

Wet Area Sealant

A wet area sealant is a flexible acrylic sealant suitable for waterproofing:

- Wall junctions and cutouts
- Bottom of sheets in shower bases or bath abutments
- Around plumbing fixtures and penetrations.

The selected wet area sealant must comply with requirements of E3/AS1 for waterproof materials.

Corner Support Angle

40mm x 40mm galvanised metal angle USG Boral DJ4040 is used to support internal corners in wet areas.

PREPARATION OF WET AREAS

Check framing for layout and fixing of additional noggings to support wet area fittings such as screens and taps and the continuous support for USG Boral water resistant linings at the shower base and bath rims.

Provide adequate noggings 25mm (nominal) above bath, shower bases, tubs and sinks for fixing the edges of USG Boral water resistant linings.

Ensure that plumbing pipes and noggings do not protrude beyond the face of the studs.

Recess preformed shower bases and baths into studs so that USG Boral water resistant linings can sit correctly in front of the shower base upstand. This will provide a natural flashing point.

» WET AREAS

INSTALLATION IN TILED AREAS

- USG Boral water resistant linings in tiled areas must be fixed using a full fastener system. Adhesive is not permitted.
- Space fasteners as per Table 27 and Figure 59.
- Sheets can be fixed horizontally or vertically with the bottom edge 6-10mm clear of the finished floor level or fixture.
- Lining sheets are best run the full length of the wall to avoid butt joints.
- Ensure sheets sit flat against framing.
- Neatly cut out penetrations and holes using hole saw and allowing approx 6mm gap for sealant.
- Fix 40mm x 40mm corner support angles where required leaving a 6mm gap at the bottom.
- Use screws as indicated in Tables 11 and 12 on page 20.
- Screws should be slightly overdriven but should not break the face paper.
- Hold plasterboard sheets firm against framing while driving fasteners.
- Position screws 10-16mm from sheet edges.

TABLE 27: FASTENER SPACING IN TILED AREAS

WALL TILES WEIGHT (INCLUDING TILE ADHESIVE)	MAX FASTENER SPACING	
	INTERMEDIATE STUDS	SHEET ENDS
No greater than 12kg/m ²	200mm	150mm
Greater than 12kg/m ² up to 32kg/m ² max	100mm	100mm

INSTALLATION IN NON-TILED AREAS

Wet Area Board™ in non-tiled areas may be fixed as per standard installation specifications (refer to page 32).

Fiberock® in non-tiled areas must be fixed using mechanical fasteners only.

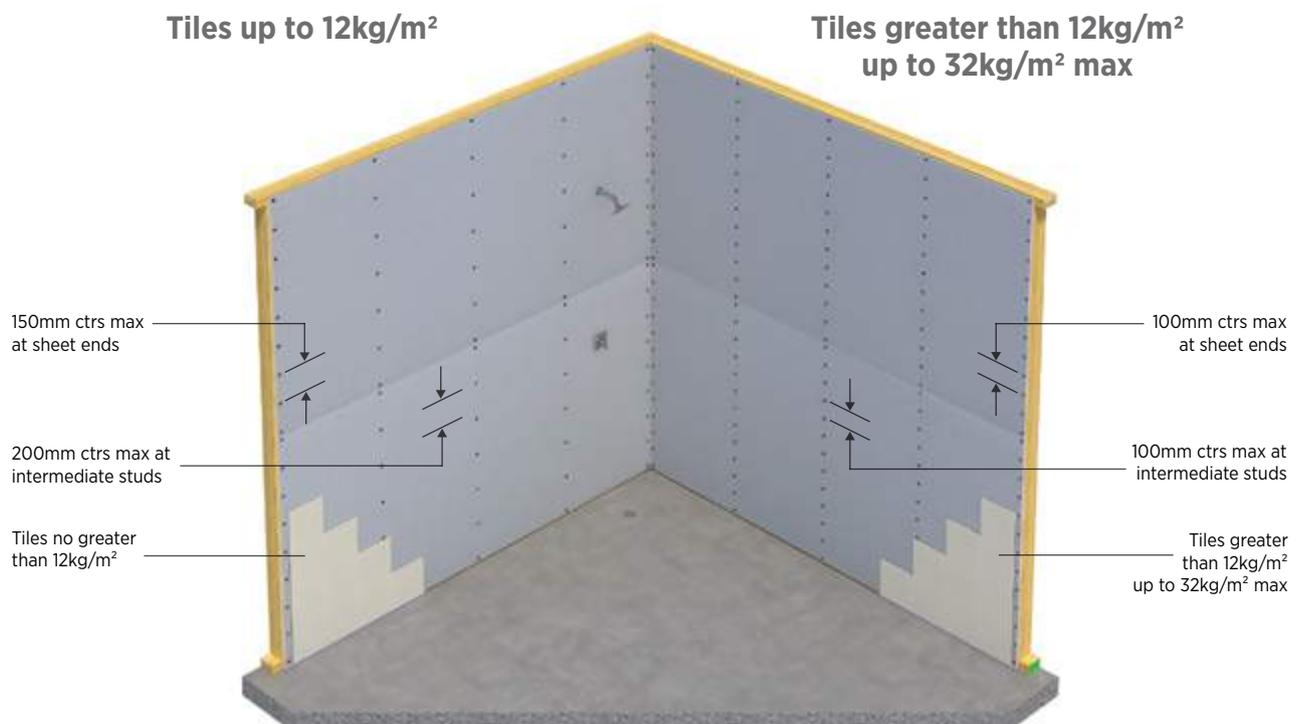


Figure 59: Plasterboard Fixing in Tiled Areas

» WET AREAS

WATERPROOFING OF JOINTS AND JUNCTIONS WITHIN WET AREAS

Joints and junctions within wet areas must be waterproofed prior to installation of tiling or other approved surface materials.

Cut edges of gypsum linings at wall-floor junctions, preformed shower bases and over bath lip must be protected by sealing with USG Boral Wet Area Sealant.

WATERPROOFING WALL JUNCTIONS

Waterproof sheet edges above baths, shower bases, laundry tubs, etc by sealing with wet area sealant for the full depth of the board (refer Figure 60).

Waterproof floor and wall junctions by sealing with wet area sealant for the full depth of the board (refer Figure 61).



Figure 60: Seal Sheet Edges Over Baths, Shower Bases, Laundry Tubs

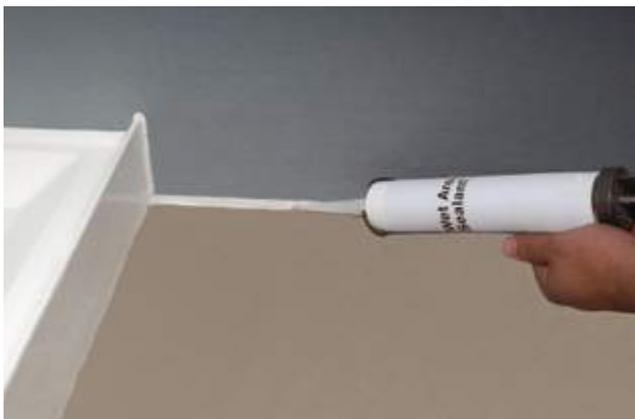


Figure 61: Seal Floor and Wall Junctions

JOINTING IN WET AREAS

- USG Boral recommends water resistant gypsum linings in tiled areas should be jointed using USG Boral setting compound and paper tape.
- With a broad knife evenly fill joint recesses with USG Boral setting compound and also apply to both sides of internal and external corners.
- Centre reinforcement paper tape over joints, internal and external corners and firmly bed into the USG Boral setting compound, ensuring there are no trapped air bubbles.
- When the tape is embedded, immediately apply a skim coat of USG Boral setting compound with a broad knife ensuring the tape is completely covered, with no tape curling at the edges.
- Cover fastener heads with a skim coat of USG Boral setting compound.
- After the setting compound has dried (min 24hrs hours) apply a waterproofing membrane that complies with either AS/NZS 4858 or an approved CodeMark™ product to the whole face of wet area walls per Figures 66-70.

NOTES:

- USG Boral base compounds can be used if a waterproofing membrane installed by a specialist contractor and complying with the requirements of AS/NZS 4858 *Wet area membranes* is applied over the whole face of wet area walls.

» WET AREAS - VINYL WALL COVERING APPLICATIONS



1. Apply bedding coat of USG Boral setting compound.



2. Bed in paper jointing tape in the corners.



3. Bed in paper jointing tape at sheet joints.



4. Apply skim coat of setting compound at joints and around penetrations.



5. Apply skim coat of setting compound to fastener heads.



6. Apply skim coat of setting compound at sheet base.



7. Apply two liberal coats of wet area seal coat at all joints, junctions, penetrations and fastener heads.



8. Completed shower enclosure.

NOTES:

- Application of compounds to be a minimum of level 4 finish prior to application of the vinyl wall covering.
- Installation of the vinyl must be carried out in accordance with the installation instructions and specification of the vinyl manufacturer/supplier.

Figure 62: Jointing and Waterproofing of Wet Areas

» WET AREAS – TILE APPLICATIONS

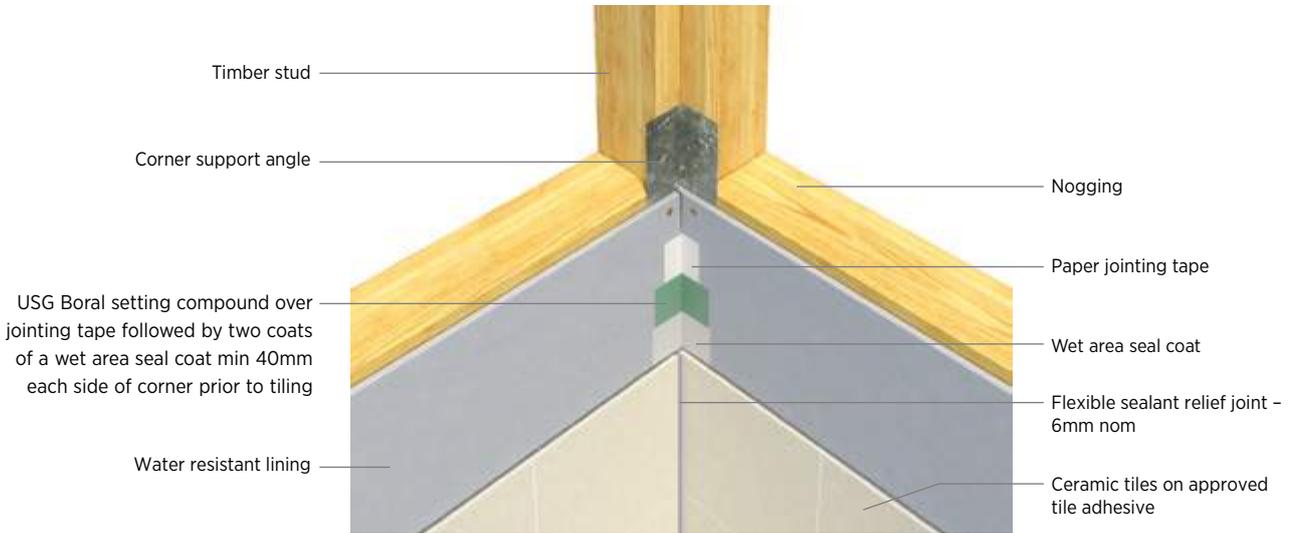


Figure 63: **Internal Corner**

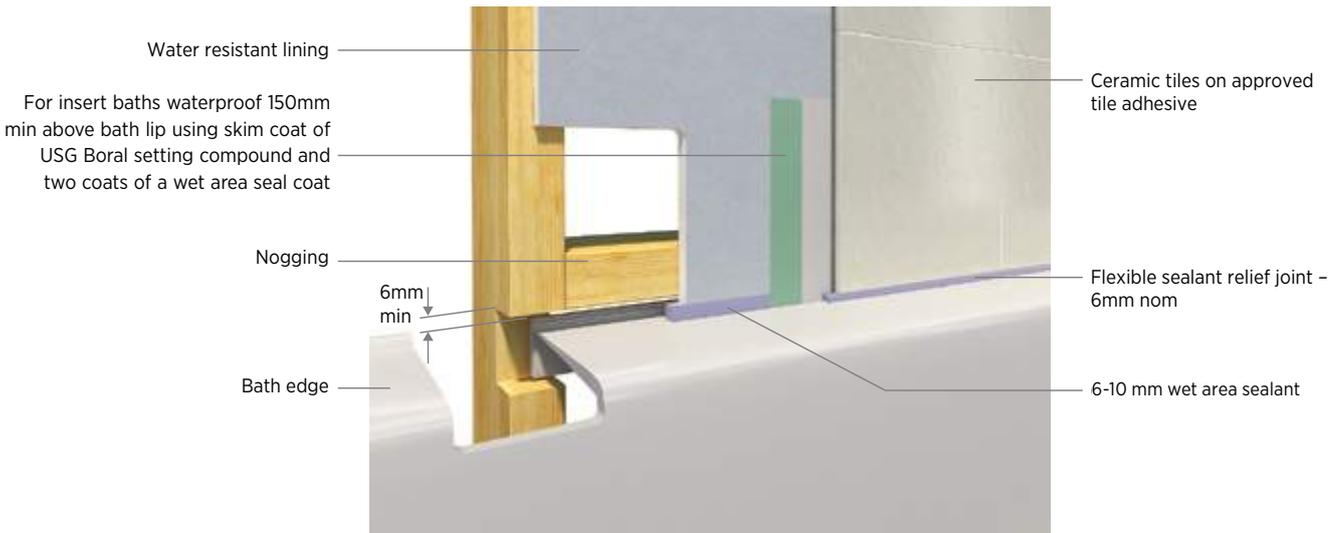


Figure 64: **Bath and wall junction**

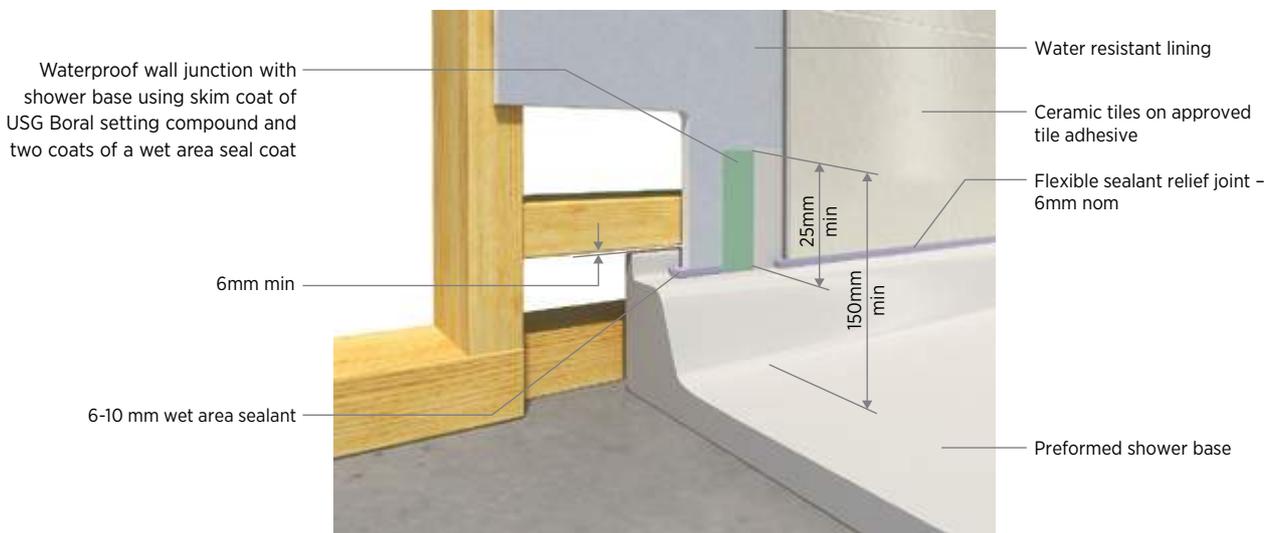


Figure 65: **Preformed shower base and wall junction**

» WET AREAS - TILE APPLICATIONS

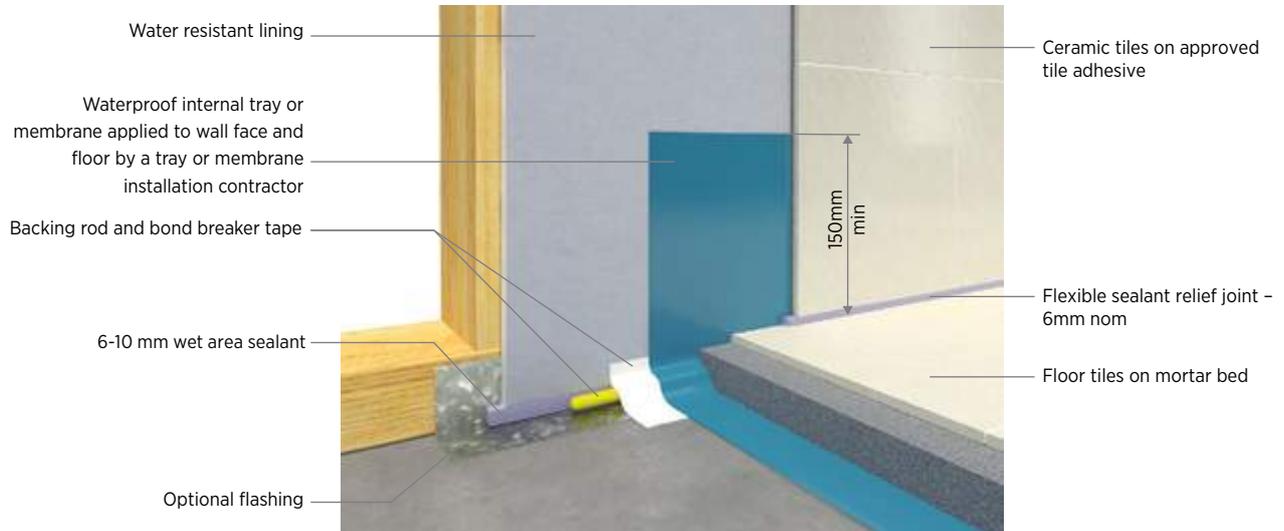


Figure 66: **In-situ shower base and wall junction** (Class I membrane)

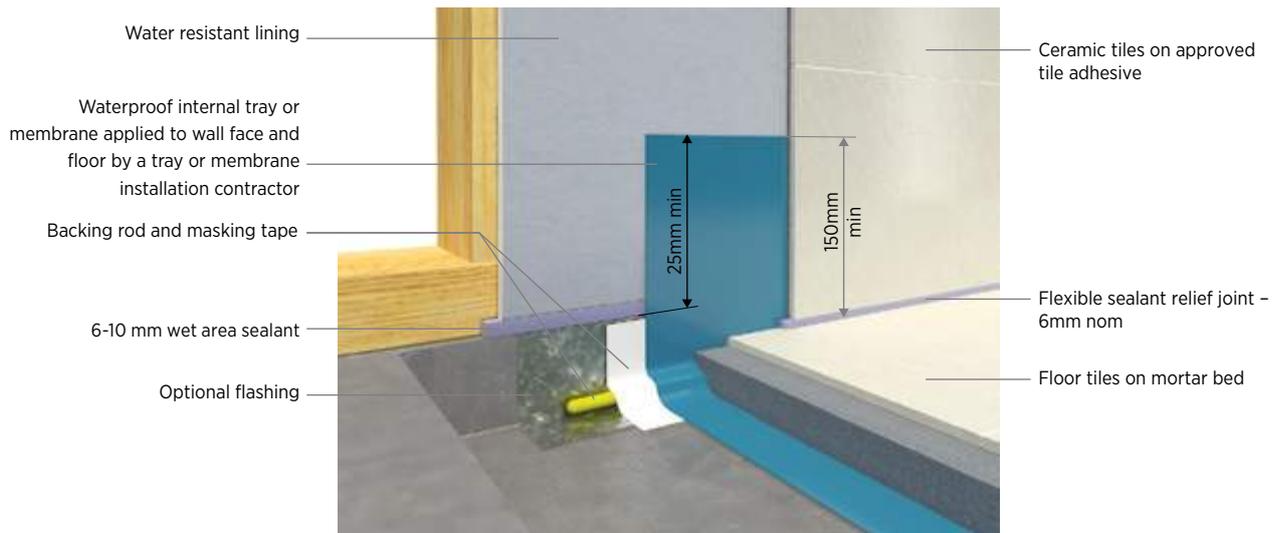


Figure 67: **Set-down shower base and wall junction**

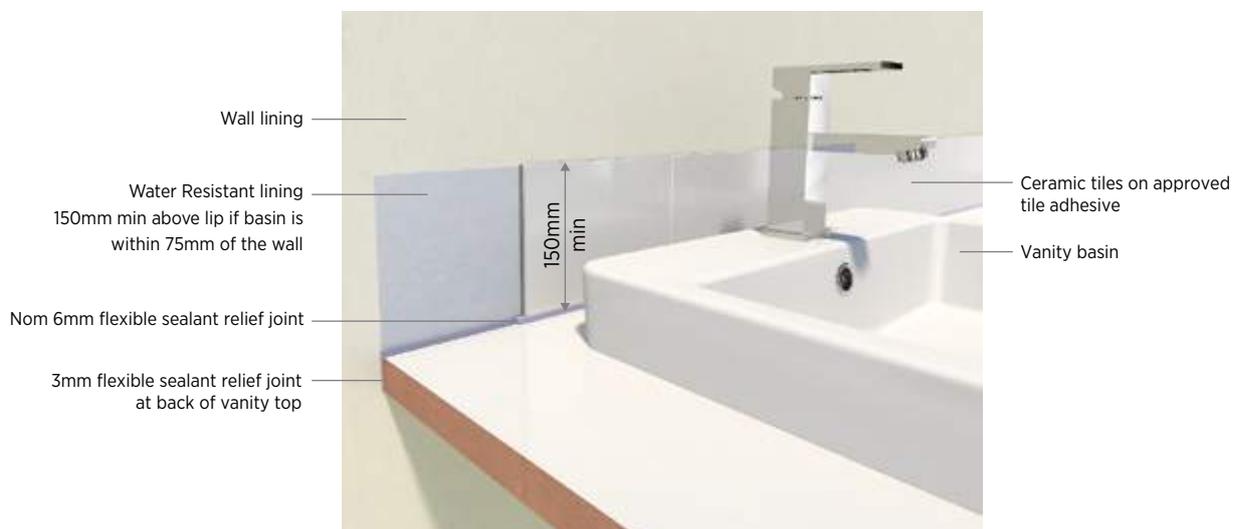


Figure 68: **Vanity unit and wall junction**

» WET AREAS – RIGID ACRYLIC SHOWER LININGS

Where rigid acrylic shower linings are to be installed, the wet area linings must not be jointed, pre-sealed or painted and must be free of dust prior to the installation of the lining. This is to ensure good adhesion of the shower lining to the surface of the wet area lining. Acrylic installation instructions and specifications of the manufacturer/supplier.

WATERPROOFING OF PENETRATIONS

Use hole saw to make penetrations for taps, shower nozzles and the like. Waterproof cut edges of gypsum linings at penetrations by sealing with a wet area sealant for the full depth of the board (refer Figure 69). Alternatively, plumbing penetrations can be waterproofed with proprietary waterproofing components (refer Figure 70).

Fastener penetrations must be waterproofed with wet area membrane treatment in compliance with AS/NZS 4858.

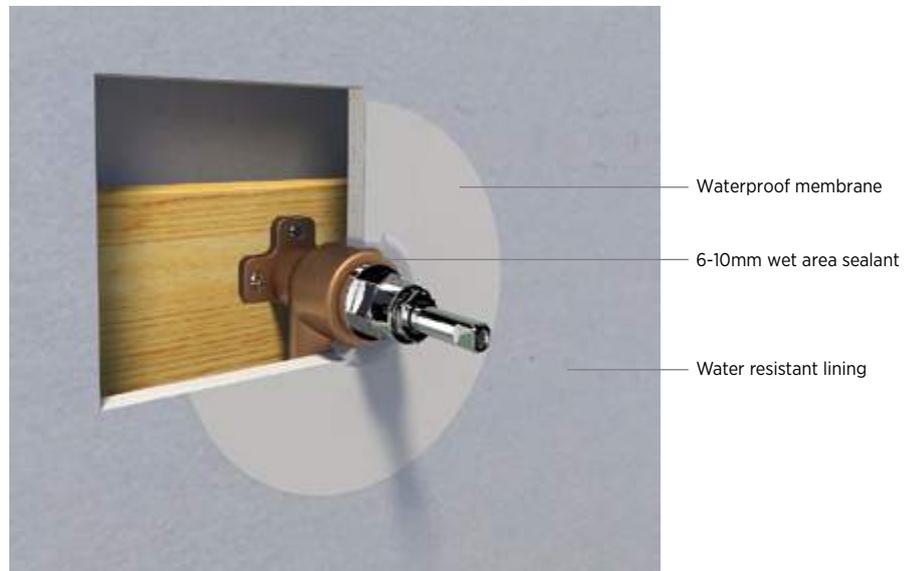


Figure 69: **Plumbing Penetrations – Sealed**



Figure 70: **Plumbing Penetrations With Proprietary Waterproofing Components**

» WET AREAS

DO'S AND DON'TS

USG Boral water resistant lining materials must:

- be fixed to framing only with mechanical fasteners when used as a substrate for tiling. Stud adhesives must not be used in tiled areas
- be faced with ceramic tiles or other approved water resistant materials when installed in wet areas
- only be applied to timber or steel framing or to a base layer of USG Boral water resistant lining material, never to other types of lining materials. Multiple layers of USG Boral water resistant lining materials must be fastened to framing individually
- be jointed with paper tape
- not be installed over a vapour barrier
- not be used in high exposure areas such as group shower rooms or steam rooms
- not be used in unprotected external applications
- not be used if fractured or damaged.

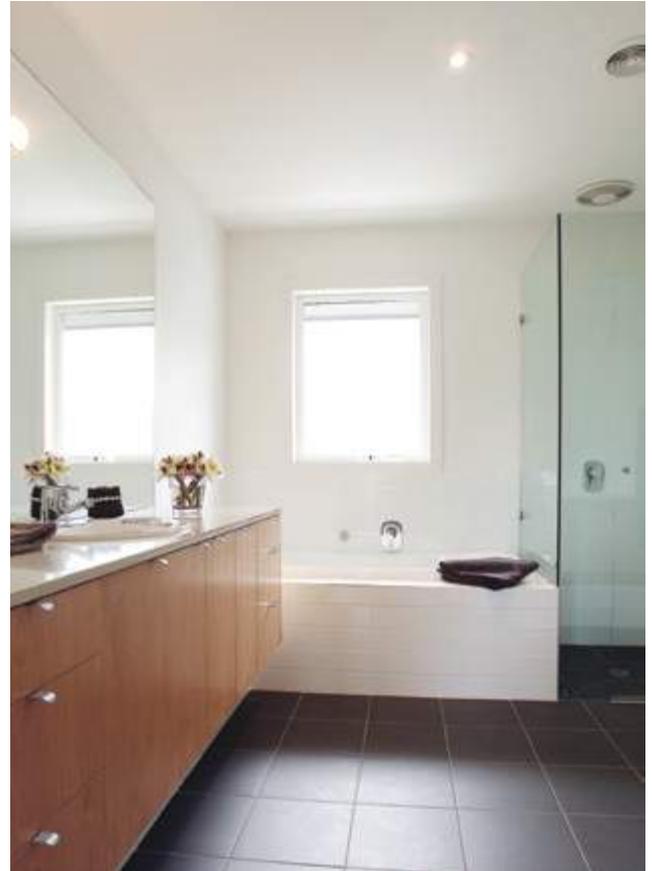


Figure 71: **Finished bathroom**

CURVES AND ARCHES

Curves and arches can be constructed using USG Boral Regular or for tight radii curves, 6.5mm Flexiboard®.

CONSTRUCTING CURVED WALLS AND CEILINGS

The minimum bending radii for some USG Boral plasterboard products are as follows:

PLASTERBOARD TYPE AND THICKNESS	MINIMUM BENDING RADIUS FOR PLASTERBOARD FIXED HORIZONTALLY
6.5mm Flexiboard®	650mm – concave 450mm – convex
10mm Regular	900mm
13mm Regular	1000mm

Shorter radii can be achieved by moistening the compressed face of plasterboard. When wetting the board, apply a small amount of clean water with a paint roller or sponge. Allow the water to soak for 15 minutes before attempting to bend the board. To prevent flat areas between the studs, space framing closer together than normal.

NOTES:

- Screw fasteners are preferable to nails to minimise possible impact damage.
- Avoid butt joints occurring in the curved section of the wall by using plasterboard sheets of suitable length.
- Make sure the sheet edge (or end) is correctly aligned to framing before driving fasteners.
- Ensure the board is in close contact with framing when fasteners are driven.
- To ensure a smooth curve, fasten in the field of board only where necessary.
- Fasten only to studs, not to top or bottom plates.

Refer relevant USG Boral publications for detailed instructions on fixing Flexiboard® plasterboard.

ARCHES

Interior wall arches, framed in timber or steel, can be lined with Regular plasterboard and the arch angles reinforced with Arch Bead.

Straight corners below the arch line should be finished with standard corner bead.

Archway templates from min 12mm thick particleboard or MDF cut to the required profile must be in place before the installation of plasterboard sheets.

Installation

- Fix plasterboard sheets, horizontally, to studs on one side of the wall as per standard installation instructions.
- Screw/nail fix to templates and around the edge of the arch at maximum 300mm centres or use stud adhesive.
- Keep fasteners 10mm min from the edge of the arch.
- Do not place butt joints over or within 200mm of the arch.
- Allowing a 10mm projection beyond the template, accurately mark the profile of the arch on the back of the sheet.
- Cut out neatly with a keyhole saw.
- Fix sheets on the other side of the wall.
- From the cut side, square the line of cut across to the uncut sheet, mark the curve and cut out neatly as before.
- Cut a strip of plasterboard to fit into the arch soffit, allowing enough length to reach 50mm below the springing line on both sides of the arch.
- Apply continuous beads of cornice adhesive to the back edges of the wall sheets around the arch.
- If the arch has a tight radius, dampen the soffit strip to assist bending.
- Fasten one end of the soffit strip 50mm below the springing line and bed the strip into the cornice adhesive, progressively working around the arch.
- Check that the soffit strip is installed neatly and tightly throughout the arch and fix the free end.
- Cut plasterboard strips for the sides of the archway and fix using stud adhesive or fasteners.
- Bend Arch Bead into position around the arch with the short leg on the face of the wall. Allow a minimum of 150mm projection below the springing line at each end.
- Fix one end of the arch bead at the springing line, then fix around the remaining arch at maximum 300mm centres.
- Fit standard external corner beads to the straight sides of the archway and fix at maximum 300mm centres.
- Joint and finish as per standard methods.

» CURVES AND ARCHES

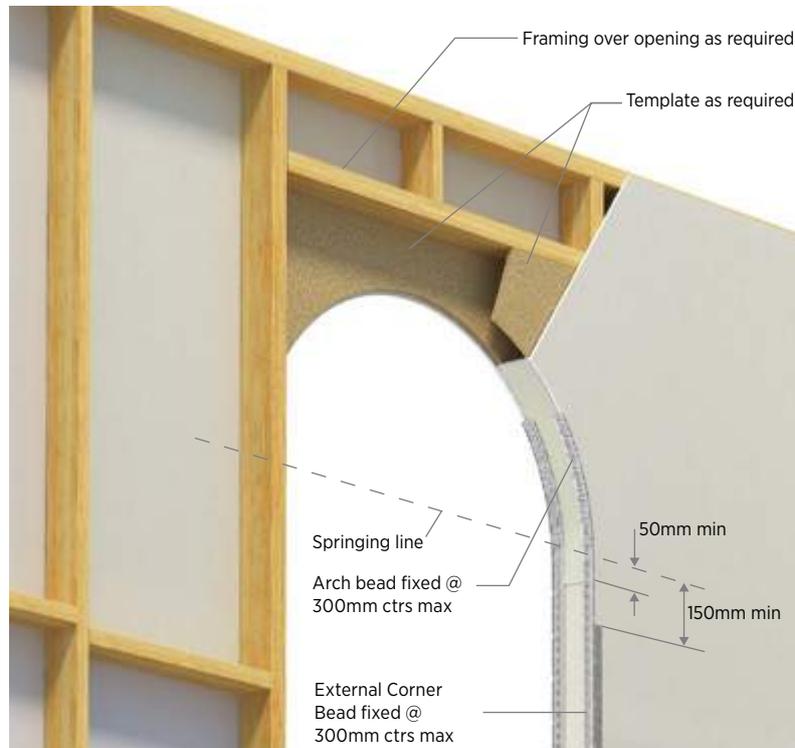


Figure 72: Arch construction



Figure 73: External Corner



Figure 74: USG Boral Paper-faced Metal Bead



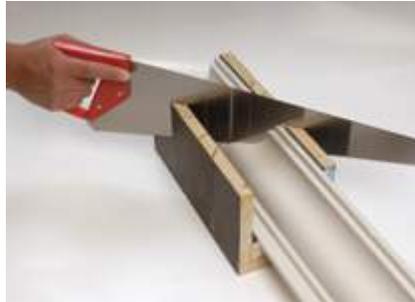
Figure 75: Arch Bead

CORNICES

The installation specifications provided below are applicable to USG Boral paper faced cornices.

HANDLING AND LAYOUT

- Ensure cornices are stacked neatly away from traffic areas to protect profile and prevent damage.
- Cornice should be carried and handled 'on edge' to avoid cracking the core or wrinkling the paper liner.
- Where possible use full lengths of cornice and mitre all corner and butt joints.
- Ensure accurate and level placement by marking ceiling and walls with a line at the cornice edge.
- Install shorter lengths of cornice first then fit longer lengths by bowing out to spring mitres into place.



Position A



Position B



Position C



Position D

Figure 76: Cutting cornices using a mitre box

CUTTING CORNICE

- Measure, mark and cut cornice with a mitre cut each end, using a fine-tooth saw and a mitre box.
- Cut internal angles from the long point, and external angles from the short point.
- Check each cut piece of cornice for actual fit.
- Measure and pre-cut cornice to length before mixing the cornice adhesive.

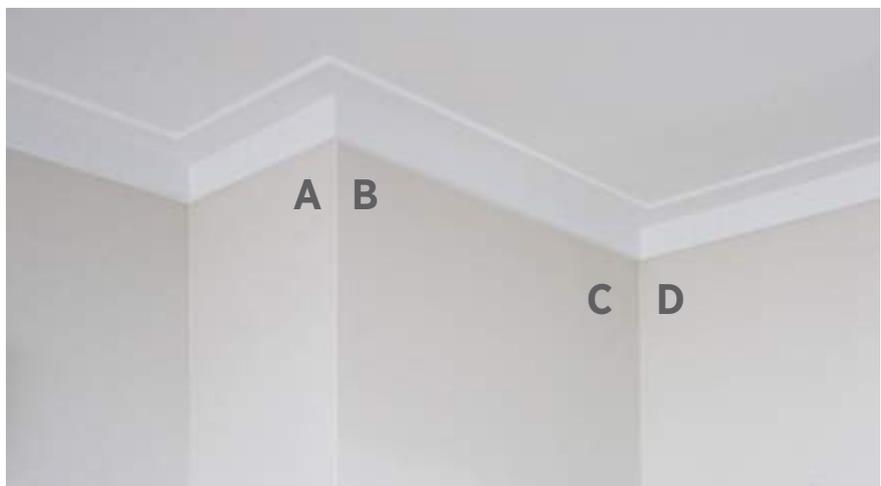


Figure 77: Finished Cornice



Figure 78: Cornice mitre box

» CORNICES

FIXING CORNICE

- Fix cornice to plasterboard walls and ceilings using USG Boral Cornice Adhesive with nails as temporary support for at least 20 minutes.
- If cornice is fixed to fibre cement linings, thoroughly wet the fibre cement at cornice line to prevent premature Cornice Adhesive dry-out and cracking at bottom edge.
- Apply 10mm bead of Cornice Adhesive to top and bottom cornice edges.
- All mitres and joints to be buttered with Cornice Adhesive.
- Fibrous plaster cornice must be thoroughly dampened along mitres prior to the application of Cornice Adhesive.
- Large cast cornices and ceiling roses may require mechanical or other supplementary fixing. Refer manufacturers recommendations.
- Painted surfaces require scoring or abrading, or both, to provide an adequate key prior to the application of Cornice Adhesive and cornice.
- Cornice must be mechanically fixed around cupboards and onto timber beams.
- In hot and dry conditions, take care to avoid premature drying of adhesive and subsequent loss of adhesion. In these conditions, surfaces may need to be slightly dampened.
- Refer to Garage and External Ceilings on page 28 for additional installation requirements in these areas.
- When adhering cornice to masonry wall, apply Cornice Adhesive to the back of cornice so that it does not squeeze out under the bottom edge.



Figure 79: Linear Cornice

MIXING CORNICE ADHESIVE

- Only mix quantities of cornice adhesive that can be used before setting commences.
- Use clean potable water and clean containers for mixing.
- Add cornice adhesive powder to water and mix to a usable paste.
- Avoid overmixing as this may accelerate setting.
- Addition of other materials to cornice adhesive could impair its performance and is not recommended.

JOINTING

Jointing and finishing of plasterboard should be carried out according to the required level of finish (refer to Levels of Finish, page 10).

If no level is specified then Level 4 is the default level of finish for domestic construction. It requires all joints and internal angles to be taped and coated as follows:

- Bed jointing tape into an initial coat of base compound.
- Apply a second coat of base compound to fill and level joints.
- Apply a coat of finishing compound.

The joint compound should be finished smooth and be free of tool marks and ridges. Internal angles are to be completed with a two coat application.

Extreme care must be taken in jointing and finishing where walls or ceilings are subject to critical lighting (refer to Glancing Light sections on pages 12 and 67 and to USG Boral publication *Guide to Lighting and Decoration of Plasterboard*).

JOINTING COMPOUNDS

Jointing compounds broadly fall into two types: setting compounds and air-drying compounds. The jointing system may consist of one or both types of compounds and jointing tape.

SETTING COMPOUNDS

Setting compounds are plaster-based and mainly used for bedding tape and basecoating. They can be applied with either hand or mechanical tools and generally provide a stronger joint than air-drying compounds.

AIR-DRYING COMPOUNDS

Air-drying compounds are vinyl-based premixed compounds that can be used for base coating and/or top coating. The use of air-drying type compounds in hot and dry conditions reduces the risk of premature dry out associated with plaster based setting compounds.

Air-drying compounds may require 24 hours drying time between coats, depending on weather conditions.

Air-drying compounds should not be applied when the interior temperature is less than 10°C.

Application of plaster based setting compounds over premixed air-drying compounds is not recommended. Paper tape must be used when taping with air-drying compounds.

STORAGE

Compounds should be stored in a dry place above ground and protected from the elements and temperature extremes. Storage in an unsuitable environment or once container or bag is opened can shorten the life of the product.

MIXING COMPOUNDS

For best results:

- Check the 'best before' date on packaging to ensure compounds are fit for use.
- Always use clean, cold potable water and clean containers and tools for mixing. Using dirty containers/water/tools may affect the setting time and set strength.
- Slowly add powder to water and allow powder to soak before mixing.
- Mix only enough compound for stated working time when using setting compounds.
- Mix by hand or with a power mixer (max of 400rpm – mixing at higher speeds may draw air into the mix, creating air bubbles). Mix until a smooth workable paste has been achieved. Avoid overmixing as this may accelerate setting and shorten the working life of the compound.
- For setting compounds, once setting has commenced, the material cannot be remixed and should not be agitated or retempered by the addition of water.
- The inclusion of other materials in the mix could impair the performance of the compound and is not recommended.

NOTES:

- Setting compounds should be used with caution in windy, dry and hot conditions as compounds may dry out before setting occurs. Faster setting compounds or air-drying compounds are recommended for such applications.
- Subsequent coats of jointing compounds should not be applied 'wet on wet'.
- Overthinning of jointing compounds may cause shrinkage and hollow joints.

» JOINTING

USG BORAL JOINTING COMPOUNDS

USG Boral offers a wide range of jointing compounds suitable for a variety of application methods and requirements:

TABLE 29: USG BORAL JOINTING COMPOUNDS

APPLICATION	PRODUCT NAME	RELATIVE DENSITY	PACKAGING	TYPE	WORKING TIME	JOINTING			HAND TOOLS	MECHANICAL TOOLS	SANDING
						1ST COAT	2ND COAT	FINISHING COAT			
Base Compounds	EasySand™ 45	Lightweight	16kg bag	Setting	30mins	✓	✓		✓	✓	
	EasySand™ 90				70mins						
	BaseCote® 45	Semi-lightweight	20kg bag	Setting	45mins						
	BaseCote® 60				60mins	✓	✓		✓	✓	
	BaseCote® 90				90mins						
	Taping Compound	Standard weight	17L / 28kg pail	Air-Drying	NA	✓			✓	✓	
Finishing Compounds	Ultralightweight	Ultra-lightweight	17L / 17kg pail	Air-Drying	NA			✓	✓	✓	Very Easy
	Total Lite™ (Grey Lid)	Lightweight	17L / 22kg pail	Air-Drying	NA			✓	✓	✓	Very Easy
	Total Lite™ Dust Control	Lightweight	17L / 4L pail	Air-Drying	NA		✓	✓	✓	✓	Very Easy
	FinalCote®	Semi-lightweight	20kg pail	Air-Drying	NA			✓	✓	✓	Easy
	TopCote550®	Standard weight	20kg pail	Air-Drying	NA			✓	✓	✓	Easy
All Purpose Compounds	EasySand™ 5	Lightweight	8.1kg bag	Setting	6mins	✓	✓	✓	✓	✓	Moderate
	EasySand™ 20				20mins						
	All Purpose Premix	Lightweight	18kg pail	Air-Drying	NA	✓	✓	✓	✓	✓	Moderate
Level 5 Finish*	Tuff-Hide® (Primer Surfacer)	Paint consistency	18.9L / 30kg pail	Air-Drying	NA					Spray / Roller	Moderate
	Diamond® Veneer Finish		20kg bag	Setting	60mins				✓		

* Refer to Levels of Finish on Page 10

» JOINTING

JOINTING TAPES

Jointing tapes are used to provide reinforcement to plasterboard joints and angles.

USG Boral SHEETROCK® Brand paper tape is a high strength special cross-fibre paper tape possessing exceptional wet strength and resisting stretching, wrinkling and tearing.

A wafer thin paper aids smooth finishing and the roughened surface produces a superior bond to jointing compounds.

Centre creased for application to angles.

Paper tape is recommended by USG Boral for jointing of gypsum wall and ceiling linings due to its high strength and suitability for all jointing compounds and applications.

Paper jointing tape must be used in wet area and fire rated applications and with air-drying type jointing compounds.

USG Boral SHEETROCK® Brand jointing tape is available in 75m and 150m x 50mm wide rolls.

NOTE:

As the two sides of paper tape are not identical, the outside of the roll should always be applied to the wet plaster compound to ensure the best adhesion.



Figure 80: Paper Jointing Tape

USG Boral SHEETROCK® Brand fibreglass tape has a unique a cross-fibre construction for providing greater joint strength and crack resistance than conventional fibreglass mesh tapes. It provides 2-coat, 1 day joint finishing and is used with setting compounds only - not to be used with air drying types.

STOPPING RECESSED JOINTS

Recessed joints should be stopped and finished with a straight or curved trowel to leave a slightly convex camber over the joint.

FIRST COAT

- Fill recessed joint with a layer of base compound using a flexible 150mm broadknife.
- Centre and press the paper tape into the base compound using a 150mm broadknife, drawing along the joint with sufficient pressure to remove excess compound.
- Ensure all air bubbles have been expelled, taking care sufficient compound is left under the tape to provide a strong bond.
- After embedding tape, apply a skim coat of compound to fill the recess.
- Spot fastener heads.

SECOND COAT

- Allow sufficient time for the first coat of base compound to set.
- Apply a second coat of base compound approx 200mm wide, using a trowel or broadknife.
- Feather joint edges.
- Spot fastener heads again, extending beyond the first coat by approx 25mm.

FINISHING COAT

- Ensure base coats are set and scrape to remove any rough spots or lumps.
- Using a trowel, apply a coat of finishing compound approx 250mm wide, feathering out approx 50mm beyond edges of the basecoat.
- Use a curved trowel on the finishing coat to produce a slight convex curve. Feather out the edges.
- Allow a minimum of 24 hours to dry (longer in cold, wet weather conditions).
- When dry, lightly sand to a smooth finish with sanding mesh or 150-220 grit paper, depending on sanding hardness of finishing compound used.

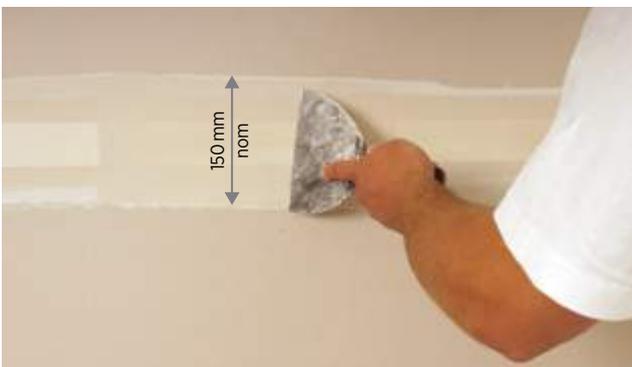
» JOINTING



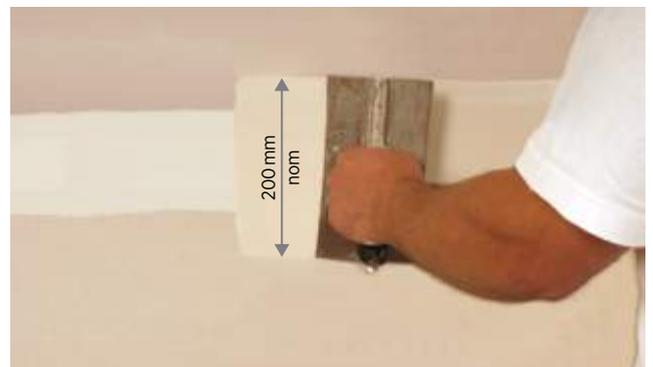
1. First coat - Bedding compound



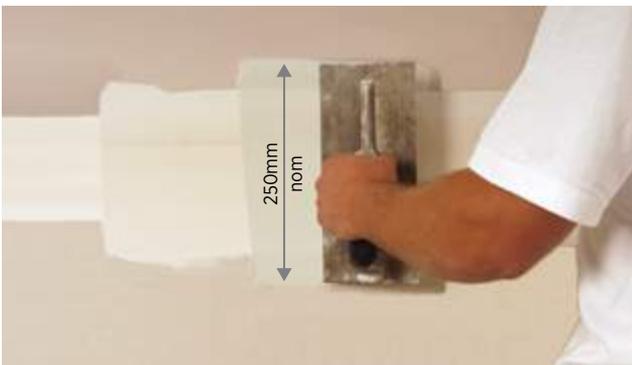
2. First coat - Bed tape



3. First coat - Skim coat



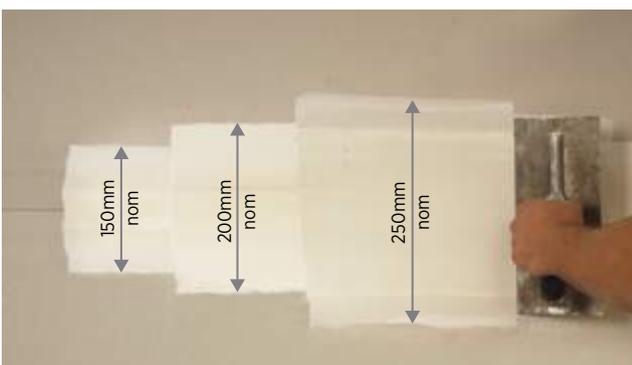
4. Second coat



5. Finishing coat



6. Dry sanding



7. Total recessed joint system

Figure 81: Stopping Recessed Joints

» JOINTING

STOPPING BUTT JOINTS

Butt or end joints should be flush-jointed and finished with a three coat system as for recessed joints.

For a flatter finish, and to minimise surface build-up of compound, widen each jointing coat so that the final coat of the finished joint is about 500mm wide.

FIRST COAT

- Using a trowel, apply a thin layer of base compound to each side of the joint (approx 300mm total width) prefilling any recess gaps at the joints.
- Centre and press the paper tape into the base compound using a 150mm broadknife, drawing along the joint with sufficient pressure to remove excess compound.
- Ensure all air bubbles have been expelled, taking care sufficient compound is left under the tape to provide a strong bond.
- After embedding tape apply a skim coat of compound over the paper tape.

SECOND COAT

- Allow sufficient time for the first coat of base compound to set before applying a second coat.
- Apply a second coat of compound to each side of the joint (approx 400mm total width).
- Feather out joint edges.
- The second coat should have a gradual convex curve.

FINISHING COAT

- Ensure base coats are set and remove any rough spots or lumps.
- Using a straight bladed trowel, apply a coat of finishing compound to each side of the joint (approx 500mm total width). Feather out the edges.
- The finished coat should have a slight convex curve.
- Allow a minimum of 24 hours to dry (longer in cold, wet weather conditions).
- When thoroughly dry, lightly sand to a smooth finish with sanding mesh or 150-220 grit sand paper, depending on sanding hardness of finishing compound used.

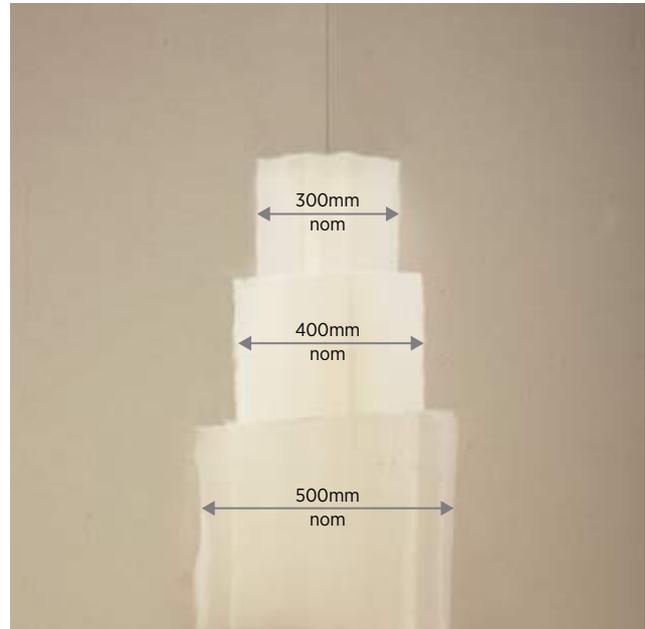


Figure 82: **Stopping Butt Joints**

» JOINTING

STOPPING CORNERS

INTERNAL CORNERS

Internal corners should be jointed with a two coat system using paper tape, or paper faced metal beads. Gaps in excess of 4mm should be pre-filled with a base compound.

Installation:

- Apply compound to both sides of internal corner using a 75mm broadknife.
- Measure and cut reinforcing tape, fold along centreline and bed into corner, using a 50mm corner taping tool.
- Apply a skim coat of compound over tape.
- When dry apply a second coat of compound with the broad knife, then finish with a 100mm corner finishing tool, feathering beyond edges of first coat.
- Allow a minimum of 24 hours to dry (longer in cold, wet weather conditions).
- When thoroughly dry, lightly sand to a smooth finish with sanding mesh or 150–220 grit paper, depending on the sanding hardness of finishing compound used.



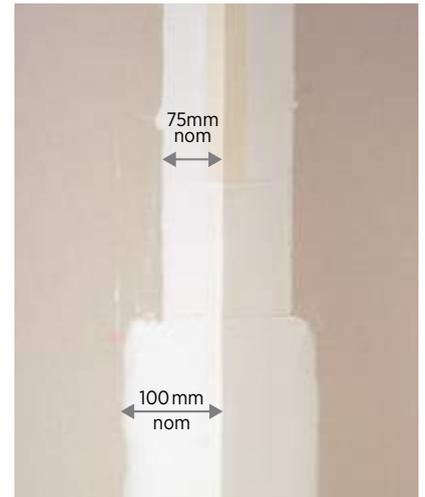
1. Apply base compound



2. Bed tape



3. Apply second coat



4. Internal angle jointing system

Figure 83: Stopping Internal Corners

» JOINTING

EXTERNAL CORNERS

External corners should be strengthened with perforated metal angles or USG Boral SHEETROCK® paperfaced metal beads then jointed and finished with a three coat system.

Installation:

- Cut metal angle to length and position so that the angle is both straight and in line with the wall surfaces.
- Fix with nails or staples at maximum 300mm centres along each face with nails opposite each other.
- Stop and finish with a three coat system as per jointing specification.
- Ensure that the first coat of compound covers approx 150mm of angle faces and is forced through the perforations.
- The second coat should extend approx 200mm from the corner.
- The final coat should extend approx 280mm from the corner with the edges feathered out.
- Ensure that the final coat is built up to the corner.
- Allow a minimum of 24 hours to dry (longer in cold, wet weather conditions).
- When finishing compound is thoroughly dry, light sand to a smooth finish with sanding mesh or 150–220 grit paper, depending on the sanding hardness of finishing compound used.

Other beads and angles (eg. Shadowline, Stopping Angle) should be finished in the same manner.

USG Boral SHEETROCK® paper faced metal beads provide fast, easy installation, do not require mechanical fasteners and provide superior resistance to edge cracking. The unique "nose coating" on the paper tape resists



1. Cut angle and fix to sides of corner @ 300mm ctrs



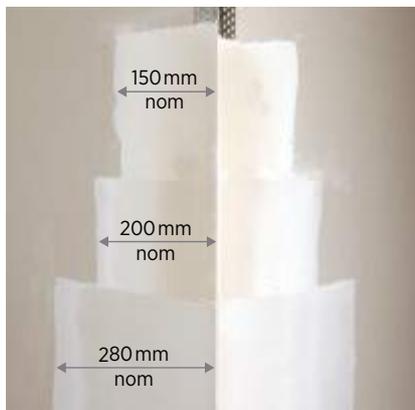
2. Apply first coat to both corner faces



3. Apply second coat to corner faces



4. Apply third coat to corner faces



5. External Angle Jointing system

Figure 84: **Stopping external angles**

scuffing and fuzzing from knives and sanding.

Available to suit externals, internals, bullnose, 135° and reveal trims, in various lengths.

TOOLS AND ACCESSORIES

A wide range of plastering tools and accessories is available through various merchants and specialist suppliers, including:

- Power Tools
- Fasteners
- Joint Knives
- Sanding tools
- Trowels
- Mechanical jointing tools
- Plasterers trestles and scaffolding.
- Bead hoppers
- Bead rollers
- Mixers

Stainless steel jointing tools are recommended for the best possible finish and service longevity.

Low cost plastic tools are also available and may be suitable where low cost or disposable tools are required.

Tools should be cleaned in water before compounds have fully set and stainless steel tools given a light rub with an oiled cloth to prevent rusting.

Plasterers trestles or scaffolding should be used to ensure correct working height.



Figure 85: Plastering Tools and Accessories

» TOOLS AND ACCESSORIES

MECHANICAL JOINTING TOOLS

The following recommendations apply to mechanical jointing tools in addition to the general Jointing and Finishing specification.

BANJO BOX (Mud Machine)

- Jointing compounds recommended for use in Banjo Box include USG Boral SHEETROCK® Brand Taping Compound, RediBase™ and longer setting compounds such as the SHEETROCK® Brand Easy Sand™ 90 and BaseCote 90.
- Centre joint tape along the joint and using a broad knife press the tape down into the bedding compound.
- With the broad knife held approximately at 45 degrees to the board surface draw along the joint with enough pressure to remove excess compound and any air bubbles sandwiched beneath the tape (avoid dry spots under tape).
- Banjo Box 'chaser' (follow up stopper) should immediately follow to avoid dry-out. Ensure full width of recess is filled.
- Leave sufficient compound under the tape to achieve a good bond.
- Immediately apply a skim coat of base compound. This reduces the possibility of the tape edge curling or wrinkling which could lead to edge cracking (especially in hot, dry conditions).



Figure 86: Banjo Box Application

FLAT BOXES (200mm, 250mm or 300mm)

- Automatic boxes distribute the correct amount of joint compound over flat surfaces. All flat boxes have an adjustable setting that automatically crowns the joint.
- When second coating with 200mm box avoid too much take off; if following through with a broad knife, this will ensure that joint is flat.

NOTES:

- Beware of creating hollow joints when following through with a broad knife.
- All topping compounds will shrink back if second coat is hollow.
- Ensure box setting cam is set correctly to compensate for any out of plane frame undulations (ie uneven trusses or centre row wall noggings). Regularly change box blades and skid plates to avoid uneven joint finish.



Figure 87: Flat Box Application

DECORATING PLASTERBOARD LININGS

GENERAL REQUIREMENTS

USG Boral plasterboard linings are an excellent base for:

- Painting
- Wallpapering
- Special finishes.

When preparing and decorating plasterboard surfaces, ensure that only high quality paints, wallpapers etc are used and applied in accordance with the manufacturer's instructions.

If using semi-gloss or gloss paint, it is recommended that plasterboard surface is finished to a Level 5 standard as these paints tend to highlight surface variations.

Take care, when sanding and finishing joints and fastener heads, to avoid scuffing the plasterboard surface adjacent to the jointed areas.

SURFACE PREPARATION

Make sure the USG Boral plasterboard linings are dry and free of dust, oil, or greasy stains before decorating surfaces. Correct visible surface variations with an approved filler.

PAINTING

When painting plasterboard walls and ceilings, follow the procedures set down by the Standard AS/NZS 2311 *The painting of buildings*.

It is recommended that a coat of quality sealer undercoat be applied to the plasterboard surface prior to the application of subsequent coats of paint.

The chosen proprietary brand sealer undercoat should be formulated to fulfil the following functions:

- Equalise variations in porosity over the entire surface.
- Stop the migration or bleeding of chemicals from the substrate which could affect the appearance of the finishing coat.
- Conceal the difference in texture between the paper and the joints.

NOTES:

- Plasterboard linings should be sealed as soon as practical to minimise the risk of paper discolouration.
- Solvent borne sealers are recommended for plasterboard surfaces that may have discoloured due to prolonged exposure to ultraviolet light.
- If plasterboard linings are painted using airless spray, all paint coats should be back rolled while wet.
- Overthinning paint may cause banding.

AVOIDING GLANCING LIGHT EFFECTS

When finishing USG Boral plasterboard walls and ceilings, consider the effects of glancing light. Walls and ceilings that seem perfectly flat in diffused light may appear rough when lit by light falling across the wall or ceiling surface.

Avoid glancing light problems through careful planning of lighting and paint application at the design stage (refer Glancing Light on page 12).

For more information, refer to the following publications:

- CSIRO, *Illumination and Decoration of Flat Surfaces*
- FWCIANZ, *Glancing Light*
- USG Boral, *Guide to Lighting and Decoration of Plasterboard*.

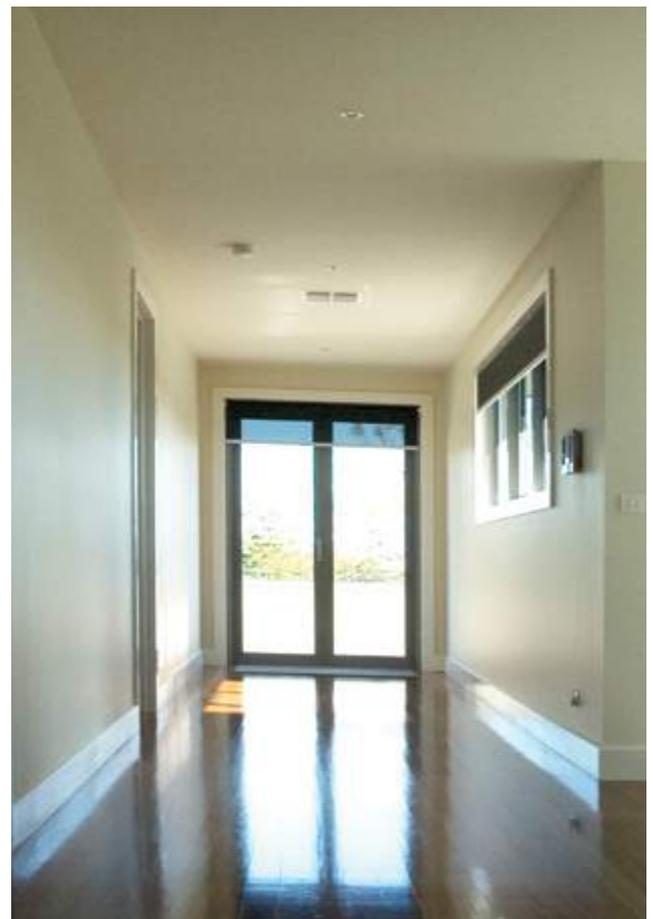


Figure 88: **Glancing Light Situation**

WARRANTY

USG Boral warrants its products for 10 years from the date of supply of the product. Refer USG Boral Warranty document for warranty conditions.

SUSTAINABILITY

USG Boral aims to minimise the environmental impact of its operations and to make a positive difference to the environment and communities in which it operates.

Plasterboard is manufactured from abundant natural gypsum resources and 100% recycled paper liner.

Plasterboard waste can be recycled back into new plasterboard or used as a soil conditioner.

HEALTH AND SAFETY

For information regarding the safe use of USG Boral products and accessories please refer to instructions on the product packaging or contact your local USG Boral Sales Office or TecASSIST for a current copy of the Material Safety Data Sheet.

TECHNICAL ENQUIRIES

USG Boral provides free technical advice to builders, architects, contractors, engineers, regulators and home owners.

USG Boral can be contacted on weekdays 8.30am – 5.00pm on **0800 USGBORAL (0800 874-267)** or **www.usgboral.com**

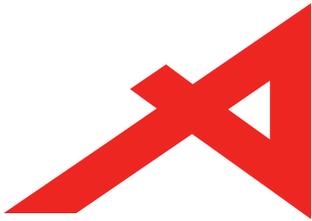
SALES ENQUIRIES

Auckland	(09) 270-2595
Wellington	(04) 560-4528
Christchurch	(03) 365-4245

This Technical Information Guide is intended to provide general information and should not be used as a substitute for professional advice. There are many variables that can influence construction projects which affect whether a particular construction technique is appropriate. Before proceeding with any project we recommend you obtain professional advice to ascertain the appropriate construction techniques to suit the particular circumstances of your project having regard to the contents of this Installation Manual. We recommend you use qualified tradespersons to install this system.

The technical information contained in this manual was correct at the time of printing. Building systems, details and product availability are, however, subject to change. To ensure the information you are using is current, USG Boral recommends you review the latest building information available on the USG Boral website. For further information contact TecASSIST® or your nearest USG Boral Sales Office.

© 2015 USG BORAL. All rights reserved. The trademarks USG BORAL, INNOVATION INSPIRED BY YOU, Unispan, Wet Area Board, Soundstop, Echostop, Firestop, Wet Area, Firestop, Impactstop, Multistop, Flexiboard, Shaftliner, Cove (55mm), Cove (75mm), Cove (90mm), New York (90mm), Sydney Cove (90mm), Manly (75mm), Cairo 2 Step (50mm), Cairo 3 step (75mm), Cairo 4 Step (100mm), Linear (75mm), BaseCote, Lightweight Taping, RediBase, LiteFinish, FinalCote, TopCote 550, All Purpose Premix, TecASSIST, PremiumBond, are trademarks or registered trademarks of USG Boral Building Products or one or more of its affiliates. SHEETROCK, Fiberock, Easy Sand, Durabond, Ultralightweight, Total Lite (Grey Lid), Tuff-Hide, Diamond are trademarks or registered trademarks owned by United States Gypsum Company and used under license.



BRANZ Appraised

Appraisal No. 899 [2015]

USG BORAL BRACING SYSTEMS

Appraisal No. 899 (2015)

Amended 30 May 2017

USG BORAL

INNOVATION INSPIRED BY YOU.™



BRANZ Appraisals

Technical Assessments of products for building and construction.



USG Boral Building Products NZ

PO Box 11-155

Ellerslie

Auckland 1542

Tel: 0800 874 267

Fax: 0800 332 123

Web: www.usgboral.com

Email: info.nz@usgboral.com



BRANZ

1222 Moonshine Rd,

RD1, Porirua 5381

Private Bag 50 908

Porirua 5240,

New Zealand

Tel: 04 237 1170

branz.co.nz



Product

- 1.1 USG Boral Bracing Systems are a range of wall bracing systems based on the use of USG Boral Sheetrock® Ceiling and Wall, USG Boral Multistop™ 4, and USG Fiberock® Aqua-Tough™. USG Boral Bracing Systems are used to resist earthquake and wind loads on timber frame buildings designed and constructed in accordance with NZS 3604: 2011. The USG Boral Bracing Calculator provides an electronic means of calculating bracing demand and resistance.

Scope

- 2.1 USG Boral Bracing Systems have been appraised for use as interior wall bracing systems in buildings within the scope limitations of NZS 3604: 2011.

Building Regulations

New Zealand Building Code (NZBC)

- 3.1 In the opinion of BRANZ, USG Boral Bracing Systems, if designed, used, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet the following provisions of the NZBC:

Clause B1 STRUCTURE: Performance B1.3.1, B1.3.2 and B1.3.4. USG Boral Bracing Systems meet the requirements for loads arising from self-weight, earthquake, wind and impact [i.e. B1.3.3 (a), (f), (h) and (j)]. See Paragraphs 8.1 – 8.9.

Clause B2 DURABILITY: Performance B2.3.1 (a) not less than 50 years. USG Boral Bracing Systems meet this requirement. See Paragraphs 9.1 – 9.4.

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

- 3.2 The bracing demand calculation and bracing distribution rules published in the USG Boral Bracing Calculator are in accordance with Section 5 of NZS 3604: 2011. Bracing resistance is provided by bracing element ratings determined in accordance with NZS 3604: 2011, Paragraph 8.3.1.2.
- 3.3 NZS 3604: 2011 is an **Acceptable Solution** for compliance with New Zealand Building Code Clause B1 Structure.



Technical Specification

4.1 The USG Boral Plasterboards and accessories used with USG Boral Bracing Systems and supplied or specified by USG Boral Building Products NZ are as follows:

USG Boral Plasterboards

USG Boral Sheetrock® Ceiling and Wall

- USG Boral Sheetrock® Ceiling and Wall is a paper-bound, gypsum-plaster core sheet lining material. It is available in 10 and 13 mm sheet thicknesses and sheet widths of 1200 mm and 1350 mm. Sheets are available in various edge profiles and lengths from 2400 mm to 6000 mm. Refer to Table 1. The nominal sheet weight is 5.9 kg/m² for 10 mm sheet thickness and 6.9 kg/m² for 13 mm sheet thickness. USG Boral Sheetrock® Ceiling and Wall face paper is buff in colour.

Table 1: USG Boral Sheetrock® Ceiling and Wall Available Sheet Sizes

Sheet Thickness [mm]	Sheet Edge Profile	Sheet Width [mm]	Sheet Length [mm]						
			2400	2700	3000	3600	4200	4800	6000
10 mm	RE/RE	1200	✓	✓	✓	✓	✓	✓	✓
10 mm	RE/SE	1350				✓		✓	✓
13 mm	RE/RE	1200	✓	✓	✓	✓	✓	✓	✓
13 mm	RE/SE	1350				✓		✓	

RE = recessed edge, SE = square edge

USG Boral Multistop™ 4

- USG Boral Multistop™ 4 is a paper-bound, gypsum-plaster core sheet lining material. It is available in 10 and 13 mm sheet thicknesses and sheet widths of 1200 mm and 1350 mm. Sheets are available in various edge profiles and lengths from 2400 mm to 4800 mm. The nominal sheet weight is 9.7 kg/m² for 10 mm sheet thickness and 11.8 kg/m² for 13 mm sheet thickness

USG Fiberock® Aqua-Tough™

- USG Fiberock® Aqua-Tough™ is a paper-less, gypsum-plasterboard reinforced with cellulose fibre. It is available in 13 and 16 mm sheet thicknesses and a sheet width of 1200 mm. Sheets are only available with a recessed edge profile and lengths of 2400 mm, 2700 mm and 3000 mm. The nominal sheet weight is 12 kg/m² for 13 mm thick sheets and 15 kg/m² for 16 mm thick sheets. USG Fiberock® Aqua-Tough™ is off-white in colour.

USG Boral Accessories and USG Boral Jointing Compounds

- As specified in the Technical Literature.

Board Substitutions

4.2 In certain situations, properties additional to bracing may be required of the plasterboard lining. Table 2 lists suitable substitute boards.

Table 2: Allowable Substitute Boards in USG Boral Bracing Systems

Specified Board	Fiberock® Aqua-Tough™		Firestop®		Multistop™ 4			Soundstop™		Wetstop™		
	13 mm	16 mm	13 mm	16 mm	10 mm	13 mm	16 mm	13 mm	16 mm	10 mm	13 mm	16 mm
10 mm Sheetrock®	✓ ¹	✓ ²	✓	✓ ²	✓	✓	✓ ²	✓	✓ ²	✓	✓	✓ ²
10 mm Multistop™	✓ ¹	✓ ²			n/a	✓						
13 mm Fiberock® Aqua-Tough™	n/a	✓ ²										

- Use 41 mm x 6 g screws
- Use 51 mm x 7 g screws



Ceiling Diaphragm Components

- 4.3 USG Boral components used in ceiling diaphragms are as follows:
- PC24 – 24 x 29 mm steel perimeter channel
 - FC37 – 23 mm deep steel ceiling batten
 - DJ4040 – 40 x 40 mm metal angle
 - DF37-S – 97 mm long x 90 mm wide direct fix brackets for ceiling batten
 - DF37-L – 193 mm long x 90 mm wide direct fix brackets for ceiling batten

Components and Accessories

- 4.4 System components and accessories for USG Boral Bracing Systems, which are supplied by the building contractor are:

Fasteners

- 32 mm or 41 mm x 6 g, or 51 mm x 7 g drywall, gold passivated, bugle head, coarse thread screw with an 8 mm head for fixing to timber framing.
- 25 mm x 6 g gold passivated, bugle head, fine thread screw with an 8 mm head for fixing plasterboard to steel ceiling battens.

Adhesive

- Adhesive must comply with AS 2753 for adhering plasterboard to timber framing.

Plywood

- Plywood must be a minimum of 7 mm thick complying with AS/NZS 2269 D-D Grade Structural.
- Plywood fixings are 50 x 2.8 mm hot-dipped galvanised steel flat-head nails.

Fasteners, Anchors and Connections

- Pryda Bracing Anchor – galvanised steel 87 mm high x 85 mm long x 50 mm wide x 4 mm thick angle bracket. The bracket is supplied with 7 Type 17 screws 5.5 x 35 mm.
- Coach screws 12 mm x 150 mm and 50 x 50 x 3 mm washer hot-dipped galvanised for fixing to timber floors.
- Cast-in bolts M12 x 150 mm minimum and 50 x 50 x 3 mm washers for fixing to concrete floors.
- Proprietary fixings with a minimum characteristic strength of 15 kN may be used, instead of cast-in bolts.
- Shot fired fasteners for fixing internal line bracing systems to concrete slabs. Refer to fastener proprietor for specifications.
- Galvanised or stainless steel strap 25 x 0.9 mm top and bottom plate connections.
- Strap fixings 30 x 2.5 mm hot-dipped galvanised or stainless steel flat-head nails.
- 10 g x 30 mm drill point wafer head screws for fixing FC37 ceiling battens to timber blocking.
- 10 g x 16 mm drill point wafer head screws for fixing FC37 ceiling battens to DJ4040 blocking.
- 6 g x 40 mm screws for fixing DJ4040 blocking to timber ceiling framing.
- Ceiling Batten Bracket Fixings – 30 x 2.5 mm hot-dipped galvanised clouts or 25 mm x 8 g wafer head screws.

Note: For corrosion protection requirements refer to NZS 3604: 2011 Section 4.

Ceiling Battens

- Timber ceiling battens as specified in NZS 3604: 2011.

Handling and Storage

- 5.1 The best results are achieved when USG Boral Plasterboards are treated as a finishing material and protected from damage. Sheets must be stacked flat and kept dry at all times. For limits on stack heights see the Technical Literature. Sheets must be carried on edge and not dragged.
- 5.2 All accessories must be kept dry.

Technical Literature

- 6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for USG Boral Bracing Systems. The Technical Literature must be read in conjunction with this Appraisal. All aspects of design, use, installation and maintenance contained in the Technical Literature and within the scope of this Appraisal must be followed.

Design Information

General

- 7.1 The tabulated bracing ratings given in Table 3 of this Appraisal are for manual calculations which have been rounded and are conservative. NZS 3604: 2011 provides methods to distribute the bracing units in walls to resist forces and a method for modifying the wall bracing capacity for alternative wall heights. The use of ceiling diaphragms is defined in the Technical Literature.
- 7.2 USG Boral Bracing Systems are for use in dry, internal situations only.
- 7.3 USG Boral Plasterboards must not be exposed to temperatures of 52°C or greater for prolonged periods. Refer to appliance and fitting manufacturers for installation details.

USG Boral Bracing Calculator

- 7.4 The USG Boral Bracing Calculator contains design procedures and an electronic calculation method for bracing demand calculated in accordance with NZS 3604: 2011, Section 5. Floor loadings can be selected in accordance with either NZS 3604: 2011 Bracing Demand Tables 5.5 – 5.10 for 2 kPa floor loads or less, or Tables 14.1 – 14.3 for 3 kPa floor loads.
- 7.5 The bracing demand calculations contained in the USG Boral Bracing Calculator are based on first principles engineering and calculate wind and earthquake demand based on the building parameters entered. Resulting bracing demand calculations are project specific and can differ from values derived using NZS 3604: 2011 wind and earthquake demand tables. The USG Boral Bracing Calculator has been assessed as part of this Appraisal.

Framing

- 7.6 Timber framing grade, spacing and construction must comply with NZS 3604: 2011. Timber treatment must comply with NZBC Acceptable Solution B2/AS1.
- 7.7 USG Boral Building Products NZ recommends the use of kiln-dried stress-graded framing timber. The minimum actual framing dimensions are 90 x 45 mm for external walls and 75 x 45 mm for internal walls.
- 7.8 Joints in the top plates of bracing panels must be tied together with 3 kN and 6 kN top plate connectors using 25 x 0.9 mm galvanised mild steel strap, 3 nails each side of joint for 3 kN and 6 nails each side of joint for 6 kN.

Board Substitutions

- 7.9 On occasions, properties additional to bracing may be required of the plasterboard lining. Refer to Table 2.

Structure

Bracing

- 8.1 The bracing units (wind and earthquake) published for manual calculations in USG Boral Bracing Systems are given in Table 3.
- 8.2 The bracing unit ratings embedded in the USG Boral Bracing Calculator are less conservative and vary with wall length.
- 8.3 The Technical Literature provides comprehensive construction and panel hold-down details. These include bottom plate fixings using bolts (concrete) or coach screws (timber) and the Pryda Bracing Anchor or nailed stud-to-plate straps.
- 8.4 The bracing units are derived from the BRANZ P21 test method based on a wall height of 2.4 m. For greater wall heights the bracing rating is calculated by multiplying the appropriate value shown in Table 3 by a factor $f=2.4$ and divided by the wall height in metres. Walls lower than 2.4 m shall be rated as if they were 2.4 m high.

Ceiling Diaphragms

- 8.5 USG Boral Plasterboard ceiling diaphragms are used to space bracing lines further apart than 6 m. The basic shape of a ceiling diaphragm must be square or rectangular and the length must not exceed twice the width.
- 8.6 For ceiling diaphragms not steeper than 15° and not exceeding 7.5 m in length, any USG Boral Plasterboard listed in Table 2 [except 10 mm USG Boral Sheetrock® Ceiling and Wall] may be used provided the perimeter fixing of the sheets and the diaphragm boundary are fixed at 150 mm centres to framing as required by NZS 3604: 2011.

Openings in Bracing Elements

- 8.7 Small openings of 90 x 90 mm or less may be placed anywhere except within 90 mm of the edge of the bracing element. Holes of a maximum diameter of 125 mm may be placed in the body of the sheet a minimum of 300 mm from the edge of the bracing element.

Water-splash Areas

- 8.8 USG Boral Bracing Systems must not be located in shower cubicles or behind baths and the like. USG Boral Bracing Systems may be used in water-splash areas provided they are protected as required by NZBC Clause E3.

Impact Resistance

- 8.9 USG Boral Plasterboards provide adequate resistance to soft body impact, based upon experience of use in domestic and light commercial applications.

Table 3: USG Boral Bracing Systems Bracing Ratings

Type	Minimum length [m]	Maximum Length [m]	Lining	Other Requirements	BU/m	
					Wind	Earthquake
10mm USG Boral Sheetrock® Ceiling and Wall						
UB1S	0.4	6.0	10 mm Sheetrock® Ceiling and Wall one side	n/a	55	50
UB2S	0.4	4.8	10 mm Sheetrock® Ceiling and Wall both sides		65	60
10 mm USG Boral Multistop™ 4						
UB1M	0.4	1.2	10 mm Multistop™ 4 one side	Panel hold-downs	85	85
	1.2	2.4			100	85
UBSM	0.6	2.4	10 mm Multistop™ 4 one side, 10 mm Sheetrock® Ceiling and Wall the other		130*	125*
UBMP	0.4	0.6	10 mm Multistop™ 4 one side, 7 mm plywood the other		90	110
	0.6	1.2			120*	130*
	1.2	2.4			150*	150*
13 mm USG Fiberock® Aqua-Tough™						
UB1FR	0.4	1.2	13 mm Fiberock® Aqua-Tough™ one side	Panel hold-downs	105	125*
	1.2	4.8			145*	140*
UB2FR	0.4	1.2	13 mm Fiberock® Aqua-Tough™ both sides		115	130*
	1.2	2.4			150*	150*
UBFRP	0.4	1.2	13 Fiberock® Aqua-Tough™ one side, 7mm plywood the other		105	130*
	1.2	2.4			150*	150*

Notes:

Where linings are specified on both faces, each face must be fastened as a bracing element.

* Timber Floors – A limit of 120 BU/m applies to NZS 3604: 2011 timber floors.

Durability

- 9.1 USG Boral Bracing Systems, including linings and their fixings have a serviceable life of at least 50 years. The ability of the systems to remain durable is dependent on them remaining dry in service, and being maintained in accordance with this Appraisal.

Maintenance

- 9.2 The building must be maintained weatherproof and USG Boral Plasterboard must be protected from external and internal moisture in accordance with NZBC Clauses E2 and E3.
- 9.3 Holes resulting from damage to the lining, up to 100 x 100 mm square, will have no significant effect on the performance of the bracing panel. Such holes may be repaired by patching, stopping and finishing as appropriate. Independent expert advice must be sought to assess the effect and repair of larger areas of damage.
- 9.4 Bracing elements require no ongoing maintenance, apart from decoration and the repair of any damage.

Prevention of Fire Occurring

- 10.1 Separation or protection must be provided to USG Boral Plasterboard from heat sources such as fire places, heating appliances, flues and chimneys. Part 7 of NZBC Acceptable Solutions C/AS1 – C/AS6 and NZBC Verification Method C/VM1 provide methods for separation and protection of combustible materials from heat sources.

Fire Affecting Areas Beyond the Fire Source

Internal Surface Finishes

- 11.1 Table 4 shows the Material Group Numbers for USG Boral Plasterboards without applied paint or wallpaper finishes. When an applied finish is used over USG Boral Plasterboards, the Material Group Number must be obtained from the manufacturer of the finish product or system, for the complete lining system. USG Boral Plasterboards can be used as internal surface linings where permitted by NZBC Performance Clause C3.4 [a].
- 11.2 In all Risk Groups, where foamed plastics building materials or combustible insulating materials form part of a wall system, the complete system including the internal lining and finishes must achieve a Group Number of not more than three.
- 11.3 In buildings with a SH Risk Group classification, there are no internal surface finish requirements for USG Boral plasterboards [with or without an applied finish], unless foamed plastics building materials or combustible insulating materials form part of the wall system.

Table 4: Surface Finish Properties

Product	Material Group Number
USG Boral Firestop®	1-S
USG Boral Multistop™	1-S
USG Boral Sheetrock® Ceiling and Wall	1-S
USG Boral Wet Area Board	1-S
USG Fiberock® Aqua-Tough™	1-S

Internal Moisture

- 12.1 USG Boral Plasterboard must be used in dry internal situations, and must not be used where likely to be exposed to liquid water, or where extended exposure to humidity above 90% RH is expected, e.g. such as may be expected in sauna rooms, commercial kitchens and the like.



Installation Information

Installation Skill Level Requirement

- 13.1 Installation of USG Boral Bracing Systems must be completed by, or under the supervision of a Licensed Building Practitioner with the relevant Licence Class, in accordance with the Technical Literature and this Appraisal.

General

- 14.1 USG Boral Bracing Systems must be installed in accordance with the Technical Literature. For inspection, reference must be made to the Technical Literature.

Framing

- 14.2 To achieve an acceptable decorative finish, the Technical Literature specifies that walls must not be lined unless the moisture content of timber framing is less than 18%. USG Boral Building Products NZ recommend a moisture content of 8–18% where buildings are to be air conditioned or centrally heated.

Cutting

- 14.3 USG Boral Plasterboards are easily cut by scoring the face paper with a sharp short-bladed trimming knife, and then snapping the plasterboard away from the cut face and cutting the back paper, or by sawing. Use of a metal straightedge facilitates clean straight cuts. Cut edges can be tidied up by using a knife. Paper dags should be removed.
- 14.4 USG Fiberock® Aqua-Tough™ is stronger than paper-faced plasterboard, but can still be cut by scoring and snapping. The sheets may also be cut with a hand saw or a power saw fitted with a dust extraction system. Cut edges may be smoothed with a sanding block or rasp.

Sheet Fixing

- 14.5 Corner fixings must be 50 mm away from the sheet corner. Fixings must be no closer than 12 mm from the paper-bound sheet edge of plasterboards or recessed edges of USG Fiberock® Aqua-Tough™, and no closer than 18 mm from a cut edge on plasterboards or sheet ends on USG Fiberock® Aqua-Tough™. Fixings must be driven at right angles to the sheet until the head is seated in a slight dimple just below the surface of the paper liner or the board surface in the case of USG Fiberock® Aqua-Tough™. Fixings must not be over-driven.
- 14.6 USG Boral wall bracing sheets are fixed at 150 mm centres around the perimeter framing of the bracing element. At the corners of the wall bracing elements, a special fastening pattern is required in both directions with fasteners spaced at 50 mm, 100 mm, 150 mm, 225 mm and 300 mm from the corner and there-after at 150 mm centres. Fixing to other framing is either mechanical or by using plasterboard adhesive.
- 14.7 The USG Boral Bracing Systems requirements for horizontal or vertical sheet installation must be met. Full sheets must be used wherever possible.
- 14.8 Plywood is nail fixed at 150 mm centres around the perimeter of each sheet and at 300 mm centres to intermediate framing. The minimum edge distance for fixings is 7 mm.

Ceiling Diaphragms

- 14.9 All USG Boral Plasterboard ceiling diaphragms require fixings around the perimeter of each sheet and the diaphragm boundary at 150 mm centres. See Paragraphs 8.5 to 8.6 and refer to the Technical Literature.

Jointing and Finishing

- 14.10 All bracing element sheet joints must be reinforced with paper tape and finished in accordance with the USG Boral Bracing Systems Technical Literature.

Health and Safety

- 14.11 Dust resulting from the sanding of stopping and finishing compounds may be a respiratory irritant, and the use of a suitable facemask is recommended.



Basis of Appraisal

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

Tests

- 15.1 Bracing tests were carried out by SCION in accordance with BRANZ Technical Paper P21 to determine the performance of USG Boral Bracing Systems when the building is subjected to lateral wind or earthquake loading. SCION's test facilities, procedures and results have been reviewed by BRANZ and found to be satisfactory.
- 15.2 USG Fibrerock® Aqua-Tough™ and the plasterboard liner papers have been subject to an accelerated aging regime by BRANZ to assess their long term properties.

Investigations

- 16.1 The USG Boral Bracing Calculator has been assessed by BRANZ and found to be satisfactory.
- 16.2 The USG Boral Bracing Systems Technical Literature has been examined by BRANZ and found to be satisfactory.
- 16.3 Site visits were carried out by BRANZ to assess the practicability of the installation of the systems, and to view completed installations.
- 16.4 An assessment was made of the durability of the systems by BRANZ technical experts and found to be satisfactory.
- 16.5 USG Boral Plasterboards have been assessed for the following properties: MOR, MOE, nail pull resistance, edge hardness, hard and soft body impact resistance and humidified deflection.

Quality

- 17.1 The manufacturing process of the Australian manufacturer USG Boral Building Products Pty Ltd and details of the quality and composition of the materials, have been examined by BRANZ and found to be satisfactory.
- 17.2 The quality management systems of USG Boral Building Products Pty Ltd have been assessed and registered by SAI Global as meeting the requirements of ISO 9001, Registration No. QECO400.
- 17.3 The manufacture of USG Fibrerock® Aqua-Tough™ has not been examined by BRANZ, but details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory. BRANZ has taken note of product certification covering quality aspects associated with the product. BRANZ also undertakes an ongoing review of product quality on an inwards goods basis.
- 17.4 USG Boral Building Products NZ is responsible for the quality of the product supplied.
- 17.5 The quality of the application and finish on-site is the responsibility of the installation, stopping and finishing contractors.
- 17.6 Designers are responsible for the design of buildings.
- 17.7 Building owners are responsible for the maintenance in accordance with the instructions of USG Boral Building Products NZ.

Sources of Information

- AS/NZS 2269: 2012 Plywood - Structural.
- AS/NZS 2588: 1998 Gypsum plasterboard.
- BRANZ Technical Paper P21: 2010 A wall bracing test and evaluation procedure.
- NZS 3604: 2011 Timber-framed buildings.
- Ministry of Business, Innovation and Employment Record of Amendments for Compliance Documents and Handbooks.
- The Building Regulations 1992.



BRANZ Appraised
Appraisal No. 899 [2015]

BRANZ Appraisal
Appraisal No. 899 [2015]
03 December 2015

USG BORAL BRACING SYSTEMS

Amendments

Amendment No 1, dated 30 May 2017.

This Appraisal has been amended to include bracing systems based on 10 mm Multistop™ 4 and to omit 10 mm Fiberock® Aqua-Tough™, plus other minor amendments.



BRANZ Appraised
Appraisal No. 899 [2015]

BRANZ Appraisal
Appraisal No. 899 [2015]
03 December 2015

USG BORAL BRACING SYSTEMS



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

The Appraisal is issued only to **USG Boral Building Products NZ**, and is valid until further notice, subject to the Conditions of Appraisal.

Conditions of Appraisal

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

For BRANZ

A handwritten signature in blue ink, appearing to read 'Chelydra Percy'.

Chelydra Percy

Chief Executive

Date of Issue:

03 December 2015

SHEETROCK® BRAND 10mm CEILING & WALL BOARD

PRODUCT TECHNICAL STATEMENT

Sheetrock® Brand 10mm Ceiling & Wall Board is USG Boral's newest engineered lightweight alternative to Regular 10mm plasterboard. It has a high strength to weight composite design.

USE

Sheetrock® Brand 10mm Ceiling & Wall Board is suitable for use in all commercial and residential situations provided that its specification and installation is in accordance with USG Boral Plasterboard Installation Manual - NZ.

Where Sheetrock® Brand 10mm Ceiling & Wall Board is to provide bracing to the building, it must be installed in accordance with the USG Boral Plasterboard Bracing Manual - NZ

It is suitable for installation on framed ceilings, where the building design falls within the design scope of NZS3604, or AS/NZS1170.

Where Sheetrock® Brand 10mm Ceiling & Wall Board is to be installed in an existing building, the installer must assure themselves that the framing and existing building are suitable for the proposed building work.

CONDITIONS & LIMITATIONS

The specification of Sheetrock® Brand 10mm Ceiling & Wall Board must be in accordance with USG Boral information.

USG Boral recommends that a person with the relevant carpentry skills and experience install the Sheetrock® Brand 10mm Ceiling & Wall Board.

Sheetrock® Brand 10mm Ceiling & Wall Board should not be exposed to sustained temperatures exceeding 42°C or to excessive, repetitive or continuous moisture before, during or after installation. All sources of moisture should be eliminated immediately



NZBC COMPLIANCE

Sheetrock® Brand 10mm Ceiling & Wall Board complies with the following performance criteria of the NZ Building Code

PERFORMANCE CRITERIA	EVIDENCE
B1.3.1 B1.3.2 B1.3.3 (a, b, c, f, j, l, o, r) B1.3.4 (a, b, c, e)	In respect of building element Manufactured in accordance with AS/NZS2588
B2.3.1(a), B2.3.2	USG and Boral have a combined plasterboard manufacturing experience in excess of 145 years. During this time USG Boral have supplied plasterboard along with plasterboard wall and ceiling systems for use within the residential and commercial sectors.
C3.4 (a)	Material Group No 1-S BRANZ assessment FAR 4435
F2.3.1	Manufactured in accordance with AS/NZS2588

When installed Sheetrock® Brand 10mm Ceiling & Wall Board will contribute to compliance with the following performance criteria of the NZ Building Code

PERFORMANCE CRITERIA	EVIDENCE
B2.3.1(a), B2.3.2	In Service history
G6.3.1	RT&A TE405-05F02

» PRODUCT TECHNICAL STATEMENT

PRODUCT DESCRIPTION

BOARD SPECIFICATION	
FEATURE	DESCRIPTION
Thickness	10mm
Edge Profiles	Recessed edge
Sheet Size (width x length)	1200 x (2400-6000mm), 1350 x (3600-6000mm), [Please refer to Size & Availability Chart for more sizes] Product availability: Certain products and sizes may only be available on order or in pack lots.
Paper Colour	Buff
Mass	5.9 kg/m ² nominal
VOC	Less than 0.5mg/m ³ TVOC
Manufacture	Manufactured in Australia to the requirements of AS/NZS 2588:1998 Gypsum plasterboard and in accordance with AS/NZS ISO 9001:2008 - Quality management systems - Requirements

PERFORMANCE DETAILS

Fire

Sheetrock® Brand 10mm Ceiling & Wall Board is a non-combustible building product. It achieves a material Group Number 1-S depending on finished coating applied (BRANZ Assessment FAR4435).

Acoustics

Sheetrock® Brand 10mm Ceiling & Wall Board may be used in an acoustic system to provide required levels of sound insulation to achieve specified acoustic ratings.

INSTALLATION

Sheetrock® Brand 10mm Ceiling & Wall Board must be installed in accordance the USG Plasterboard Installation Manual - NZ, or the USG Boral Plasterboard Bracing Manual - NZ

MAINTENANCE

Sheetrock® Brand 10mm Ceiling & Wall Board does not require maintenance but USG Boral recommends that a visual check of the board be undertaken as part of normal maintenance, for instance when the surface coating is reapplied. In the event that damage is apparent to the Sheetrock® Brand Ceiling Board then it must be removed and replaced in accordance with the USG Plasterboard Installation Manual - NZ, or the USG Boral Plasterboard Bracing Manual - NZ.

STORAGE & TRANSPORTATION

Sheetrock® Brand Ceiling Board, like all plasterboards, is vulnerable to potential in transit damage. It should be transported and stored horizontally. Once onsite ensure that it is covered, to avoid the possibility of exposure to moisture.

SUSTAINABILITY

Sheetrock® Brand Ceiling & Wall Board has been manufactured using 100% recycled liner paper. Independently tested for VOC

QUALITY ASSURANCE

Sheetrock® Brand Ceiling & Wall Board is manufactured in Australia. These manufacturing sites are ISO9001:2008 accredited.

Certificate details are SAI Global Cert No. QEC0400.

This certification dates from 1992.

REFERENCES

Refer www.usgboral.com for information on Sheetrock® Brand Ceiling board.

Test results may be available upon request, providing the information is not commercially sensitive.

QUALITY ASSURANCE

REFERENCES

Refer www.usgboral.com for information on Fiberock® Aqua Tough. Test results may be available upon request, providing the information is not commercially sensitive.

WARRANTY

For details of the USG Boral warranty refer www.usgboral.com

DURABILITY STATEMENT

This statement is in relation to Clause B2 Durability of the New Zealand Building Code (NZBC). USG Boral Plasterboard products and systems are designed for internal use and when installed in accordance with the installation instructions detailed within the relevant Technical Installation literature they are fully compliant with the NZBC.

FURTHER INFORMATION

Contact USG Boral TecASSIST on 0800 USGBORAL (0800 874-267) or online at www.usgboral.com

For sales enquiries:

Auckland (09) 270-2595

Wellington (05) 560-4528

Christchurch (03) 365-4245

SIGN OFF & REVIEW DATE

SIGNED	David Peck
POSITION	New Zealand Manager
DATE	1 June 2015
REVIEW DATE	1 June 2016

SHEETROCK® BRAND 13mm STANDARD BOARD

PRODUCT TECHNICAL STATEMENT

Sheetrock® Brand 13mm Standard Board is USG Boral's newest, engineered lightweight alternative to Regular 13mm plasterboard. It has a high strength to weight composite design.

USE

Sheetrock® Brand 13mm Standard Board is suitable for use in all commercial and residential situations provided that its specification and installation is in accordance with USG Boral Plasterboard Installation Manual - NZ.

It is suitable for installation on framed walls and ceilings, where the building design falls within the design scope of NZS3604, or AS/NZS1170.

Where Sheetrock® Brand 13mm Standard Board is to be installed in an existing building, the installer must assure themselves that the framing and existing building are suitable for the proposed building work.

CONDITIONS & LIMITATIONS

The specification of Sheetrock® Brand 13mm Standard Board must be in accordance with USG Boral information.

USG Boral recommends that a person with the relevant carpentry skills and experience install the Sheetrock® Brand 13mm Standard Board.

Sheetrock® Brand 13mm Standard Board should not be exposed to sustained temperatures exceeding 42°C or to excessive, repetitive or continuous moisture before, during or after installation. All sources of moisture should be eliminated immediately.

NZBC COMPLIANCE

Sheetrock® Brand 13mm Board complies with the following performance criteria of the NZ Building Code

PERFORMANCE CRITERIA	EVIDENCE
B1.3.1 B1.3.2 B1.3.3 (a, b, c, f, j, l, o, r) B1.3.4 (a, b, c, e)	In respect of building element Manufactured in accordance with AS/NZS2588
B2.3.1(a) B2.3.2	USG and Boral have a combined plasterboard manufacturing experience in excess of 145 years. During this time USG Boral have supplied plasterboard along with plasterboard wall and ceiling systems for use within the residential and commercial sectors.
C3.4 (a)	Material Group No 1-S BRANZ assessment FAR 4435
F2.3.1	Manufactured in accordance with AS/NZS2588



When installed Sheetrock® Brand 13mm Standard Board will contribute to compliance with the following performance criteria of the NZ Building Code

PERFORMANCE CRITERIA	EVIDENCE
B2.3.1(a), B2.3.2	In Service history
G6.3.1	RT&A TE405-05F02

PERFORMANCE DETAILS

Fire

Sheetrock® Brand 13mm Standard Board is a non-combustible building product. It achieves a material Group 1-S depending on finished coating applied (BRANZ Assessment FAR4435).

Acoustics

Sheetrock® Brand 13mm Standard Board may be used in an acoustic system to provide required levels of sound insulation to achieve specified acoustic ratings

INSTALLATION

Sheetrock® Brand 13mm Standard Board must be installed in accordance USG Boral Plasterboard Installation Manual - NZ

MAINTENANCE

Sheetrock® Brand 13mm Standard Board does not require maintenance but USG Boral recommends that a visual check of the board be undertaken as part of normal maintenance, for instance when the surface coating is reapplied. In the event that damage is apparent to the Sheetrock® Brand Board then it must be removed and replaced in accordance with the USG Boral Plasterboard Installation Manual - NZ.

STORAGE & TRANSPORTATION

Sheetrock® Brand 13mm Standard Board, like all plasterboards, is vulnerable to potential in transit damage. It should be transported and stored horizontally. Once onsite ensure that it is covered, to avoid the possibility of exposure to moisture.

» PRODUCT TECHNICAL STATEMENT

SUSTAINABILITY

Sheetrock® Brand 13mm Standard Board has been manufactured using 100% recycled liner paper.

Independently tested for VOC.

QUALITY ASSURANCE

Sheetrock® is manufactured in Australia. These manufacturing sites are ISO9001:2008 accredited.

Certificate details are SAI Global Cert No. QEC0400.

This certification dates from 1992.

REFERENCES

Refer www.usgboral.com for information on Sheetrock® Brand 13mm Standard Board.

Test results may be available upon request, providing the information is not commercially sensitive.

WARRANTY

For details of the USG Boral warranty refer www.usgboral.com

DURABILITY STATEMENT

This statement is in relation to Clause B2 Durability of the New Zealand Building Code (NZBC). USG Boral Plasterboard products and systems are designed for internal use and when installed in accordance with the installation instructions detailed within the relevant Technical Installation literature they are fully compliant with the NZBC.

FURTHER INFORMATION

Contact **USG Boral TecASSIST**

Freephone: 0800 USG BORAL/(0800 874-267),
www.usgboral.com

For sales enquiries:

Auckland (09) 270-2595

Wellington (05) 560-4528

Christchurch (03) 365-4245

SIGN OFF & REVIEW DATE

SIGNED	David Peck
POSITION	New Zealand Manager
DATE	1 June 2015
REVIEW DATE	1 June 2016



INSTALLATION INSTRUCTIONS

Wall

PINK® BATTS® WALL INSULATION

Installation Instructions

Correct installation with no compression, gaps or folds is critical to ensure Pink® Batts® wall insulation performance is not compromised.

Safety:

Each installation is unique, so prior to installation check for all hazards that may cause injury:

- Carry out any required repair work before starting installation
- Ensure there's adequate lighting to identify any hazards
- Treat all electrical cables as live, being careful not to cut or expose cables and wires
- Beware of other sharp objects (protruding nails, splinters etc.), pests (bees and wasps), loose boards and pipe work

Note: Seek professional advice if you are unsure how best to isolate the hazard or have a professional installer carry out the work on your behalf.

We recommend PinkFit® professional installers. PinkFit® are a nationwide network of professional installers who guarantee that their completed installation will meet the requirements of NZS 4246:2006.

Call **0800 746 534** for your local PinkFit® installer

Wall

PINK® BATTS® WALL INSULATION

Installation:

Any slight irritation to exposed skin caused by the fibres in glass wool, or through their inhalation, is harmless and temporary.

However for your comfort while installing, it's recommended you wear:

- Loose fitting work clothes which cover the arms and legs
- Covered shoes
- Dust mask
- Safety glasses

For safety while installing, it's recommended you use:

- Cut resistant gloves (if knife is used)

For an efficient installation, the following tools are recommended:

- Stable working platform
- Knife
- Tape measure

To ensure Pink® Batts® wall insulation performance isn't compromised, use only wall products for installing in wall applications.

- Ensure the product is installed dry
- If cutting is required, cut oversize by 5-10 mm to ensure a good friction fit
- Ensure there are no gaps, folds or compression of the product to achieve optimal performance
- Fill gaps around windows and doors with off-cuts
- Do not cover vents. Insulate around vents to allow unhindered ventilation
- Fit Pink® Batts® insulation tight and close around electrical cables and pipes. It's important to minimise compression, gaps and folds in the insulation. For electrical cables and small diameter pipes, partially cut insulation and place around the cables and pipes

CAUTION: Electrical cables and equipment installed prior 1989 may overheat and fail when partially or completely covered with bulk thermal insulation



Tip: To verify Building Code Compliance, staple a product label at an easy to find location away from any hot items such as downlights or water cylinders.

Refer to NZS 4246 for the correct installation of insulation and clearances.

Product Guide

	LIFETIME WARRANTY*	BRANZ APPRAISED	ENVIRON MENTAL CHOICE	GREENGUARD IAQ CERTIFIED	CODE	SIZE (mm)	NOMINAL STABILISED THICKNESS (mm)	NOMINAL TOTAL AREA PER PACK (m ²)	APPROX COVERAGE PER PACK* (m ²)
Pink® Batts® R1.8 Wall	✓	✓		✓	7120118	1140 X 580	90	17.2	19.6
Pink® Batts® R2.2 Wall	✓	✓		✓	7120122	1140 X 580	90	13.9	15.8
Pink® Batts® R2.4 Wall	✓	✓		✓	7120124	1140 X 580	90	10.6	12.1
Pink® Batts® Ultra® R2.6 Wall	✓	✓	✓	✓	7120126	1140 X 580	90	9.9	11.3
Pink® Batts® Ultra® R2.8 Wall	✓	✓	✓	✓	7120128	1140 X 580	90	6.6	7.5
Pink® Batts® R1.0 Masonry Wall	✓	✓		✓	7160110	1220 x 580	40	21.2	-
Pink® Batts® R1.2 Masonry Wall				✓	7160134	1220 x 580	40	17.0	-
Pink® Batts® Ultra® R3.2 140mm Wall	✓	✓	✓	✓	7120132	1140 X 580	140	9.9	11.3
Pink® Batts® Ultra® R3.6 140mm Wall	✓	✓	✓	✓	7120136	1140 X 580	140	7.3	8.3
Pink® Batts® Ultra® R4.0 140mm Wall	✓	✓	✓	✓	7120140	1140 X 580	140	5.3	6.0
Pink® Batts® R2.2 Narrow Wall	✓	✓		✓	7120123	1140 X 380	90	9.5	11.2
Pink® Batts® Ultra® R2.6 Narrow Wall	✓	✓	✓	✓	7160207	1140 X 380	90	7.8	9.2
Pink® Batts® Steel R2.2 Wall	✓	✓		✓	7160214	1220 X 610	90	15.6	15.6
Pink® Batts® Ultra® Steel R2.6 Wall	✓	✓	✓	✓	7160215	1220 X 610	90	9.7	9.7

* Coverage relates to standard structure and actual coverage may vary.

For full details of the Pink® Batts® Lifetime Warranty visit pinkbatts.co.nz

Wall

PINK® BATTS® WALL INSULATION

Storage and Maintenance

Pink® Batts® insulation should be protected from damage and weather. Store under cover in clean, dry conditions. The installed product should remain dry at all times. If the product becomes wet or damp, the source of dampness (e.g. leak in building) should be repaired and any wet or damp insulation should be removed and replaced with new insulation of an equivalent R-value.

Disposal of bags

Recyclable LLDPE bags are used for packaging of Pink® Batts® insulation. These bags are categorised as Rec 4 and can be placed in a recyclable refuse collection bin. For further details download the relevant product data sheet from pinkbatts.co.nz

Accreditations/Appraisals/Certifications



Tasman Insulation New Zealand Ltd
Certified QMS



For full details of the Pink® Batts® Lifetime Warranty visit pinkbatts.co.nz

TASMAN
INSULATION NEW ZEALAND

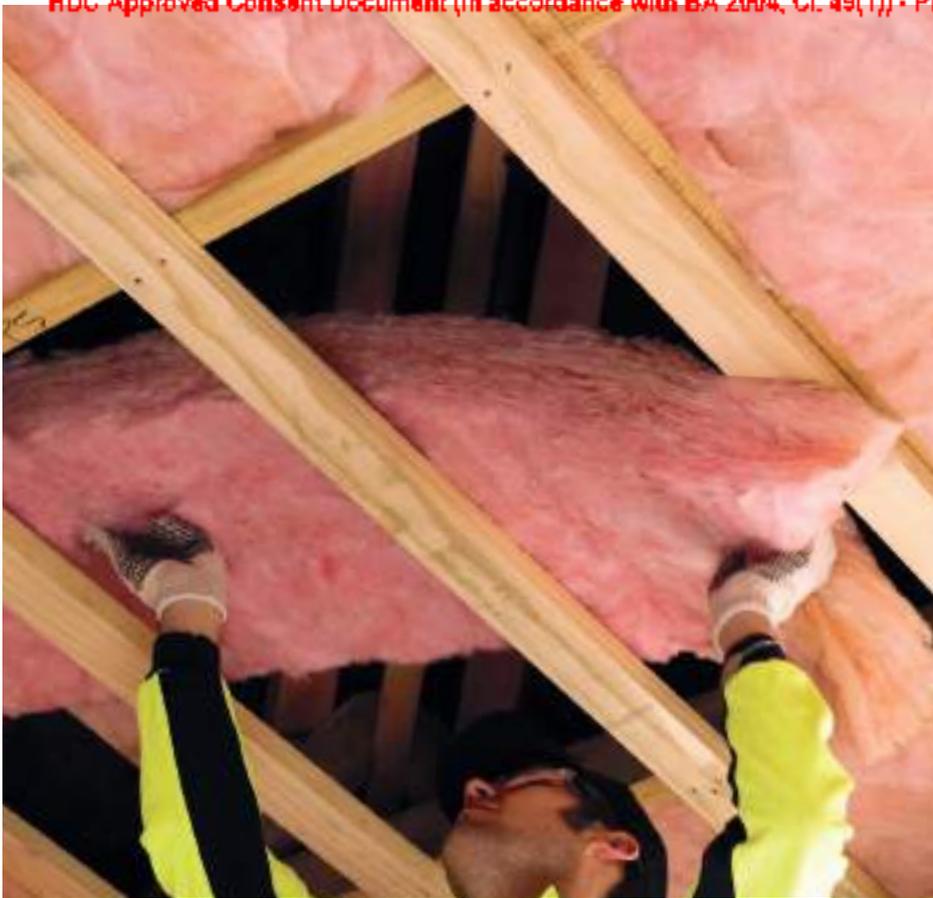
DISTRIBUTED BY

Tasman Insulation New Zealand Ltd
9-15 Holloway Place, Penrose, Auckland,
New Zealand

This document supersedes all previous versions and may have been superseded; is a guide only and the purchaser should ascertain the suitability of this product for the end-use situation intended and when used in conjunction with other products; and is provided without prejudice to Tasman Insulation New Zealand Ltd (Tasman) standard terms of sale. Tasman retains the right to change specifications without prior notice. Refer to www.pinkbatts.co.nz or consult Tasman for further information. Do not use this product for any application not detailed in this document. All claims about this product are subject to any variation caused by normal manufacturing process and tolerances. The liability of Tasman and its employees and agents for any errors or omissions in this document or otherwise in relation to the product is limited to the fullest extent permitted by law. Except where the consumer acquires the goods for the purposes of a business, any rights a consumer may have under the Consumer Guarantees Act are not affected. The colour PINK and Pink® are registered trademarks of Owens Corning used under license by Tasman Insulation. Batts® is the registered trade mark of Tasman Insulation.

pink batts®

Always.



INSTALLATION INSTRUCTIONS

Roof

PINK® BATTS® CEILING INSULATION

Installation Instructions

Correct installation with no compression, gaps or folds is critical to ensure Pink® Batts® ceiling insulation performance is not compromised.

Safety:

Each installation is unique so prior to installation check for all hazards that may cause injury:

- Carry out any required repair work before starting installation
- Ensure there's adequate lighting to identify any hazards
- Treat all electrical cables as live, being careful not to cut or expose cables and wires
- Beware of other sharp objects (protruding nails, splinters etc.), pests (bees and wasps), loose boards and pipe work

- Avoid installing during the warmest part of the day. The roof cavity temperature can increase to uncomfortable levels

- Do not stand on ceiling or ceiling battens

Note: Seek professional advice if you are unsure how best to isolate the hazard or have a professional installer carry out the work on your behalf.

We recommend PinkFit® professional installers. PinkFit® are a nationwide network of professional installers who guarantee that their completed installation will meet the requirements of NZS 4246:2006.

Call **0800 746 534** for your local PinkFit® installer

Roof

PINK® BATTS® CEILING INSULATION

Installation:

Any slight irritation to exposed skin caused by the fibres in glass wool, or through their inhalation, is harmless and temporary.

However for your comfort while installing, it's recommended you wear:

- Loose fitting work clothes which cover the arms and legs
- Covered shoes
- Dust mask
- Safety glasses

For safety while installing, it's recommended you use:

- Cut resistant gloves (if knife is used)
- Kneepads (for retrofitting)

For an efficient installation, the following tools are recommended:

- Stable working platform (for new build)
- Knife
- Tape measure
- Install rod for tight spaces
- Head torch (for retrofitting)
- Kneeling board or planks (for retrofitting)

For retrofitting, take into consideration:

- Using planks laid across joists to walk and work on
- Leveling and refitting any existing insulation if required with correct clearances
- Removing any damp insulation
- Starting installation at the point furthest away from the ceiling access hole

To ensure Pink® Batts® ceiling insulation performance isn't compromised, confirm the correct product and R-value is used in ceiling applications.

- Ensure the product is installed dry
- Friction fit product between framing, ensuring there are NO gaps, folds or compression of the product to achieve optimal performance
- If cutting is required, cut oversize by 5-10mm to ensure a good friction fit
- For retrofitting, install over timber where insulation already exists or where appropriate. Any open air pockets beside joist/truss cord ends at the roof perimeter to be blocked off with insulation off-cuts
- Fit Pink® Batts® insulation beneath electrical wiring and plumbing work (refer to NZS 4246)
- Install to the outer edge of the top plate covering at least 50% of it
- Maintain a 25mm gap clearance between the Pink® Batts® insulation and any roofing material. If required, to maintain 25mm clearance, trim insulation or use a thinner product around the perimeter
- Insulate access hole cover and secure in place with strapping or glue
- Remove excess material



Tip: To verify Building Code Compliance, staple a product label at an easy to find location away from any hot items such as downlights or water cylinders e.g. on truss/rafter above ceiling access hole.

Refer to NZS 4246 for the correct installation of insulation around electrical auxiliary devices and downlights.

Roof

PINK® BATTS® CEILING INSULATION

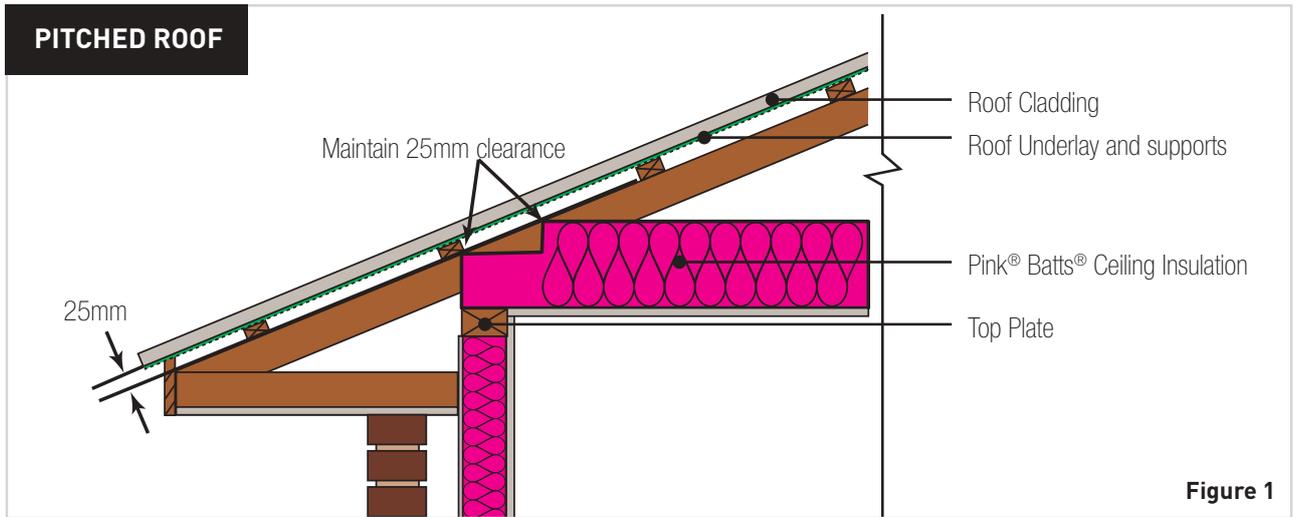


Figure 1

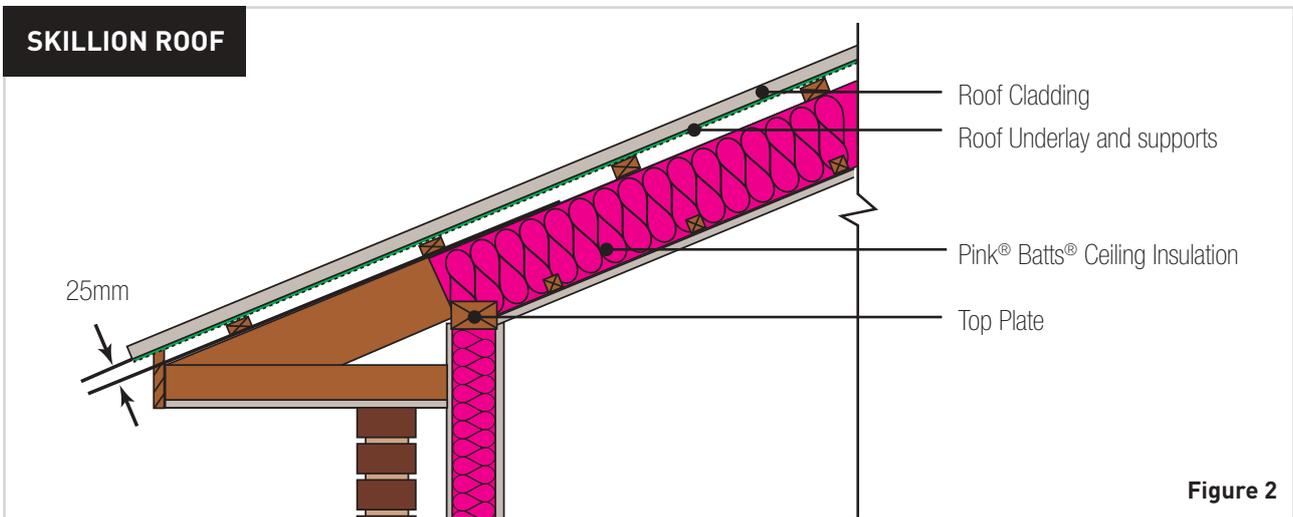


Figure 2

Clearances

Adhere to the clearances below

Area	Minimum Clearance	Comments
Incandescent light	50mm	
CA rated downlight	Nil	No minimum clearance is required however do not install insulation over the top of the downlight
IC rated downlight	Nil	No minimum clearance is required and insulation can be installed over the top of the downlight
Unknown lights & Halogen	200mm	From outer edge of downlight, to ALL other insulation including existing insulation (Transformers can sit in the clearance zone, but MUST NOT be covered) See Figure 3.
Unducted Fans	200mm	From outer edge of extractor fan to ALL other insulation including existing insulation
Metal Chimneys & flues	50mm	From outer edge of metal chimney flue to ALL other insulation including existing insulation
Roofing material	25mm	To the roofing material i.e. - to the roof itself and building paper

Roof

PINK® BATTS® CEILING INSULATION

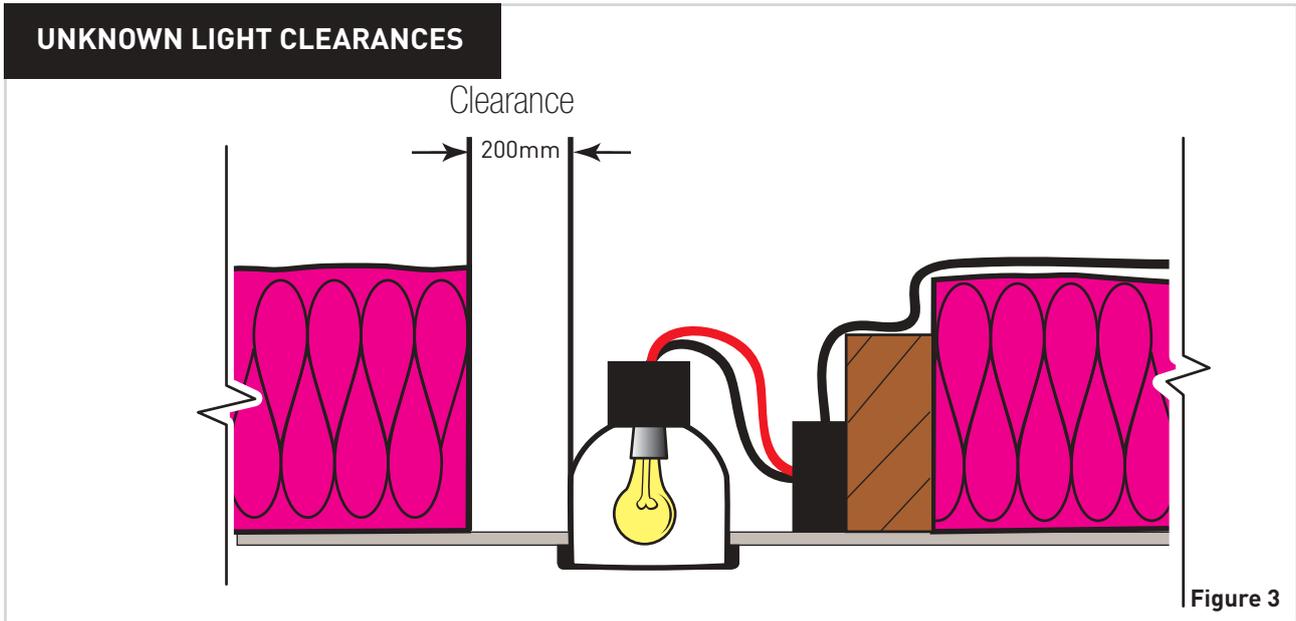


Figure 3

Note: Pink® Batts® ceiling insulation can be installed from below when the ceiling is to be lined or replaced

Caution: Electrical cables and equipment partially or completely surrounded with bulk thermal insulation may overheat and fail. This applies to wiring installed prior to 1989.

Product Guide

	LIFETIME WARRANTY*	BRANZ APPRAISED	ENVIRONMENTAL CHOICE	GREENGUARD IAQ CERTIFIED	CODE	SIZE (mm)	NOMINAL STABILISED THICKNESS* (mm)	NOMINAL TOTAL AREA PER PACK (m²)	APPROX COVER-AGE PER PACK** (m²)
Pink® Batts® Classic R1.8 Ceiling	✓	✓		✓	7110118	1220 X 432	95	13.7	14.4
Pink® Batts® Classic R2.2 Ceiling	✓	✓		✓	7110122	1220 X 432	115	12.6	13.3
Pink® Batts® Classic R2.6 Ceiling	✓	✓		✓	7110126	1220 X 432	140	10.5	11.1
Pink® Batts® Classic R3.2 Ceiling	✓	✓		✓	7110132	1220 X 432	170	8.4	8.8
Pink® Batts® Classic R3.6 Ceiling†	✓	✓	✓‡	✓	7110136	1220 X 432	180	7.4	7.7
Pink® Batts® Ultra® R4.0 Ceiling	✓	✓	✓	✓	7110140	1220 X 432	195	6.3	6.6
Pink® Batts® Ultra® R4.6 Ceiling	✓	✓	✓	✓	7110146	1220 X 432	215	5.3	5.5
Pink® Batts® Ultra® R5.0 Ceiling	✓	✓	✓	✓	7110150	1220 X 432	220	4.2	4.4
Pink® Batts® Ultra® R6.0 Ceiling NEW	✓	✓	✓	✓	7110160	1220 X 432	235	3.7	3.9
Pink® Batts® Ultra® R6.3 Ceiling NEW	✓	✓	✓	✓	7110163	1220 X 432	250	3.2	3.3
Pink® Batts® Ultra® R7.0 Ceiling NEW	✓	✓	✓	✓	7110170	1220 X 432	260	2.6	2.8

* Designers should allow for an additional 10% increase in loft for restricted cavities e.g skillion roofs

** Coverage relates to standard structure and actual coverage may vary.

‡ This product is manufactured in both New Zealand and Australia. Environmental Choice New Zealand applies to New Zealand made products only.

For full details of the Pink® Batts® Lifetime Warranty visit pinkbatts.co.nz

Roof

PINK® BATTS® CEILING INSULATION

Storage and Maintenance

Pink® Batts® insulation should be protected from damage and weather. Store under cover in clean dry conditions. The installed product should remain dry at all times. If the product has become wet or damp, the source of the dampness (e.g. leak in roof) should be repaired immediately and any wet or damp insulation should be removed and replaced with new product of an equivalent R-value.

Disposal of bags

Recyclable LLDPE bags are used for packaging of Pink® Batts® insulation. These bags are categorised as Rec 4 and can be placed in a recyclable refuse collection bin. For further details download the relevant product data sheet from pinkbatts.co.nz

Accreditations/Appraisals/Certifications



Tasman Insulation New Zealand Ltd
Certified QMS



‡ R3.6 ceiling product is manufactured in both New Zealand and Australia. Environmental Choice New Zealand applies to New Zealand made products only.

For full details of the Pink® Batts® Lifetime Warranty visit pinkbatts.co.nz



DISTRIBUTED BY

Tasman Insulation New Zealand Ltd
9-15 Holloway Place, Penrose, Auckland,
New Zealand

This document supersedes all previous versions and may have been superseded; is a guide only and the purchaser should ascertain the suitability of this product for the end-use situation intended and when used in conjunction with other products; and is provided without prejudice to Tasman Insulation New Zealand Ltd (Tasman) standard terms of sale. Tasman retains the right to change specifications without prior notice. Refer to www.pinkbatts.co.nz or consult Tasman for further information. Do not use this product for any application not detailed in this document. All claims about this product are subject to any variation caused by normal manufacturing process and tolerances. The liability of Tasman and its employees and agents for any errors or omissions in this document or otherwise in relation to the product is limited to the fullest extent permitted by law. Except where the consumer acquires the goods for the purposes of a business, any rights a consumer may have under the Consumer Guarantees Act are not affected. The colour PINK and Pink® are registered trademarks of Owens Corning used under license by Tasman Insulation. Batts® is the registered trade mark of Tasman Insulation.



Always.



ARDEX WPM 001

Superflex One-Part Undertile Waterproofing Membrane

Single-Component Undertile Liquid Waterproofing Membrane

Class III Membrane - Conforms to AS4858:2004

BRANZ Appraised (No. 472 and No. 473)

Suitable for internal and external use

Low VOC content – meets Green Building Council of Australia
Green Star IEQ-13 requirements

Fast-drying acrylic membrane



ARDEX Australia Pty Ltd
20 Powers Road
Seven Hills NSW 2147
Phone: 1300 788 780
Fax: 1300 780 102
Email: techinfo@ardexaustralia.com
www.ardexaustralia.com

ARDEX New Zealand Ltd
32 Lane Street, Woolston
Christchurch, New Zealand 8023
Phone: 0800 227 339
Fax: (03) 384 9779
Email: info@ardexnz.com
www.ardex.co.nz

ARDEX WPM 001

Superflex One-Part Undertile Waterproofing Membrane

PRODUCT DESCRIPTION

ARDEX WPM 001 (Superflex Bathroom & Balcony Premixed 1 Part) is a tough, ready to use waterproofing membrane specifically designed for use under tiles. ARDEX WPM 001 has been uniquely formulated with synthetic microfibres to increase its strength and eliminate the need for a separate reinforcement mat. ARDEX WPM 001 is based on the most advanced acrylic polymer technology, and is totally resistant to re-emulsification once cured.

ARDEX WPM 001 is flexible, safe to use, low in odour, and is fully compatible with polymer modified tile adhesives. ARDEX WPM 001 is one of the fastest drying one part acrylic membranes on the market – normally ready to tile in 48 hours @ 23°C.

ARDEX WPM 001 meets the Green Building Council of Australia Green Star IEQ-13 requirements for Architectural Sealant when tested in accordance with SCAQMD Method 304-91 Determination of Volatile Organic Compounds (VOC) in Various Materials as referenced by South Coast Air Quality Management Division (SCAQMD) Rule 1168.

FEATURES/BENEFITS

- Fast drying ARDEX WPM 001 can be tiled over in 48 hours in non critical areas*
- Liquid reinforced: Excellent strength, eliminates need for reinforcing mat
- Flexible: Accommodates normal building movement class 3 membrane as per AS/NZ 4858: 2004 Wet Area Membranes
- Advanced acrylic: Will not re-emulsify once cured
- Designed for tiling - Fully compatible with ARDEX tile adhesive systems
- Water based, safe to use, low odour & easy cleaning
- CSIRO Appraisal #91 for undertile waterproofing in shower recesses
- Conforms to the requirements of AS/NZ 4858: 2004 Wet Area Membranes. (Ref: CSIRO Report 3779)

*Critical areas include areas where the membrane is applied at greater than 0.5mm or over impermeable substances such as over bond breakers or incorporating other reinforcement. Longer drying times are necessary in these areas.

APPLICATION RANGE

Performance Levels

Commercial and residential

Location

Internal wet areas, balconies, decks, and other areas that will be tiled or otherwise protected from regular foot traffic. Only recommended on concrete, screed and render substrates externally.

Surfaces

Walls & floors

Substrates

Concrete

Cured for min. 28 days or sealed when set with one coat of ARDEX WPM 300 (HydrEpoxy 300) at a coverage rate of 3.0 square metres per litre and allowed to cure overnight. External wet concrete should be allowed to dry thoroughly or sealed with one coat of ARDEX WPM 300 as above.

Renders and screeds

Cured for min. 7 days or sealed when set with one coat of ARDEX WPM 300 at a coverage rate of 3.0 square metres per litre and allowed to cure overnight. Wet render should be allowed to dry thoroughly or sealed with one coat of ARDEX WPM 300 as above.

Fibre cement

Suitable for wet area grade fibre cement.

Plasterboard

Wet area grade only.

Plywood

Structural plywood (PAA branded), marine grade or other wet area grade only. Not recommended for external use (Refer ARDEX). Plywood panels shall be laid with staggered joints (brick bond), the edge of sheets shall be supported with dwangs or framing. The maximum recommended span in E2/AS1 is 400mm. However specific design may allow 17.5mm plywood or greater to be laid on 400mm purlins with nogs or dwangs at 600mm or even 1200mm centres. Plywood shall be laid with the face grain at right angles to the supports. External edges shall be chamfered with a minimum radius of 5mm. Plywood shall be fixed with 10 gauge x 50mm stainless steel countersunk head screws with 3mm gaps between all sheets, at 150mm centres on edges, and 200mm in the body of the sheets. All joints in the plywood and junctions of plywood with other materials shall have 25mm ARDEX Release tape applied before application of the membrane.

Particleboard

Wet area grade, internal use only (special preparation is required – contact ARDEX).

Permanent Immersion

In conditions of permanent immersion, it is recommended that ARDEX WPM 002 (Superflex Two Part) is used. Must be covered with tiles for full immersion.

Contact ARDEX for use over existing membranes, covering materials, and any other substrates not listed.

TABLE 1

	Thickness per Coat		Total Dry Film Thickness (2 coats)	Theoretical Coverage		Per Unit
	Dry Film	Wet Film		Per coat	For 2 coats	
FLOORS	0.5mm	1.0mm	1.0mm	15m ²	7.5m ²	20kg(15L) unit
WALLS	0.25mm	0.5mm	0.5mm	30m ²	15m ²	20kg(15L) unit

SPECIFICATION CLAUSE

ARDEX WPM 001 (Superflex Premixed)

The waterproofing membrane shall be ARDEX WPM 001: a one part acrylic modified fibre reinforced membrane formulated to provide a tough, long lasting water barrier under tiling systems.

PACKAGING

Single component: 20kg (approx 15 litres) or 6.5kg (approx 5 litres).

SHELF LIFE

12 months when stored in the original unopened packaging, in a dry place at 23°C. Do not store in direct sunlight. Replace lid tightly after use. Use remaining contents from part used containers within 3 months.

COVERAGE

Two coats are recommended for an effective waterproof membrane.

Coverage will vary depending on the porosity of the surface.

One 20kg (15 litre) unit will cover approximately 7.5-15m² (based on two coats) depending on area requirements between wall and floor surfaces to be treated. Refer Table 1.

DRYING TIMES

Recoat time

1-2 hours at (23°C/50% RH) between first and second coats. Alternatively, if a polyester mat is used between coats then the second coat can be applied whilst the first coat is still wet.

Dry through

The slowest drying areas are those where the membrane has been applied over a silicone bond breaker, eg. wall and floor junctions. The membrane cannot be tiled over until these critical areas are completely dry. ARDEX WPM 001 is totally dry in 48 hours at 23°C/50% RH, but can take up to 72 hours at 10°C/50% RH in corners or for thick films.

Fully cured

The shower should not be used until the membrane has reached its full strength. ARDEX WPM 001 membrane is fully cured after 3 days at 23°C, or after 5 days at 10°C.

Drying times will vary depending on humidity, surface temperature and surface porosity.

Do not apply on substrates where the surface temperature is below 10°C or above 35°C.

CLEANING

Wash hands, brushes, rollers, etc, with water while the membrane is still fresh. Remove cured material with mineral turpentine.

SAFETY PRECAUTIONS

Do not use the product in the following situations:

- Areas subject to negative hydrostatic pressure or rising damp, unless treated with ARDEX WPM 300.
- Where the substrate is wet – wet surfaces can be sealed with one coat of ARDEX WPM 300 at a coverage rate of 3.0 square metres per litre and allowed to cure overnight.
- Where rain is imminent.
- Where the membrane will be left exposed and subjected to regular foot traffic.
- On glazed, glass or other totally impervious surfaces (eg. areas pre-treated with water repellants).
- Where the surface temperature is below 10°C or greater than 35°C.
- All floor areas must have adequate falls either built into the substrate or achieved with a sand/cement screed prior to application of the ARDEX WPM 001.

For substrates or situations other than those listed contact ARDEX.

SAFETY DATA

ARDEX WPM 001 is non-hazardous and non dangerous. It may produce discomfort of the eyes, respiratory tract and skin. Do not breathe gas/fumes/vapour/spray. Avoid contact with skin. Wear eye/face protection. In case of contact with eyes, rinse with plenty of water and seek

ARDEX WPM 001

Superflex One-Part Undertile Waterproofing Membrane

medical advice.

ADDITIONAL INFORMATION IS LISTED IN THE MATERIAL SAFETY DATA SHEET.

QUALITY PRODUCT

ARDEX WPM 001 is manufactured and tested to ARDEX procedures which are maintained in accordance with Quality System Standard ISO 9001.

USER NOTES

The technical details and recommendations contained in this data sheet are given in good faith and represent the best of our knowledge and experience at the time of printing. It is the responsibility of the user to ensure that the product is used in accordance with ARDEX instructions and in applications for which they are intended.

APPLICATION

Apply ARDEX WPM 001 by brush or roller. A medium nap (12-15mm pile) paint roller is recommended. New rollers should be dampened with water before being used for the first time.

For best results with a paint brush use a good quality, 50mm long bristle variety.

To achieve the required dry film thickness per coat, application must consist of laying the product onto the surface and light finish the surface. Do not try to apply in the same manner as a building paint. A conventional building paint is normally applied at 25-40 micrometers wet film thickness while ARDEX WPM 001 needs to be applied at between 0.5 and 1.0 mm per coat depending on product and application (Refer Table 1).

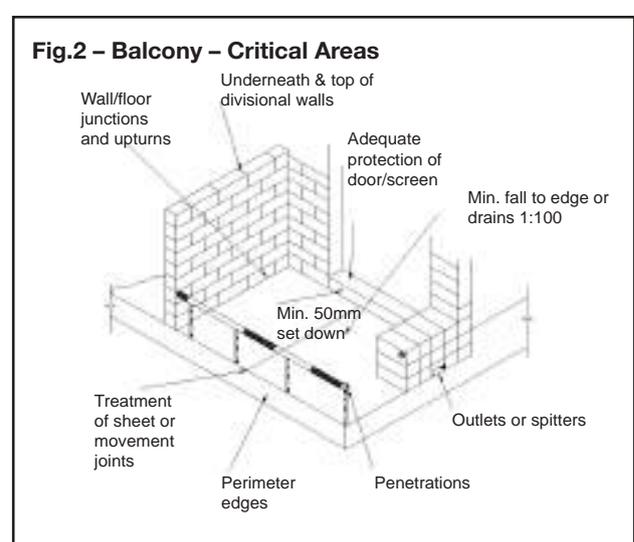
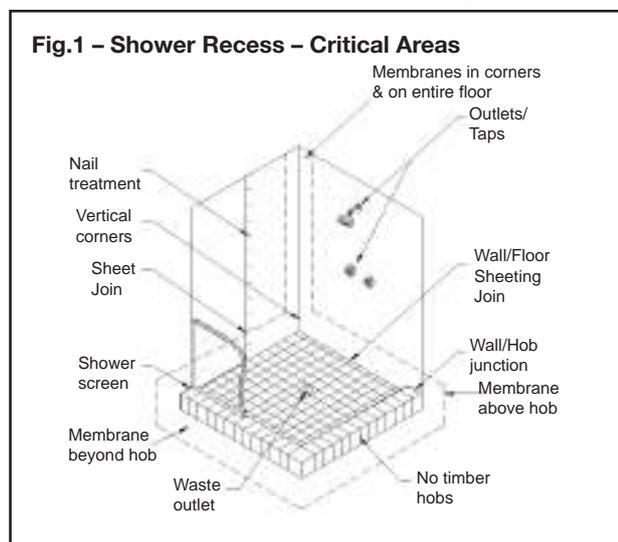
CRITICAL AREAS:

INTERNAL WET AREAS

1. Construction should be in accordance with Australian 3740 - 2004 Waterproofing of wet areas

within residential buildings.

2. All render and tile bed requirements should be completed before application of the membrane and tiles or other floor coverings should be direct bonded to the membrane.
3. Ensure wall & floor sheets are installed as per sheet manufacturer's recommendations.
4. Ensure suitable brick/concrete hobs are used (do not use timber).
5. Ensure that falls to the waste are min 1:60 (ie. approx. 30mm in 2mtr)) before waterproofing. Ensure outlet pipes are fixed securely and that the waste or drainage flanges are recessed into the floor.
6. Avoid sheet joints in shower recess floor. Ensure that sheets are securely fixed to the wall at the bottom edge, and sheet joints are sealed with a neutral cure silicone sealant spread approximately 6mm on either side of the joint.
7. Treat nail and screw holes with neutral cure silicone sealant.
8. Seal the perimeters of taps, shower outlets and waste outlets with neutral cure silicone sealant.
9. Apply a bead of neutral cure silicone sealant to all horizontal and vertical corners.
10. Apply a bead of neutral cure silicone sealant to the junction of the hob or angle and walls. Spreading the sealant to 6mm on either side of the joint.
11. Waste outlets shall incorporate a puddle flange or similar in accordance with AS3740 & the top surface shall be set flush with the surface to which the membrane is to be applied. A bead of neutral cure silicone shall be applied across the intersection of the puddle flange and the screed/floor.
12. Apply the membrane to the entire shower recess floor and down into waste or drainage flange. Apply



the membrane over the hob and at least 150mm beyond the outside edge of the hob (ideally to entire wet area floor).

13. Apply the membrane 1800mm up the walls or to the height of the shower rose within the shower recess.
14. Install the shower screen to inside edge of the hob.

BALCONIES AND DECKS

1. Ensure that the deck is constructed with falls to edge/drains of min 1:100 (ie. 20mm in 2m) or else achieve the fall with a sand/cement screed.
2. Ensure a min set down (step down) of 50mm to the finished floor level (ie. top of tiles).
3. Ensure suitable flashing is installed, ideally prior to the installation of the balcony screen/ sliding door.
4. Treat any sheet joints with a neutral cure silicone prior to waterproofing.
5. Prepare and seal all wall/floor junctions with a bead of neutral cure silicone.
6. Apply the membrane up the step down and as far up underneath the screen door flashing as possible (ideally waterproof prior to installing door).
7. Where possible, apply the membrane prior to building divisional walls, or other items such as planter boxes.
8. Apply the membrane to the entire balcony floor and at least 50mm up the wall above the top surface of the finished tiles and finished below the wall drainage vents.
9. Apply the membrane to the top of the parapets and divisional walls, or else install suitable metal capping.
10. Apply the membrane down over the front edge of the balcony onto the drip rail.
11. Carefully seal any gaps around balcony penetrations prior to applying the membrane.
12. Apply the membrane down into outlets and drains, ensuring excess material is removed.
13. Ensure all weep holes are above the membrane application area.

APPLICATION NOTES

Surface preparation

- Ensure all surfaces are structurally sound and totally dry. The pores of concrete surfaces should be open (absorbent surface). All sheet substrates must be securely fixed in accordance with the manufacturers instructions.
- Falls to outlets of at least 1:60 or approx. 30mm in 2mtr (wet areas) or 1:100 externally, must be achieved prior to tiling.
- The surface to be coated should be free from

dust, oil, paint, curing compounds and any other contaminating materials.

- Damaged concrete should be repaired (leveled) and surface defects including all cracks and sharp protrusions should be treated prior to the application of the membrane.
- Remove laitance on concrete or screeds by mechanical means.
- Highly dense (>40MPa) or steel trowelled concrete should be roughened by suitable mechanical means (shot blasting, grinding, etc).

Priming

The primer is a critical part of the waterproofing system. Apply one coat of ARDEX WPM 265 (Sheltercoat/ Superflex Water Based Primer) by brush or roller to all areas to be waterproofed including the floor waste. Allow the primer to completely dry prior to the application of the ARDEX WPM 001 membrane. This will take around 20-30 minutes depending upon weather conditions and porosity of the substrate. Coverage is approximately 6m² per litre. Plastic (eg. PVC) pipes should be primed with a solvent based plumbers pink primer. Prime metal surfaces with a suitable metal primer such as epoxy polyamide primer.

GENERAL APPLICATION

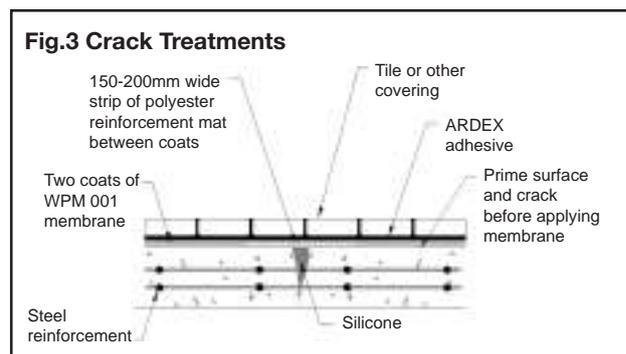
Crack preparation

Cracks <2mm:

Clean and remove any loose particles in the crack. Prime the crack and adjacent area carefully with ARDEX WPM 265 and allow to dry before applying two coats of ARDEX WPM 001 membrane in a band at least 200mm wide equidistantly across the crack, along the length of the crack.

Cracks 2-6mm:

(Refer Fig. 3) Prepare and prime the crack as above. Apply a bead of neutral cure silicone into the crack and extend it 6mm either side. Apply a 300mm wide band of ARDEX WPM 001 equidistantly across the crack along the entire length of the crack. Place a 190mm wide band of ARDEX "Deckweb" polyester woven cloth reinforcement over the applied membrane. Thoroughly



ARDEX WPM 001

Superflex One-Part Undertile Waterproofing Membrane

wet out the cloth preferably using a fluted roller, and remove all creases in, or air pockets under the mat. Immediately apply a second coat to completely fill the mat.

Cracks >6mm:

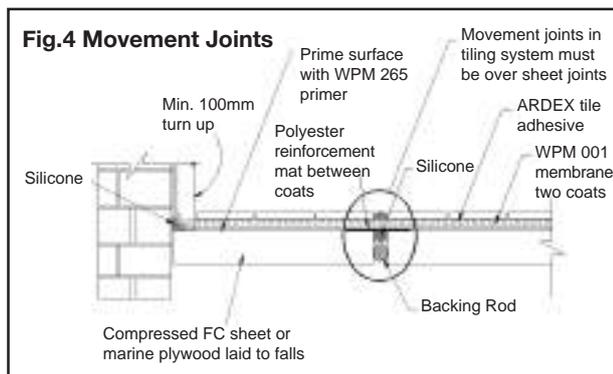
Contact your local ARDEX representative.

Movement/construction joints

Movement joints (<6mm)

Use same procedure as in crack preparation.

Clean and prime the joint before filling it with a bead of neutral cure silicone and extending it 6mm each side of joint. Apply a 300mm wide band of ARDEX WPM 001 equidistantly across the crack along the entire length of the crack. Place a 190mm wide band of ARDEX "Deckweb" polyester woven cloth reinforcement over the applied membrane. Thoroughly wet out the mat and remove all creases in, or air pockets under the mat. Immediately apply a second coat to completely fill the mat.



Construction joints (>6mm)

Use the same procedure as above, but replace the reinforcing mat with 120mm of ARDEX Coving Bandage. Note: if tiling, movement joints should be taken to the surface of the tiles. Fill the joints between the tiles immediately above the movement joints with an appropriate joint sealant. (Refer Fig.4)

Corners & coving areas

After priming with ARDEX WPM 265 and allowing to dry, apply a generous bead (12mm) of neutral cure silicone sealant to seal all junctions between two substrates in coving areas and corners. Smooth over the silicone so that it extends 6mm up the wall and 6mm over the floor and allow to touch dry.

Apply a first coat of ARDEX WPM 001 to the area and allow the membrane to dry.

Apply a second coat ensuring that excess product is removed from the junction (the final dry film thickness should be minimum of 1.0mm). Alternatively, if a

polyester reinforcement mat is used between coats then the second coat can be applied as soon as the mat is fully bedded into the first coat.

WALL/FLOOR JUNCTION

After priming with ARDEX WPM 265 and allowing to dry, apply a generous bead (12mm) of neutral cure silicone sealant to seal all junctions between two substrates. Smooth over the silicone so that it extends 6mm up the wall and 6mm over the floor and allow to touch dry. Place a 190mm wide band of ARDEX "Deckweb" polyester woven mat reinforcement over the applied membrane. Thoroughly wet out the cloth and remove all creases in, or air pockets under the mat. Immediately apply a second coat to completely fill the mat. The ARDEX WPM 001 should be applied to at least 100 mm up the wall surfaces as per the recommendations for the application of ARDEX WPM 001 to floors.

Walls

Two coats of ARDEX WPM 001 are required to achieve a minimum total dry film thickness of 0.5mm.

After priming with ARDEX WPM 265 and allowing to dry, apply two coats of ARDEX WPM 001 (to achieve a minimum dry film thickness of 0.5mm) in two opposite directions. Wall sheet joints should be treated with a neutral cure silicone, PVC duct tape or base jointing compound. In balcony situations take the membrane up underneath any existing cover flashing or install appropriate flashing. Allow the first coat to dry before applying the second coat.

Floors

Two coats of ARDEX WPM 001 are required to achieve a minimum total dry film thickness of 1.0mm. The flooring recommendations should be extended at least 150 mm up all perimeter walls.

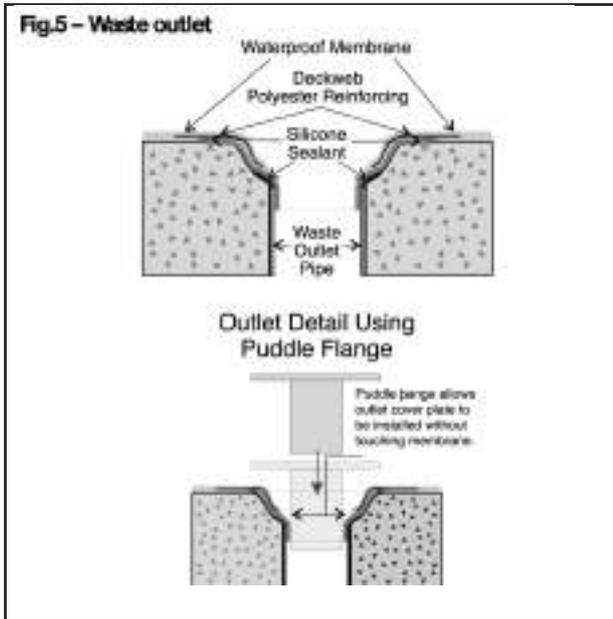
Prime the surface with ARDEX WPM 265 and allow to dry.

Apply the first coat over the primed surface and allow it to dry (1-2 hours at 23°C, 50%RH) before applying a second coat in an opposite direction. In shower recesses a drainage flange must be installed on all timber/sheeted floors, and are strongly recommended on all other substrates. Where possible rebate the flange into the floor. Seal the perimeter of the flange with neutral cure silicone treatment. If a flange is not installed the membrane must be applied down into the pipe. (Refer Fig.5) Allow the membrane to dry completely before tiling. Refer drying times above.

Waste Outlet

Prime the surface with ARDEX WPM 265 and allow to dry. Surfaces of the outlet flange must be primed with an appropriate primer.

Apply ARDEX WPM 001 over the adjacent floor surface extending down into the waste outlet flange overlapping

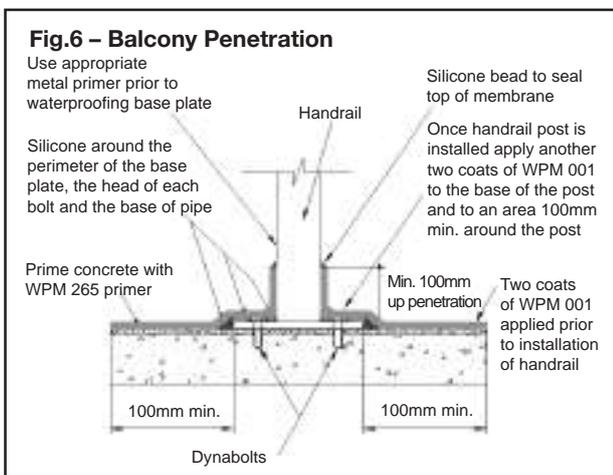


the edge of flange by at least 30mm. Place ARDEX “Deckweb” polyester woven mat reinforcement over the applied membrane. Thoroughly wet out the cloth and remove all creases in, or air pockets under the mat. Immediately apply a second coat to completely fill the mat. (Refer Fig. 5)

Balcony penetrations (Refer Fig.6)

All upstands are to be mechanically fixed through the membrane, which must be fabricated with a base plate flange.

Prime the metal with an appropriate metal primer such as an epoxy polyamide primer and allow to dry. Apply a 10mm bead of neutral cure silicone around the



perimeter of the penetration. Apply the first coat of ARDEX WPM 001 on the substrate and the flanged metal. Allow first coat to dry before applying a second coat ensuring a finished dry film thickness of no less than 1.0mm is achieved. Place a suitable flashing collar around the penetration sealing it with a suitable sealant.

Tiling systems

It is advisable to conduct a flood test of the shower once the membrane has cured (normally after 72 hours), and before the tiling commences. A broad range of ARDEX tile adhesives can be used over ARDEX membranes. Contact ARDEX or your nearest ARDEX stockist for advice on the most suitable system.

TECHNICAL DATA

ARDEX WPM 001 Characteristics of liquid

Form & Colour	Blue viscous paste
Type	Single part
Specific Gravity	Approx. 1.34kg/litre
pH of Liquid	8.5
Viscosity of Liquid (RVT Brookfield, spindle 7 speed 10)	52,000cps
Non Volatile Matter (volume) AS1321.10	50.3%±1
Tensile Strength 7 days dry AS1145	1.04 MPa
Full Cure	1.92 MPa
Elongation at Break 7 days dry AS1145	780%

Conforms to requirements of class 3 membrane of AS/NZ 4858: 2004 Wet Area Membranes.

NOTE: Most of the tests have been carried out in the ARDEX laboratory under standard conditions (23±2°C, 50±5% R.H)

ARDEX WPM 001

Superflex One-Part Undertile Waterproofing Membrane

Toll Free Technical Services:

1800 224 070 (Australia)

0800 227 339 (New Zealand)

ARDEX Australia Pty Ltd

20 Powers Road

Seven Hills NSW 2147

Phone: 1300 788 780

Fax: 1300 780 120

Email: technicalservices@ardexaustralia.com

www.ardexaustralia.com

ARDEX New Zealand Ltd

32 Lane Street, Woolston

Christchurch, New Zealand 8023

Phone: 0800 227 339

Fax: (03) 384 9779

Email: info@ardexnz.com

www.ardex.co.nz

DISCLAIMER

The technical details, recommendations and other information contained in this data sheet are given in good faith and represent the best of our knowledge and experience at the time of printing. It is your responsibility to ensure that our products are used and handled correctly and in accordance with any applicable New Zealand Standard, our instructions and recommendations and only for the uses they are intended. We also reserve the right to update information without prior notice to you to reflect our ongoing research and development program. Country specific recommendations, depending on local standards, codes of practice, building regulations or industry guidelines, may effect specific installation recommendations. The supply of our products and services is also subject to certain terms, warranties and exclusions, which may have already been disclosed to you in prior dealings or are otherwise available to you on request. You should make yourself familiar with them. © ARDEX New Zealand Ltd. All aforementioned products are the trade marks of ARDEX New Zealand Ltd.

MANROSE

MANROSE FANS ... PROVIDING VENTILATION SOLUTIONS

In recent years, building design and home improvements have concentrated on heating and prevention of heat loss with double glazing, insulation and draught exclusion particular favourites. However this preoccupation with the reduction in heat loss has created its own problems. Basically air is no longer able to circulate freely and the moisture that it contains can lead to condensation, damp problems, even ill health. This air can also be contaminated by carbon monoxide and other combustion gases from domestic fires and heating appliances and can carry the unpleasant stale smells from cooking, smoking etc. A ducted fan will extract the moisture and stale air to the outside of the building, out of harms way.

Securimax Limited, the distributor for Manrose fans, has an extraction fan for just about every requirement and everything that is needed to duct it. Consumers are more aware of the options, whether it's a complete home ventilation system or a bathroom extraction system, consumers are now requesting products that not only introduce fresh air or extract steam to their high expectations but also blend in with the décor of their homes.



This trend has resulted in an increase in demand for the Manrose Low profile models, which with their flush fitting appearance, are now demanded by 95% of consumers when given the choice over other Manrose models.

Along with their aesthetic appeal of the Low Profile models, they also include several important features for ease of installation and maintenance. These models incorporate "snap-in" gib fixing clips for ease of mounting, and longer spigots to provide easier duct connection. Optional chrome and satin silver fascias complete the range, offering a perfect match with any décor. These high quality units have a unique design, which has moved the fan assembly into the spigot of the fan, ensuring a minimal 10mm fascia is all that is visible in the room.

There are several options when considering the best ventilation solutions for your situation: Induct Fans and Shower Fan kits are the most common installation method, as the fan is mounted in the ceiling space with the grille directly above the source of the steam. Generally this type of installation is quieter as the fan is not directly in the bathroom.



Ceiling Mounted Fans are designed for low pitched roofs or between floors where there is no ceiling access. This enables the fan to be accessible for service after installation. The most popular ceiling mounted fan is the heat/fan/light unit. With a 40% increase in fan performance the Manrose Pro Series heat/fan/light units have been designed to meet the demands of today's larger bathrooms.

Thru Wall Fan Kits are designed to vent directly through an exterior wall, for use where the bathroom is located on an external wall.

These are some of the options available for a full range of ventilation solutions visit www.securimax.co.nz



Wall/Ceiling Mounted Fans



Thru Wall Fans



Pro Series Heat n' Vent 2



Pro Series Heat n' Vent 4

Manrose and Securimax have a long standing relationship, which allows us to develop products specifically for the NZ market and incorporate features and demands of our customer base. This has led to all Manrose products being upgraded with ball bearing motors. With fan reliability being a critical factor in fan performance, a ball bearing motor will ensure these fans perform consistently for a number of years. AS a result we are supporting all Manrose fans with a five year warranty.

Securimax Limited, the distributor for Manrose fans, has an extraction fan for every application. With continual development and innovation to ensure that future consumer demands are not only met but exceeded.

Securimax... providing all your healthy home solutions!

For more information please visit www.securimax.co.nz
Download the Ventilation Selection Guide Brochure.pdf



Silhouette

Lo-Carbon RANGE

100/150mm AXIAL EXTRACT FAN

Installation and Wiring Instructions



Stock Ref. N°

44 16 24	- 100B
44 16 25	- 100T
44 16 26	- 100HT
44 16 28	- 150B
44 16 29	- 150T
44 16 30	- 150HT

220-240V~50Hz

Vent-Axia®

PLEASE READ INSTRUCTIONS IN CONJUNCTION WITH ILLUSTRATIONS.
PLEASE SAVE THESE INSTRUCTIONS.

IPX4
CE

Installation and Wiring Instructions for the Lo-Carbon Silhouette Range of Extractor Fans.



**IMPORTANT:
READ THESE INSTRUCTIONS
BEFORE COMMENCING THE
INSTALLATION**

DO NOT install this product in areas where the following may be present or occur:

- Excessive oil or a grease laden atmosphere.
- Corrosive or flammable gases, liquids or vapours.
- Ambient temperatures higher than 40°C or less than -5°C.
- Possible obstructions which would hinder the access or removal of the Fan.

SAFETY AND GUIDANCE NOTES

- A. All wiring to be in accordance with the current I.E.E. Regulations, or the appropriate standards of your country and **MUST** be installed by a suitably qualified person.
- B. The Fan should be provided with a local isolator switch capable of disconnecting all poles, having a contact separation of at least 3mm.
- C. Ensure that the mains supply (Voltage, Frequency, and Phase) complies with the rating label.
- D. The Fan should only be used in conjunction with the appropriate Vent-Axia products.
- E. The fan should only be used in conjunction with fixed wiring.
- F. When the Fan is used to remove air from a room containing a fuel-burning appliance, ensure that the air replacement is adequate for both the fan and the fuel-burning appliance.
- G. The Fan should not be used where it is liable to be subject to direct water spray for prolonged periods of time.
- H. Where ducted Fans are used to handle moisture-laden air, a condensation trap should be fitted. Horizontal ducts should be arranged to slope slightly downwards away from the Fan.
- I. This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.
- J. Children should be supervised to ensure that they do not play with the appliance.
- K. Stationary appliances not fitted with means for disconnection from the supply mains having a contact separation in all poles that provide full disconnection under over voltage category III, the instructions state that means for disconnection must be incorporated in the fixed wiring in accordance with the wiring rules.

DESCRIPTION

The Lo-Carbon Silhouette 100mm fan is an axial extraction fan suitable for domestic bathrooms and W.C's. The Lo-Carbon Silhouette 150mm fan is an axial extraction fan suitable for domestic kitchens and utility rooms. They are available as wall or panel mounted models with shutter timer and humidity combinations.

Long life ball bearing DC motor with anti-vibration mounts provides low noise transmission into plasterboard/panels for silent operation.

The fan can be wall or panel/ceiling mounted.

ACCESSORIES (not supplied)

WALL FITTING KIT

A range of 100mm and 150mm wall kits are available for installing into most walls using telescopic liners supplied.

	Stock Reference	
	White	Brown
100	254102	254100
150	140902A	140903A

A. INSTALLATION

IMPORTANT: The fan should only be used in conjunction with fixed wiring.

PANEL/CEILING MOUNTING

1. For panel/ceiling mounting the fan should be installed into a closed duct system of at least 1.2m long (max 3m) or protected by an exterior air grille that must comply with the standard requirements of your country to prevent access to the fans impeller.
2. Cut a 105mm diameter hole for 100mm fans or a 155mm diameter hole for 150mm fans.
3. Loosen the screw at the bottom of the grille and remove the front grille. Mark the screw centres through the holes in the fan back plate. Drill, plug and screw into position.
4. Attach ducting as required for the installation.
5. Wire the fan as described in Section B-Wiring. Adjust any settings as required (see Section C-Setup).
6. Replace the grille and tighten the retaining screw.
7. After installation, ensure impeller rotates freely and the shutters can open.

WALL MOUNTING

1. For wall mounting either cut a 117mm diameter hole for 100mm fans or a 170mm diameter hole for 150mm fans, through the wall and insert the wall sleeve. Slope the sleeve slightly downwards away from the fan. Cut to length and cement both ends into position flush with the wall faces.
2. Loosen the screw in the bottom of the grille and remove the front grille. Mark the screw centres through the holes in the fan back plate. Drill, plug and screw into position. Fix exterior grille into position with the louvres positioned downwards. (Note:- The grille must comply with the standard requirements of your country to prevent access to the fans impeller. The wall kit used in this installation should provide a minimum ducting length of 100mm from the fans back plate to the inside of the external grille).
3. Wire the fan as described in Section B-Wiring. Adjust any settings as required (see Section C-Setup).
4. Replace the grille and tighten the retaining screw.
5. After installation, ensure impeller rotates freely and the shutters can open.

B. WIRING.



WARNING: THE FAN AND ANCILLARY CONTROL EQUIPMENT MUST BE ISOLATED FROM THE POWER SUPPLY DURING THE INSTALLATION / OR MAINTENANCE.

IMPORTANT

- The fan should only be used in conjunction with fixed wiring.
- The cross - sectional area of supply cord used should be ranged from 1 -1.5mm².
- Cable entry can only be made from the rear of the fan.
- The extraction fan is suitable for connection to 220-240V 50Hz supply.
- The fan is a class II double insulated product and **MUST NOT** be earthed.

1. Select and follow the appropriate wiring diagram. (Fig. 2 or 3)
2. Check all connections have been made correctly and ensure all terminal connections and cable clamps are securely fastened.
3. Ensure the impeller rotates and is free from obstructions.

C. SETUP



WARNING: THE FAN AND ANCILLARY CONTROL EQUIPMENT MUST BE ISOLATED FROM THE POWER SUPPLY DURING THE INSTALLATION / OR MAINTENANCE.

ACCESSING THE CONTROL SETTINGS – (Fig. 4)

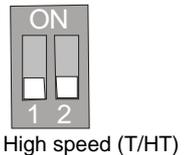
1. Loosen the screw in the bottom of the grille and remove the front grille.
2. Carefully pull the inner cap from the centre of the fan away from the chassis.
3. Adjust the settings as outlined below.

SPEED SETTING:

The fan has two speed settings for different installation requirements:

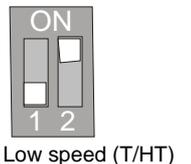
1) High speed:

- T and HT models: Dip switch 2 in the 'OFF' position. (Fig.5 – and right)
- 100B/150B models: Remove jumper (Fig.5)



2) Low speed (Factory set):

- T and HT models: Dip switch 2 should be in the 'ON' position. (Fig.5 – and right)
- 100B/150B models: Replace jumper. (Fig.5)



Dip switch 1 should be in the 'OFF' position (T and HT models only).

TIMER ADJUSTMENT (T AND HT MODELS)

BEFORE ADJUSTING THE TIMER, SWITCH OFF THE MAINS SUPPLY. TIMER SHOULD ONLY BE ADJUSTED BEFORE OR DURING INSTALLATION.

1. Remove the fan grille. The controller is factory set at 15 minutes approx. The overrun time period can be adjusted from 1-30 minutes by altering the adjuster on the control PCB.
2. To REDUCE the operating time, use a small screwdriver to turn the adjuster Fig.5. CLOCKWISE.
3. To INCREASE the operating time, use a small screwdriver to turn the adjuster Fig.5. ANTI-CLOCKWISE.
4. Replace the fan grille.

HUMIDITY SET-POINT ADJUSTMENT (HT MODELS ONLY)

BEFORE ADJUSTING THE CONTROLLER, SWITCH OFF THE MAINS SUPPLY. HUMIDISTAT SHOULD ONLY BE ADJUSTED BEFORE OR DURING INSTALLATION.

1. Remove the fan grille. The controller is factory set to switch on at about 70% RH. The humidity set point can be adjusted from 65-95%RH by altering the adjuster on the control PCB.
2. To LOWER the set-point use a small screwdriver to turn the adjuster Fig.5. ANTI-CLOCKWISE. This makes the controller MORE sensitive.
3. To RAISE the set-point use a small screwdriver to turn the adjuster Fig.5. CLOCKWISE. This makes the controller LESS sensitive.
4. Replace the fan grille.

D. SERVICING AND MAINTENANCE.



WARNING: THE FAN AND ANCILLARY CONTROL EQUIPMENT MUST BE ISOLATED FROM THE POWER SUPPLY DURING MAINTENANCE.

1. At intervals appropriate to the installation, the fan should be inspected and cleaned to ensure there is no build up of dirt or other deposits.
2. Wipe the inlets and front face with a damp cloth until clean.

The fan has sealed for life bearings, which do not require lubrication.

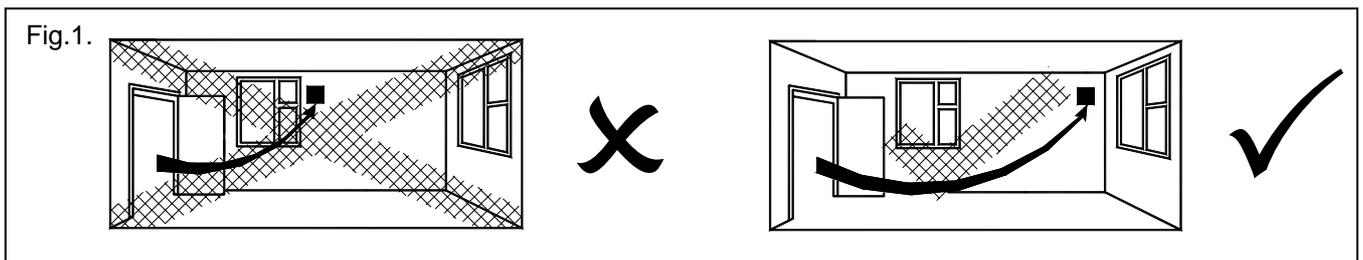


Fig.2 Models: 100B/150B, 100HT/150HT (Timer not used)

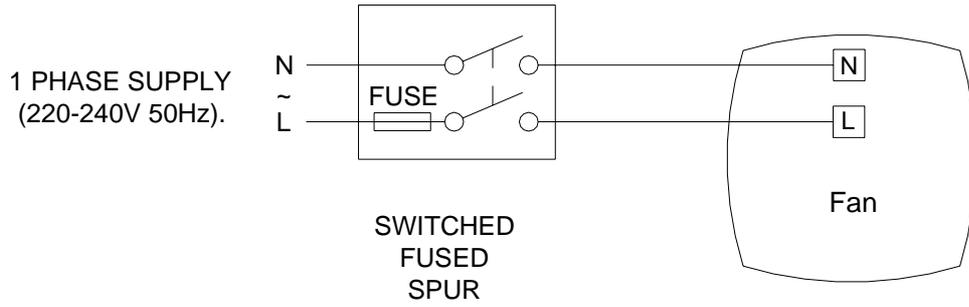


Fig.3 Models: 100T/150T, 100HT/150HT

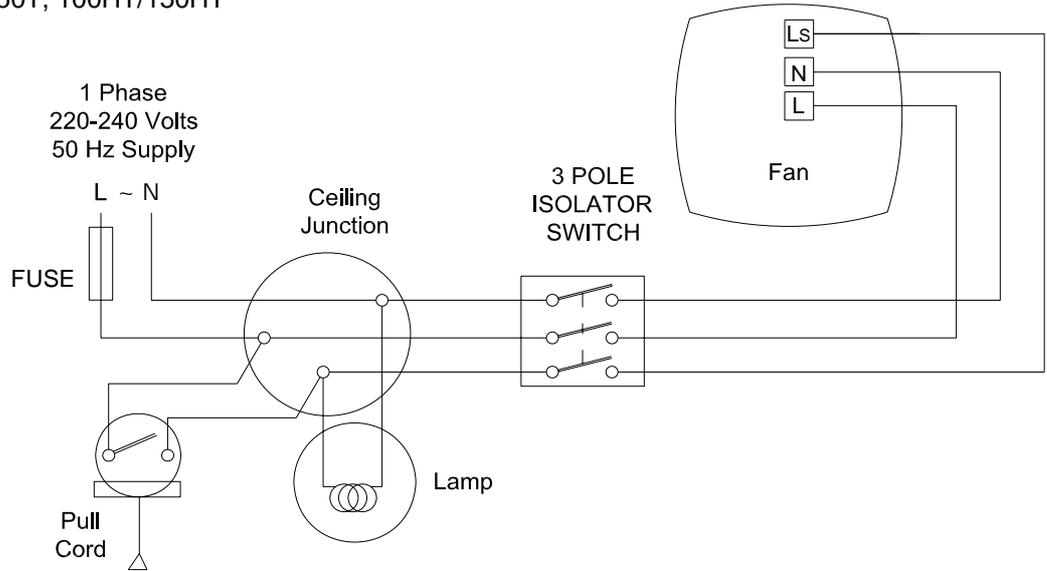


Fig.4. Accessing the control settings

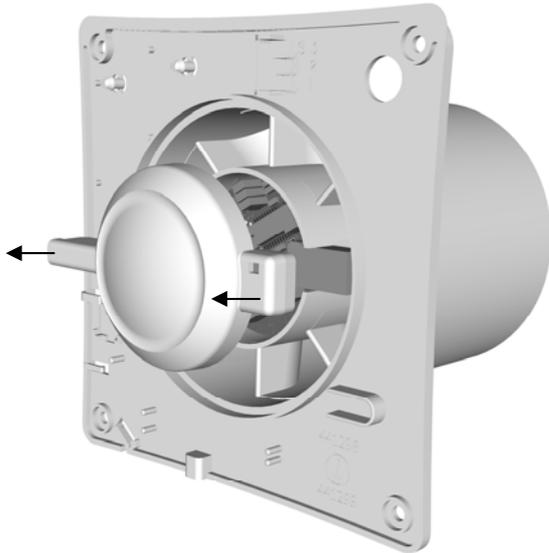
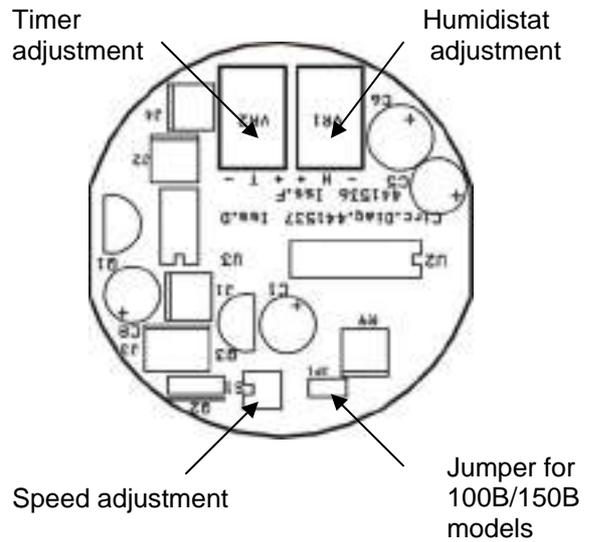


Fig.5.



Vent-Axia®

Head Office: Fleming Way, Crawley, West Sussex, RH10 9YX. Tel: 01293 526062 Fax: 01293 551188

UK NATIONAL CALL CENTRE, Newton Road, Crawley, West Sussex, RH10 9JA

SALES ENQUIRIES: Tel: 0844 8560590 Fax: 01293 565169

TECHNICAL SUPPORT: Tel: 0844 8560594 Fax: 01293 532814

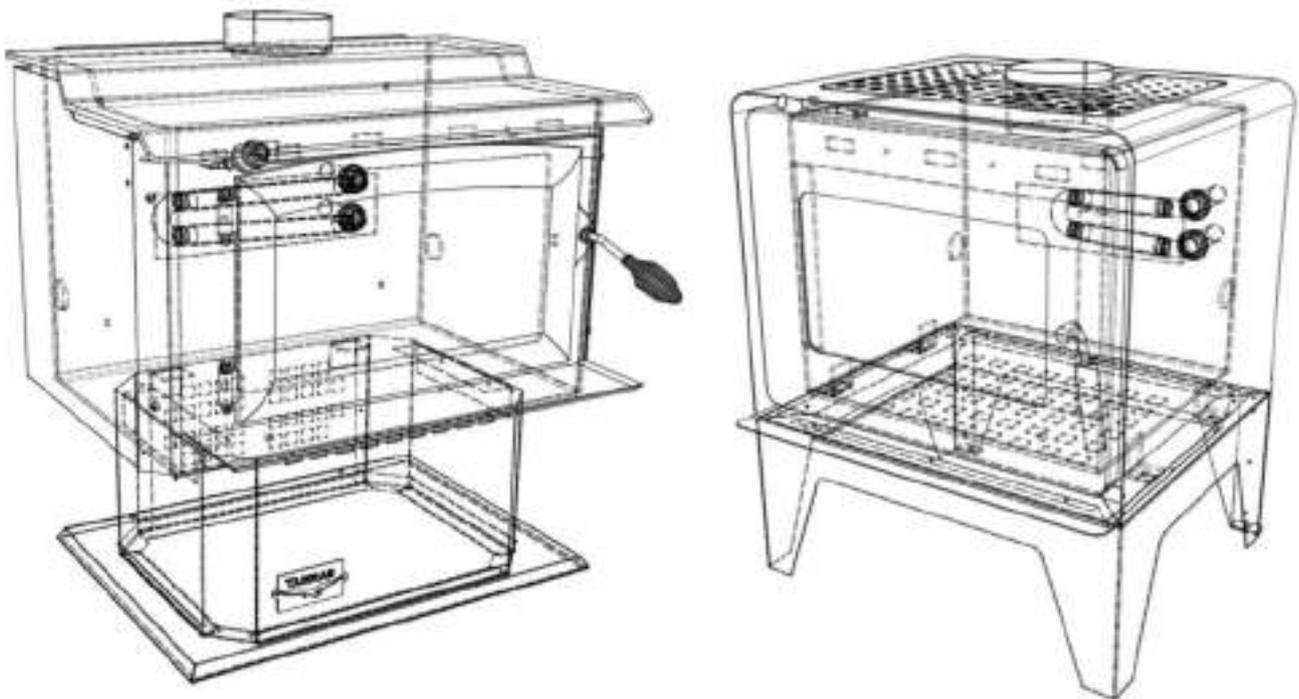
For details of the warranty and returns procedure please refer to www.vent-axia.com or write to Vent-Axia Ltd, Fleming Way, Crawley, RH10 9YX



WOODSMAN

Warming kiwi homes since 1887.

Specifications and Installation Instructions for Woodsman Solid Fuel Burners



The installation of any Woodsman solid fuel burner requires a Building Consent prior to installation commencing. We recommend the installation of a Woodsman solid fuel burner or flue system be undertaken by the holder of a current SFAIT (Solid Fuel Appliance Installation Technician) qualification issued by the NZHHA (NZ Home Heating Association Inc.).

www.nzhha.co.nz

Proudly Manufactured By:



Harris Home Fires
41 Braddon St
Addington
Christchurch 8024
New Zealand
Email sales@hhf.co.nz

P O Box 4043
Christchurch 8140
New Zealand

Phone 03 366 1796
Freephone 0800 3661796
Fax 03 366 1795

Contents

	PAGE
Testing and Certification	3
Clearances	4 & 5
Flue Shields	6
Ceiling Heights	6
Flue Shield Deflector	6
Floor Protector/Hearth Graph (Graph 1)	7
Rear Deflector	7
Dimensions	8
Reducing Clearances	9
Installation Instructions	10
Floor Protector Materials	10
Minimum Flue Height	11
Flue Installation Details	11
Sealing Flue Joints	12
Fitting The Wetback To The Firebox	13

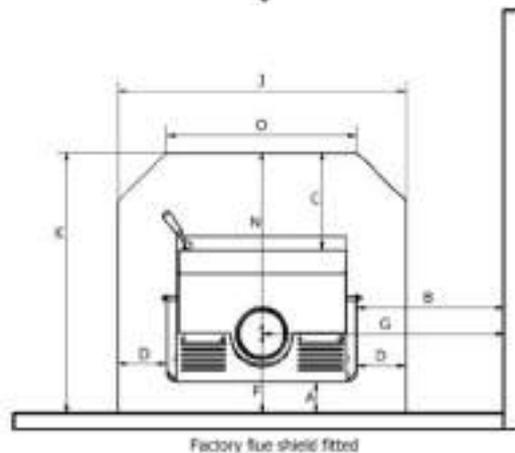
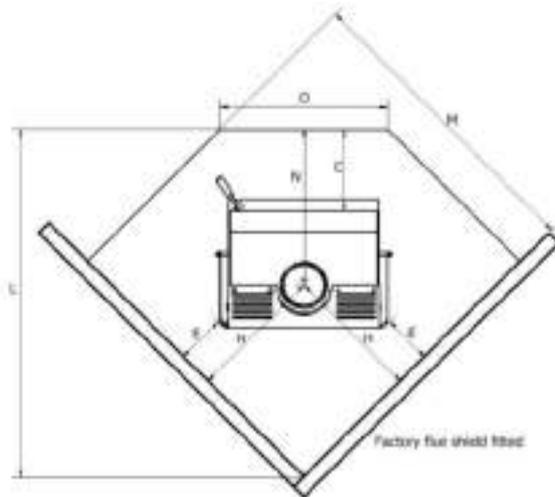
Testing and Certification

MODEL	AS/NZS 2918:2001, APP B	AS/NZ 2918:2001, APP E	AS/NZS 4012:1999	AS/NZS 4013:1999	ECan Cert Number
ECR NoVo	Complies	N/A	67%	0.9g/kg	153733
ECR NoVo Wet	Complies	N/A	65%	0.9g/kg	155148
Totara	Complies	Complies	67%	0.9g/kg	110220
Matai ECR MkIII	Complies	N/A	71%	0.7g/kg	102148
Matai ECR MkV	Complies	N/A	65%	0.7g/kg	102454
IMF	Complies	Complies	N/A	3.9g/kg	N/A
Flare - Wood	Complies	N/A	68%	0.97g/kg	134775
Flare - Wood WB	Complies	N/A	65%	0.89g/kg	135021
Flare - Multi	Complies	N/A	N/A	N/A	N/A
RMF	Complies	N/A	83%	3.9g/kg	N/A
Strongman	Complies	N/A	N/A	N/A	N/A
Aspen	Complies	N/A	71%	0.5g/kg	111306
Aspen WB	Complies	N/A	65%	0.5g/kg	111307
Brunner MKII	Complies	N/A	71%	0.5g/kg	142896
Brunner MKII WB	Complies	N/A	65%	0.5g/kg	142897
Tasman MKII	Complies	N/A	71%	0.5g/kg	142898
Tasman MKII WB	Complies	N/A	65%	0.5g/kg	142899
Tarras MKIII	Complies	N/A	69%	0.37g/kg	143492
Tarras MKIII WB	Complies	N/A	65%	0.5g/kg	143494

Minimum Safe Installation Clearances to COMBUSTIBLE Materials

	BRUNNER MKII & TASMAN MKII	BRUNNER MKII & TASMAN MKII With Rear Deflector Fitted (see Page 7)	FLARE-WOOD	FLARE-MULTI	TARRAS MKIII	TARRAS MKIII With Rear Deflector Fitted (see Page 7)
A	200	120	100	100	230	160
B	450	450	320	350	480	460
C	300	300	300	300	300	300
D	118	118	110	110	67	67
E	230	240	120	150	250	220
F	345	265	281	281	372	302
G	758	758	635	665	863	843
H	535	545	449	479	611	581
J	850	850	850	850	898	898
K	1025	945	933	933	1052	982
L	1437	1451	1287	1329	1544	1500
M	1220	1230	1122	1152	1304	1274
N	680	680	652	652	680	680
O	615	615	600	600	600	600
Flue Shield Requirements (See Page 6)	1200 With flue shield deflector fitted	1200 With flue shield deflector fitted	1200 With flue shield deflector fitted	1200 With flue shield deflector fitted	1200 With flue shield deflector fitted	1200 With flue shield deflector fitted

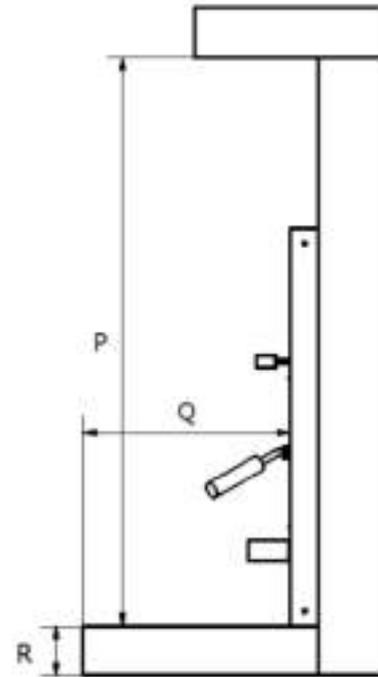
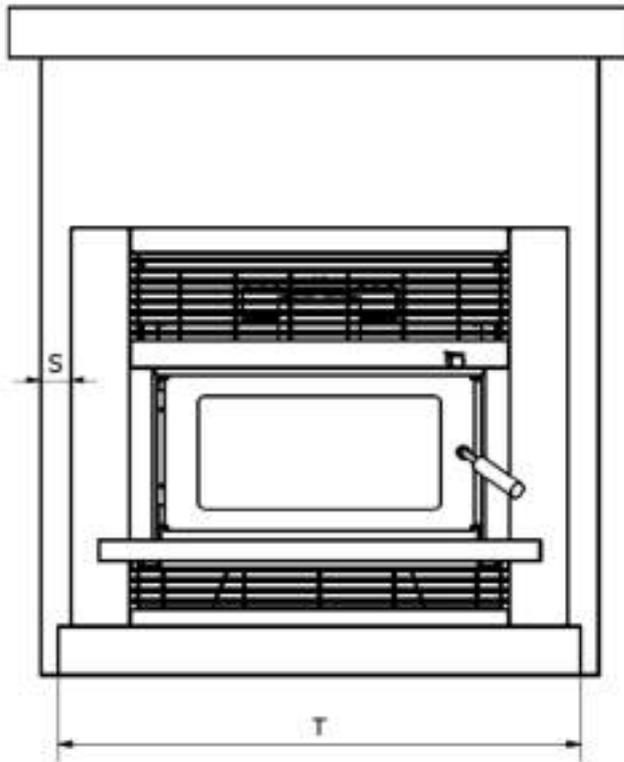
	ECR MkIII, MkIV, MkV	ECR NoVo With Rear Deflector Fitted (see Page 7)	ASPEN	RMF	STRONGMAN
A	100	110	255	125	300
B	400	490	435	500	875*
C	300	300	300	300	GRAPH 1
D	150	115	118	150	150
E	200	200	230	180	380
F	251	265	404	276	441
G	690	800	743	790	1233**
H	512	517	521	492	711
J	880	850	850	880	1015
K	807	792	1084	832	1364
L	1280	1259	1417	1252	1928
M	1110	1049	1219	1060	1616
N	556	527	680	556	923
O	580	450	615	580	715
Flue Shield Requirements (See Page 6)	900	1200	1200	900	1200



Dimensions **A**, **B** & **E** are taken from the combustible wall to the closest point of the appliance including panels
 Dimension **C** is measured from the edge of the hearth to the closest point of the firebox door frame as in AS/NZS 2918:2001 3.3.2

All dimensions are given in millimetres .
 *610mm with firebox side panels fitted.
 **968mm with firebox panels fitted.

Minimum Safe Installation Clearances to COMBUSTIBLE Materials



	IMF	Totara
P	980	1060*
Q	Graph 1	Graph 1
R	Graph 1	Graph 1
S	50	50
T	840	840

* Dimension P can be 920mm with a factory supplied heat deflector fitted

Ceiling Heights

All Woodsman free standing fires have been tested and approved to AS/NZ 2918:2001 App B with a ceiling height of 2.4m and with the factory flue shield fitted in the below configurations. In some cases, the top of the flue shield terminates within 600mm of the ceiling height (refer to AS/NZ 2918:2001 **4.5.2**) but all ceiling temperatures did not exceed the allowable limit in these cases and are therefore able to be installed. Reports are available on request for Councils.

If the ceiling height is less than 2.4m, then heat shielding is required as per AS/NZ 2918:2001 Table 3.2

Factory Flue Shields

Standard 900mm high flue shield:

ECR MKIII & RMF

Standard 1200mm high flue shield:

Brunner, Tasman, Aspen, ECR NoVo & Strongman

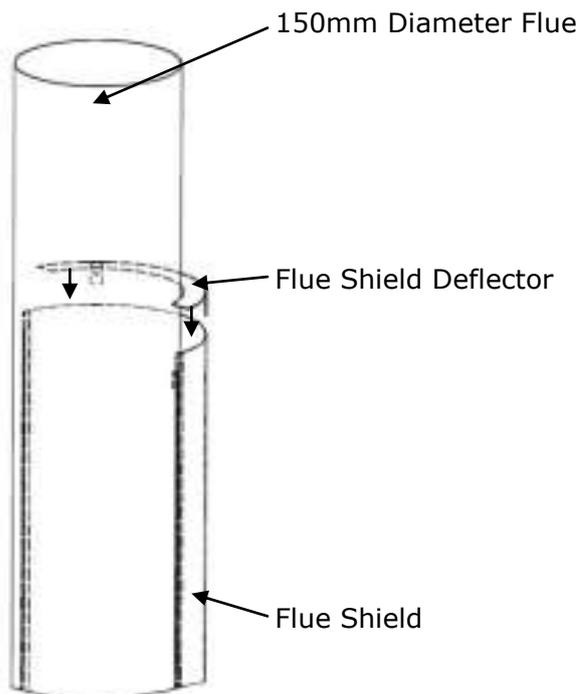
1200mm high flue shield with flue shield deflector (REQUIRED)

Tarras MKII, Tarras MKIII, Brunner/Tasman MKII & Flare (All Variants) - See Below

IMPORTANT - Flue shields should be no further than 10mm off the top of the fire box

Fitting the Flue Shield Deflector

for Tarras MKII, Tarras MKIII, Brunner/Tasman MKII and Flare (All Variants)



To fit the heat shield deflector:

- Place the deflector on top of the heat shield and ensure no large gaps
- Fix in place by securing the tabs with rivets to the heat shield

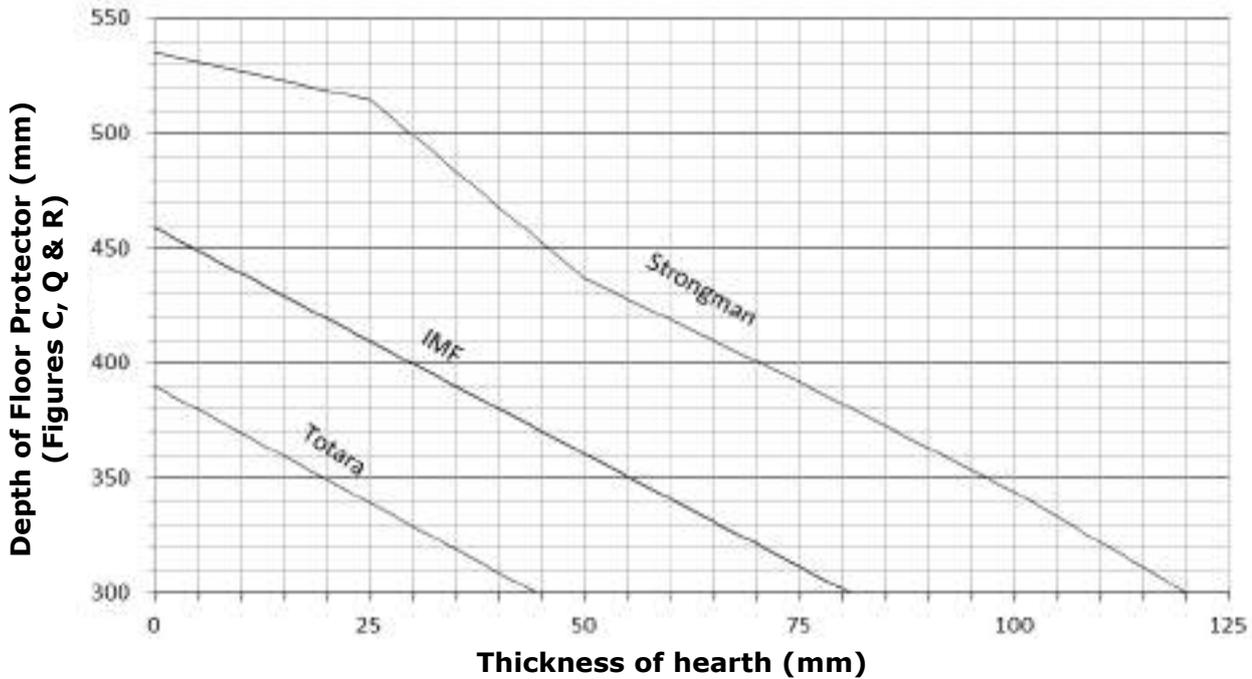
WARNING

This part is required to be installed on the listed models with ALL types of flue kits. Failure to do so, may cause the ceiling to over heat. The part is located in the fire itself and not the flue kit packaging.

Floor Protector Graph

Graph 1

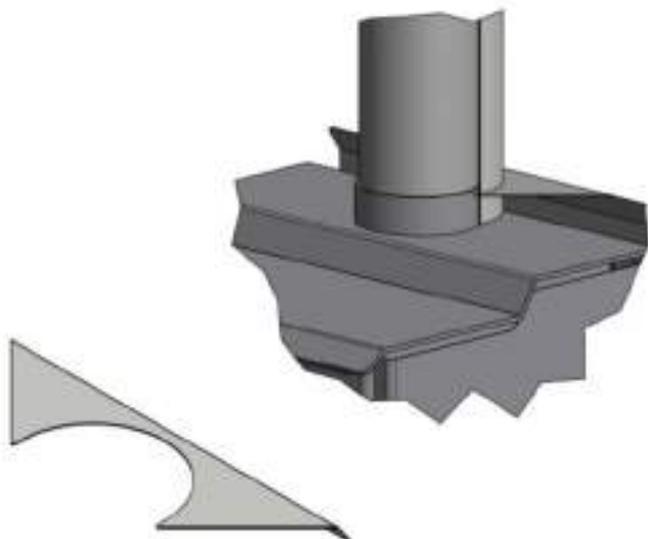
Floor Protector Sizes



This graph refers to Page 4 dimension C and Page 5 dimension Q & R.

The floor protector distance out in front of the fire (taken from the door), is dependent on the thickness of the floor protector. The thicker the floor protector is above the surrounding combustible floor, the less this distance is out in front of the fire.

Rear Deflector



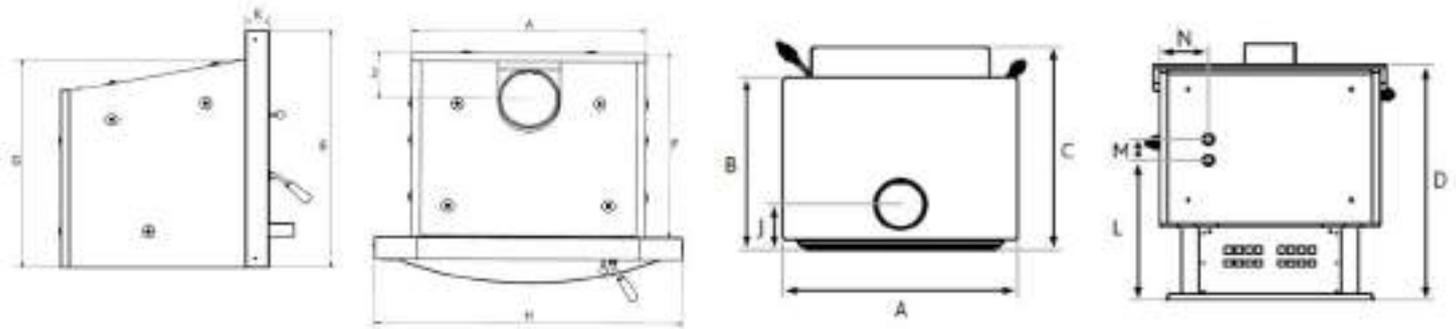
The rear deflector is used for reducing rear clearances for applicable fires (see page 4 for details). It is located loose in the firebox.

To fit the rear deflector, simply attach it to the rear shield of the fire using 2 rivets in the predrilled holes.

The rear deflector should be positioned tight up against the flue shield as shown.

Available for:
 Brunner MKII, Tasman MKII, ECR NoVo & Tarras MKIII

Dimensions



	TOTARA	ECR MKIII, V	ECR NoVo	BRUNNER MKII & TASMAN MKII	TARRAS MKIII	FLARE WOOD	FLARE MULTI	RMF	STRONG-MAN	IMF Deluxe
A Overall Stove Width	642	580	620	615	765	630	630	580	715	590
B Stove Depth Door Frame to Rear		390	382	525	522	540	540	390	521	
C Overall Stove Depth Ledge to rear		450	466	630	640	602	602	450	590	
D Overall Stove Height		620	705	757	772	764	764	620	695	
E Insert Fascia Height	650									740
F Insert Depth	506									480
G Insert Maximum Height	570									590
H Insert Fascia Width	840									850
J Flue Centre to Back of Unit	136	150	155	145	142	181	181	150	141	115
K Insert Fascia Depth	62									120/6 5
L Wetback Height		283	414	478	479	502	502			
M Wetback Centres		130	65	65	65	65	65			
N Wetback Position		290	108	107	180	133	133			

Disclaimer;

While every attempt is made to ensure this information is as accurate as possible, a tolerance of +/- 5mm should be allowed for in these dimensions

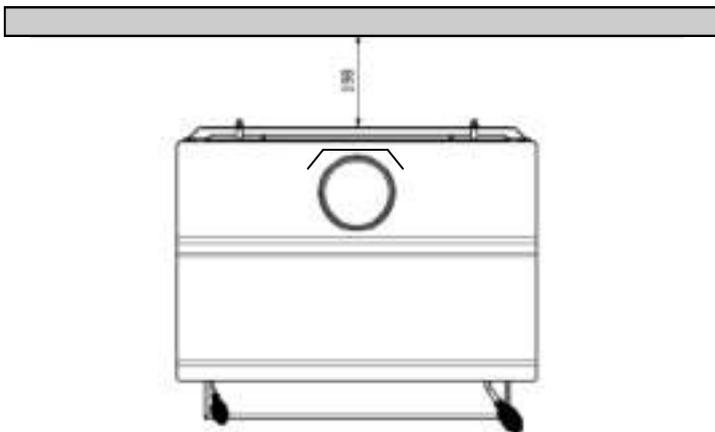
Reducing Clearances

The clearances that are provided on page 4 are to combustible materials. You can safely reduce those clearances by following the instructions located in AS/NZS 2918:2001 table 3.1 and 3.2

You can reduce the clearances by placing a non-combustible heat shield, with an air gap behind it and vented top and bottom, between the fire and the combustible wall. Masonry may be used as a heat shield material. The heat shield must extend a minimum of **450mm** beyond the top of the appliance and must be of appropriate width to ensure that the unshielded rear clearance is adhered to beyond the sides of the heat shield. See example below.

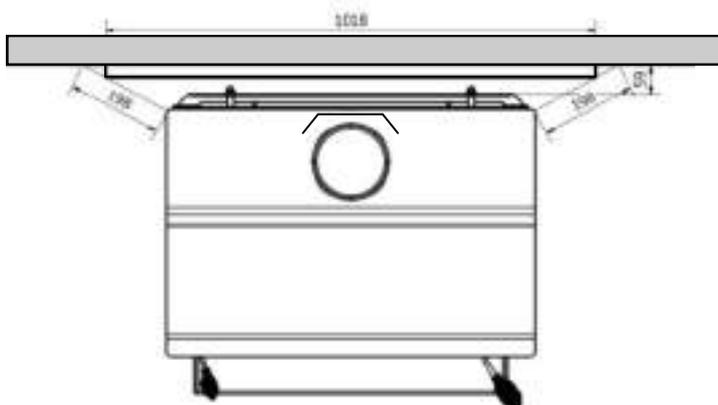
Clearance factors for heat shields which are within 45 degrees of the vertical

Heat Shield Construction	Minimum Air Gap Dimension	Clearance Factor
Single layer of continuous material	12mm	0.4
Single layer of continuous material	25mm	0.3
Two spaced layers of continuous material	12mm + 12mm	0.2



Unshielded Dimension for Woodsman Tarras MKII

Rear Clearance - 198mm (combustible to stove)



Heat shield with 25mm air gap with Woodsman Tarras MKII

Heat Shield - Single layer of continuous material with 25mm air gap.
Size 1018mm wide x 1222mm high

Reduced Rear Clearance - 59mm (combustible to stove)
Calculation: **198mm x 0.3 = 59mm**

WARNING - This is only an example, you must refer to the full AS/NZS 2918:2001 document for more details and consult your local building inspector. Where heat shields are used to reduce appliance dimensions, additional flue shielding may be required (refer 4.5.2).

Installation Instructions

This appliance should only be installed by a trained and NZHHA qualified installer.

Warning: the appliance and flue system shall be installed in accordance with AS/NZS 2918 and the appropriate requirements of relevant building code/codes.

Warning: appliances installed in accordance with this standard shall comply with the requirements of AS/NZS 4013 where required by the regulatory authority, i.e. the appliance shall be identifiable by a compliance plate with the marking "Tested to AS/NZS 4013".

Any modification of the appliance that has not been approved in writing by the testing authority is considered to be in breach of the approval granted for compliance with AS/NZS 4013.

Caution: mixing of appliance or flue system components from different sources or modifying the dimensional specification of components may result in hazardous conditions. Where such action is considered, the manufacturer should be consulted in the first instance.

Caution: cracked and broken components e.g. glass panels or ceramic tiles, may render the installation unsafe.

- Maintain a clearance of at least 1 metre between front of the appliance and building structure or any other substantial immovable object.
- If the appliance is installed on a heat sensitive floor, the floor should be protected with an insulation floor protector, which shall extend entirely beneath the heater. For the correct floor protector extension, refer to dimension C in FIG 1 & 2.
- Your appliance shall be seismically restrained, including the floor protector using the provided holes or brackets. The restraints should be sufficient enough to resist a seismic loading equal to 0.4 times the mass of the appliance. We recommend a minimum of 8mm dynabolts on concrete floors and 8mm coach screws for wooden floors of appropriate length.

Minimum Material Specifications For Floor Protectors on a Floor of Combustible Material

MODEL	SPECIFICATION
ASPEN	9mm Eterpan LD + 8mm ceramic tiles (or equivalent)
FLARE (All Variants) ECR (MkIII, IV, V) RMF TOTARA*	8mm ceramic tiles only (or equivalent)
STRONGMAN	24mm Eterpan LD (or equivalent)
BRUNNER MKII TASMAN MKII TARRAS MKIII ECR NoVo	Ash Floor Protector. Any non-combustible material of any thickness

*The Totara is also approved with 1mm sheet steel with a 10mm spacing above combustible material. For use when extending hearths.

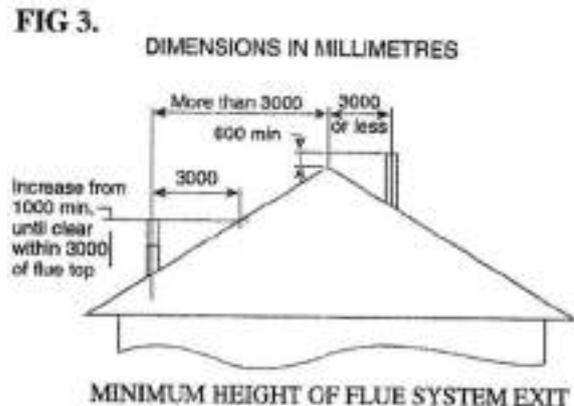
Minimum Flue Height

The top of the flue system should be at least 600mm above the highest point of the roof ridgeline, if the point of intersection of the flue system and the roofline is less than 3 metres from the ridgeline horizontally.

If the point of intersection of the flue system and the roofline is greater than 3 metres horizontally, the top of the flue system shall be at least 1 metre above the point of intersection with the roofline. (refer FIG 3)

The total flue height should be no less than 4.6m from the level of the hearth.

These are considered to be **minimum dimensions**, and depending on local conditions, **taller flue system heights may be required for satisfactory performance.**



Flue Installation Detail

Your Woodsman appliance should be installed with a HeatSaver Flue System.

A HeatSaver Flue System is available from all authorised Woodsman dealers throughout New Zealand.

The HeatSaver Flue System contains a complete installation drawing and correct clearances from the ceiling level up. Minimum clearances from the appliance to nearby combustible surfaces are given in FIGS 1 & 2.

Use of a flue system other than a genuine HeatSaver Flue System may affect the safety of the installation, and may affect your Woodsman warranty.

Insist on a genuine HeatSaver Flue System.

Installation requirements for Woodsman fireplace inserts and flue system where timber framing is less than 50mm from the chimney structure.

Installation should be carried out by a qualified installer who will ensure:

- That the minimum clearances determined by tests in accordance with AS/NZS 2918:2001 are complied with to prevent overheating of nearby combustibles.
- That the minimum opening size of **600mm wide x 600mm high x 500mm deep** is available when firebricks are removed, and that extra provision also be made for plumbing where a hot water booster is fitted (where permitted).
- That any flue requirements specific to the model being installed are met in full - refer HeatSaver Flue System Instructions.
- Where the fireplace opening is in a heat sensitive wall, a non-metallic heat resistant material shall extend not less than 50mm beyond each side of the appliance and 150mm beyond the top of the appliance.
- Clearance of at least 1 metre between the front of the appliance and building structure, or any other substantial material object.
- That the insulating floor protector of non-combustible material is provided, extending not less than the dimensions shown in the chart. (Refer Table 2)
- A fireplace appliance shall not be connected to a flue common with an open fireplace.

Sealing Flue Joints

IMPORTANT

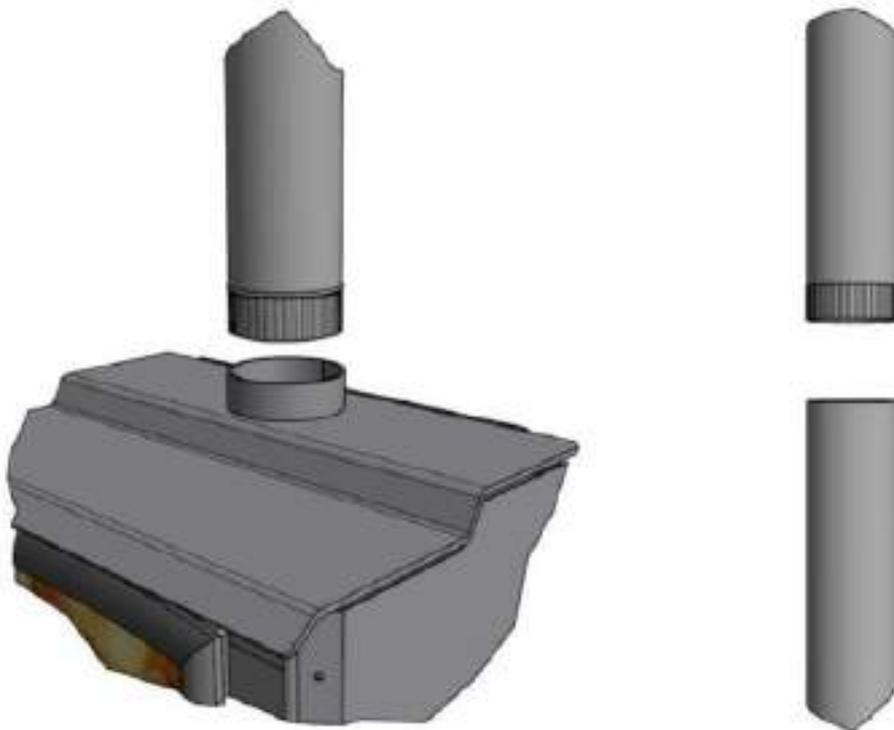
All Flue Joints Are Required To Be Sealed Using Flue Cement

It is extremely important that ALL flue joints are sealed at the time of installation using flue cement or a suitable exhaust cement.

If flue joints are not sealed properly, it can lead to performance issues with the fire such as;

- Lower heat output of the fire, due to decreased performance
- Blocked flue
- Smoke coming out the door when open, due to decreased suction
- Hard to light

The formation of soot and creosote will not seal the flues, especially on the lower lengths, as the high temperatures inhibit its formation.



Any issues that arise as a result of the flues not being sealed, are not covered by the warranty and are not the responsibility of the manufacturer.

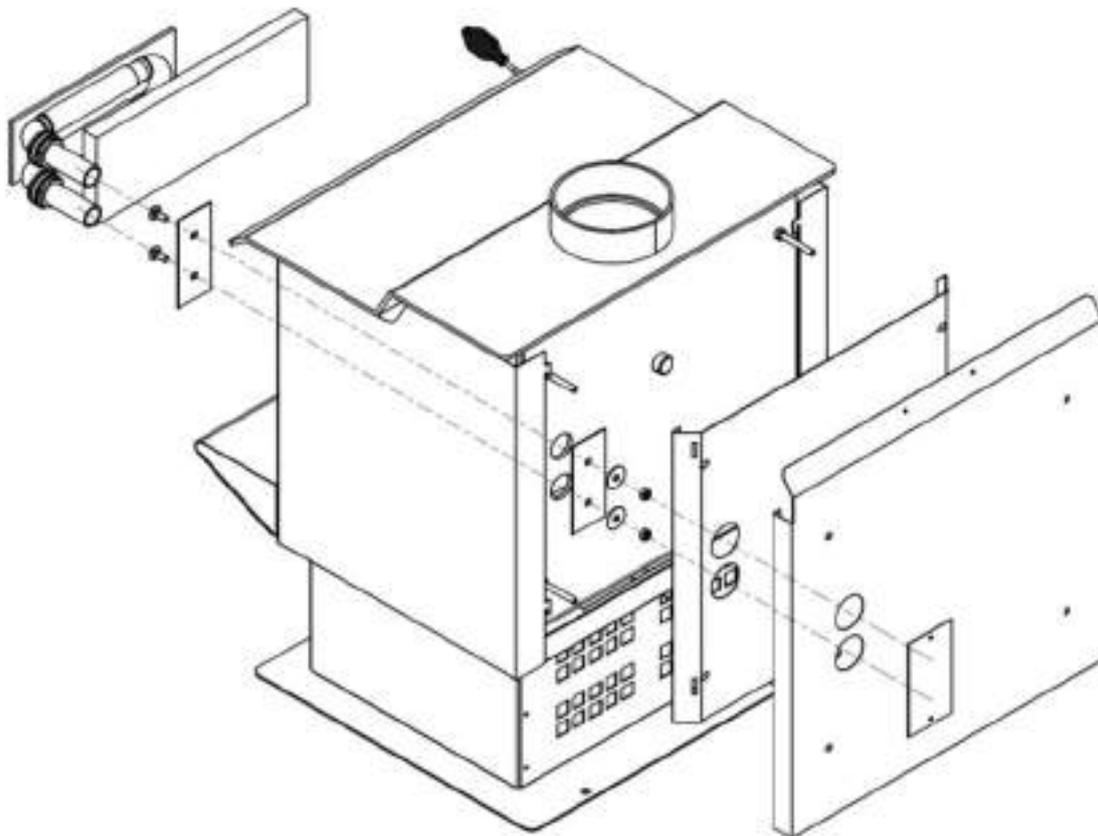
It is the installers responsibility to ensure that this is done at the time of installation.

Fitting the Wetback To The Firebox

Instructions for fitting a loose wetback to the firebox where the fire has been pre-punched with wetback holes.

- Remove knock-outs and cover plates in the rear panels
- Remove top rear firebrick
- Undo coach bolts on firebox plug to expose wetback holes
- Cut rear firebrick with a saw only enough to expose the wetback holes on the inside and to allow for the placement of the wetback in front of the brick
- Remove 1 nut off each wetback tube
- Place wetback into fire with firebrick behind it
- Replace nuts onto the rear of the wetback. Ensure the wetback is level before tightening using a 40mm tube socket

This task should be completed before the fire is positioned in place.

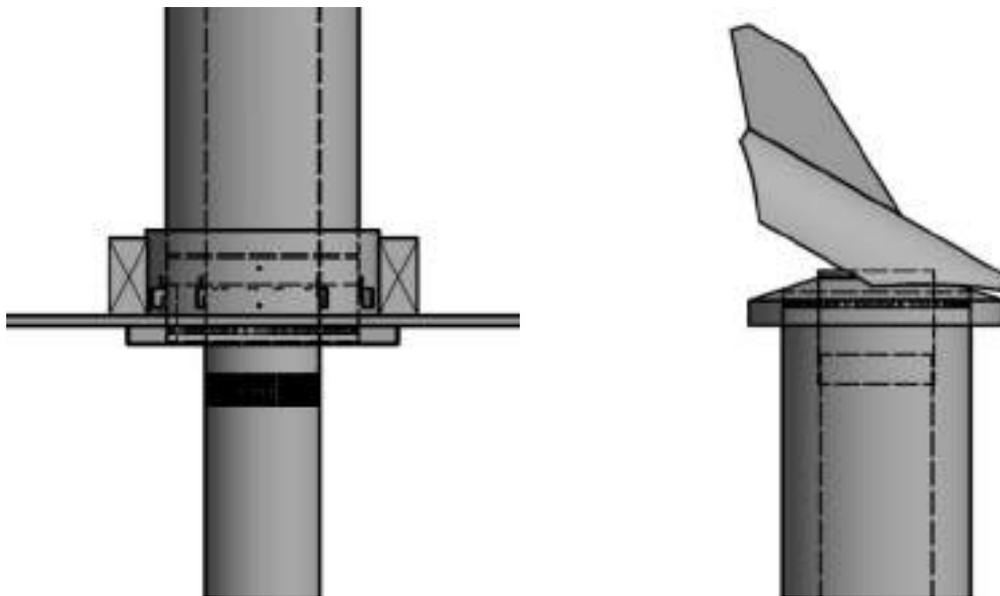


Note: Rear panels do not need to be removed if a tube socket is used for tightening

WETBACK WARNINGS:

- Do not connect to an unvented hot water system.
- **NEVER** burn the appliance without the wetback connected to the water system. This will immediately damage the wetback and void the warranty.
- AS/NZS 2918:2001 states; "all water connections to an appliance shall be in accordance with the appropriate requirements of AS 3500.4.1 or NZS 4603 and the regulatory authority, as appropriate".

HeatSaver Flue Kit Installation Instructions For Solid Fuel Appliances



The installation of any Woodsman solid fuel burner requires a Building Consent prior to installation commencing. The installation of a Woodsman solid fuel burner or flue system MUST be undertaken by the holder of a current SFAIT (Solid Fuel Appliance Installation Technician) qualification issued by the NZHHA (NZ Home Heating Association Inc.). www.nzhha.co.nz

KEEP THESE INSTRUCTIONS FOR FUTURE REFERENCE

Proudly Manufactured By:

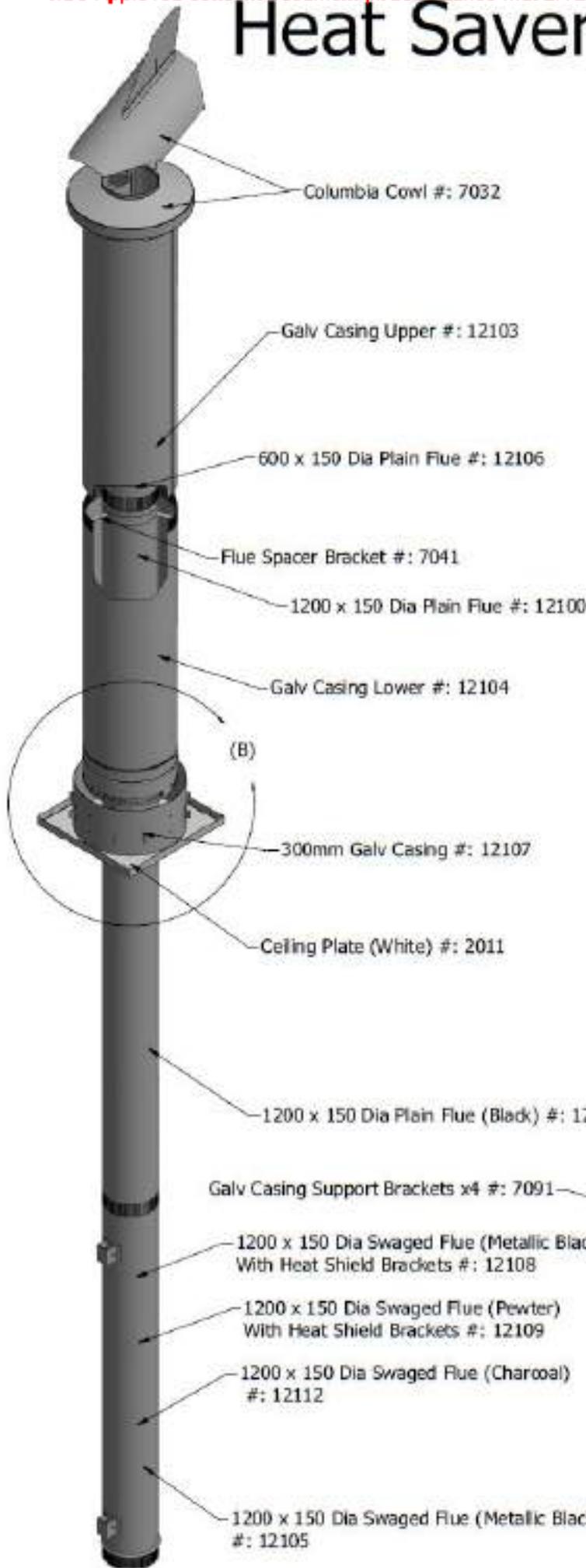


Harris Home Fires
41 Braddon St
Addington
Christchurch 8024
New Zealand
Email sales@hhf.co.nz

P O Box 4043
Christchurch 8140
New Zealand

Phone 03 366 1796
Freephone 0800 3661796
Fax 03 366 1795

Heat Saver II Flue Kit



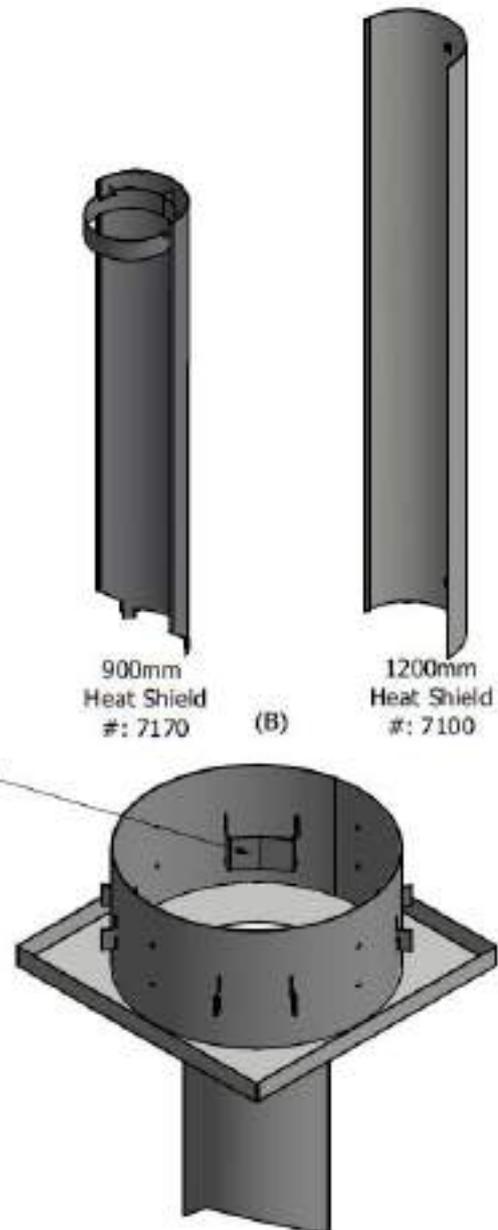
Extension Set

Galv Casing Extension #: 12101

Plain Flue Extension #: 12100

Internal Extensions

Metallic Black 1200 #: 12102
Charcoal 1200 #: 12111
Pewter 1200 #: 12110



INSTALLATION INSTRUCTIONS

- This HeatSaver flue system is tested and certified to AS/NZS 2918:2001 Appendix F, which means it is approved for use on all solid fuel appliances with a flue diameter of 150mm.
- A copy of the Laboratory Test Certificate for this HeatSaver Flue System is included as part of these Installation Instructions, (refer to paperwork with flue kit).
- Installation of any solid fuel appliance should only be carried out by suitably trained and qualified personnel.
- Position the stove to the desired position, always ensuring that the manufacturer's minimum clearances to combustibles are complied with.
- Check that there are no roofline ridges or valleys in the way, or if they cannot be avoided, that the installer knows how to weatherproof the penetration and reinstate the full strength of the structure.
- At the ceiling level, construct a square frame of 300mm x 300mm internal dimensions and cut away the ceiling materials from the inside of this frame.
- Lower the 300mm flue pipe casing into this frame and nail in place when the bottom edge is 25mm below the ceiling level and the 8 nail holes provided are touching the timber frame.
- Check all 4 locating brackets are securely in place and drop 250mm diameter lower casing in place. This will naturally settle so it protrudes 25mm below the ceiling.
- Make roof penetration, assemble and fit required flue length and install with upper casing. Secure all joints with at least 3 stainless steel rivets or self tapping screws.
- Frame and brace upper installation as required and flash the roof to shield penetration.
- Fit ceiling plate to ceiling.
- When trimming the stainless steel flue length, remember to allow for expansion when flue is hot.
- Fix the bottom section of the HeatSaver Columbia Cowl in place and then attached top section by bending tab away from the shaft to allow the top section to slide down onto the washer. Bend tab back in place once done. Do not over bend tab so that it touched the shaft. See page 6
- Secure the flue to the fire, drill through flue neck on fire and secure with 2 to 3 s/s screws or rivets.
- **All flue joints should be sealed using a flue cement. (see page 4)**

IMPORTANT

All Flue Joints Are Required To Be Sealed Using Flue Cement

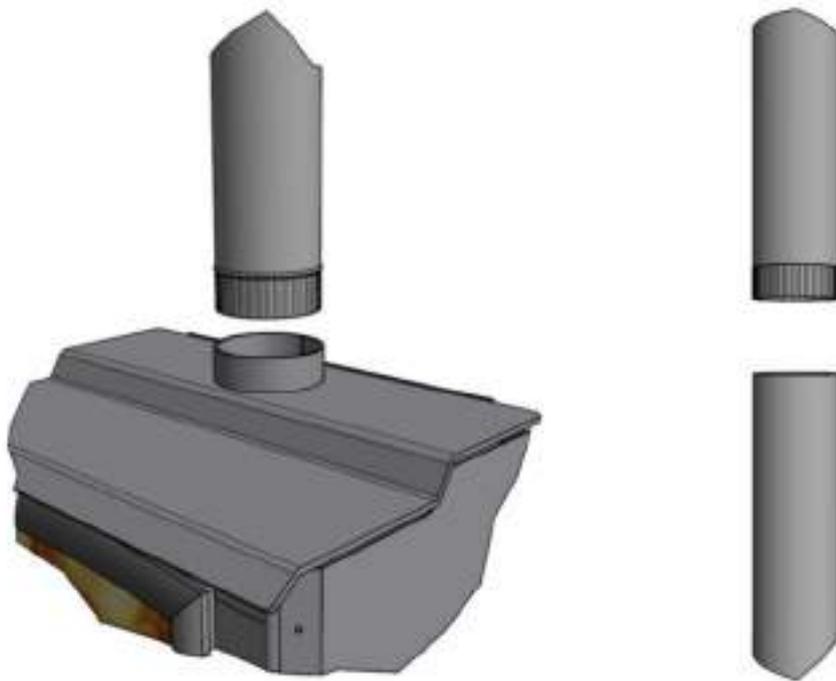
It is extremely important that ALL flue joints are sealed at the time of installation using flue cement or a suitable exhaust cement.

Woodsman fires are designed and tested with all flue joints sealed.

If flue joints are not sealed properly, it can lead to performance issues with the fire such as;

- Lower heat output of the fire, due to decreased performance
- Blocked flue
- Smoke coming out the door when open, due to decreased suction
- Hard to light

The formation of soot and creosote will not seal the flues, especially on the lower lengths, as the high temperatures inhibit its formation.



Any issues that arise as a result of the flues not being sealed, are not covered by the warranty and are not the responsibility of the manufacturer.

It is the installer's responsibility to ensure that this is done at the time of installation.

Fitting Factory Flue Shields

Your HeatSaver Flue System comes standard with a factory flue shield of one of 2 types;

- **900mm high**, contains 1 x painted metal strap. This is used for the Woodsman ECR, Blaze, Boston, Manhattan, RMF and Milford.
- **1200mm high**, This is suitable for the Woodsman Brunner, Tasman, Aspen, Tararas, Strongman and other branded fires which can use 1200mm high single heat shields.

Fitting the 900mm High Flue Shield

1. The heat shield has 2 'tabs' at the bottom which corresponds to 2 slots on the fire behind the flue neck. Insert the tabs.
2. Take the metal strap and fold the two ends around the flue until they meet at the back of the flue at about the height of the top of the heat shield.
3. Hold both ends together and push the tabs through the single slot at the back of the heat shield and fold out tabs to secure in place.

Fitting the 1200mm high heat shield

Your lower length of painted flue already has 2 location brackets attached.

1. Ensure these brackets are facing towards the back wall and centralised.
2. Secure the flue shield in place with screws



1200mm Flue Shield

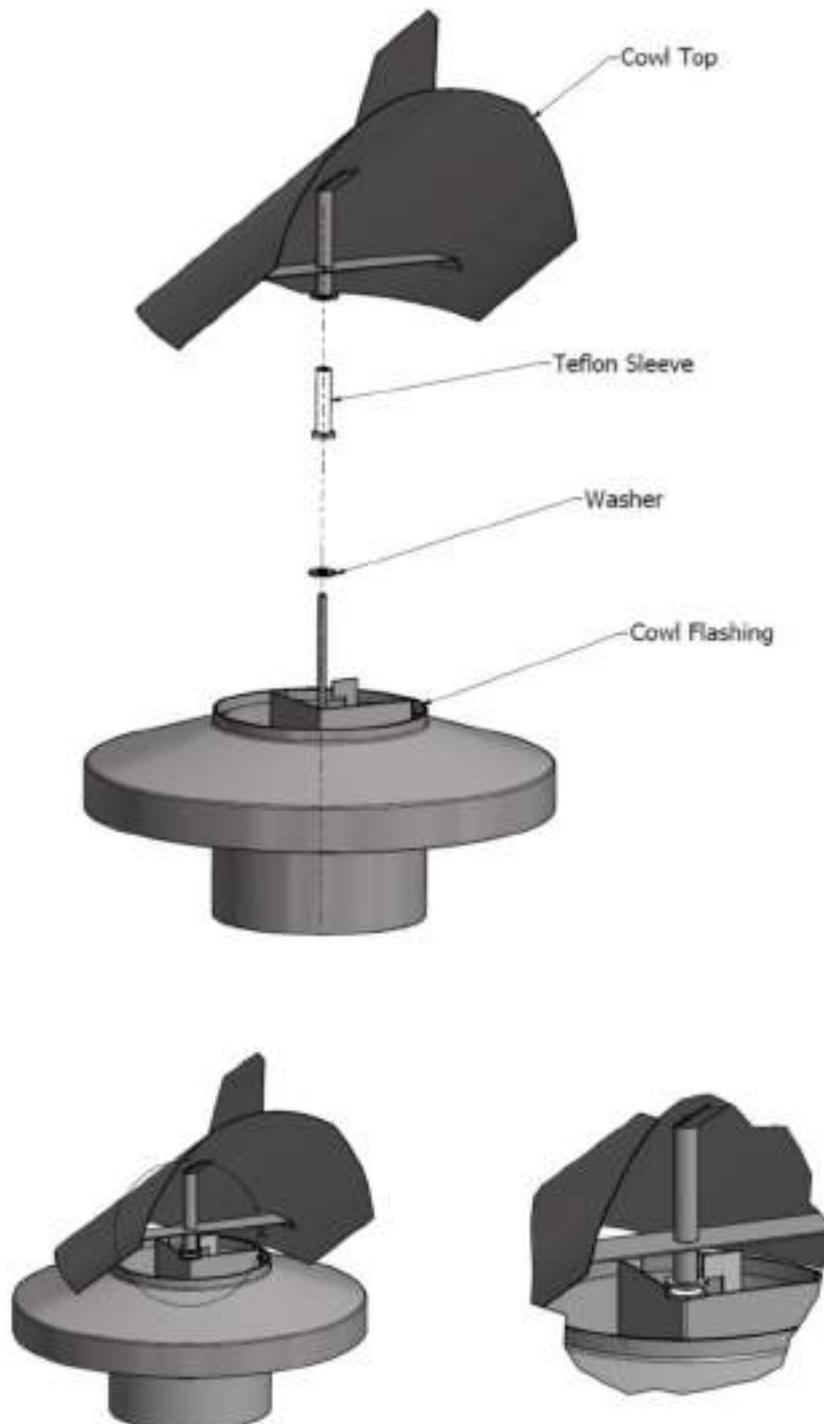


900mm Flue Shield

IMPORTANT - Flue shields should be no further than 10mm off the top of the fire box

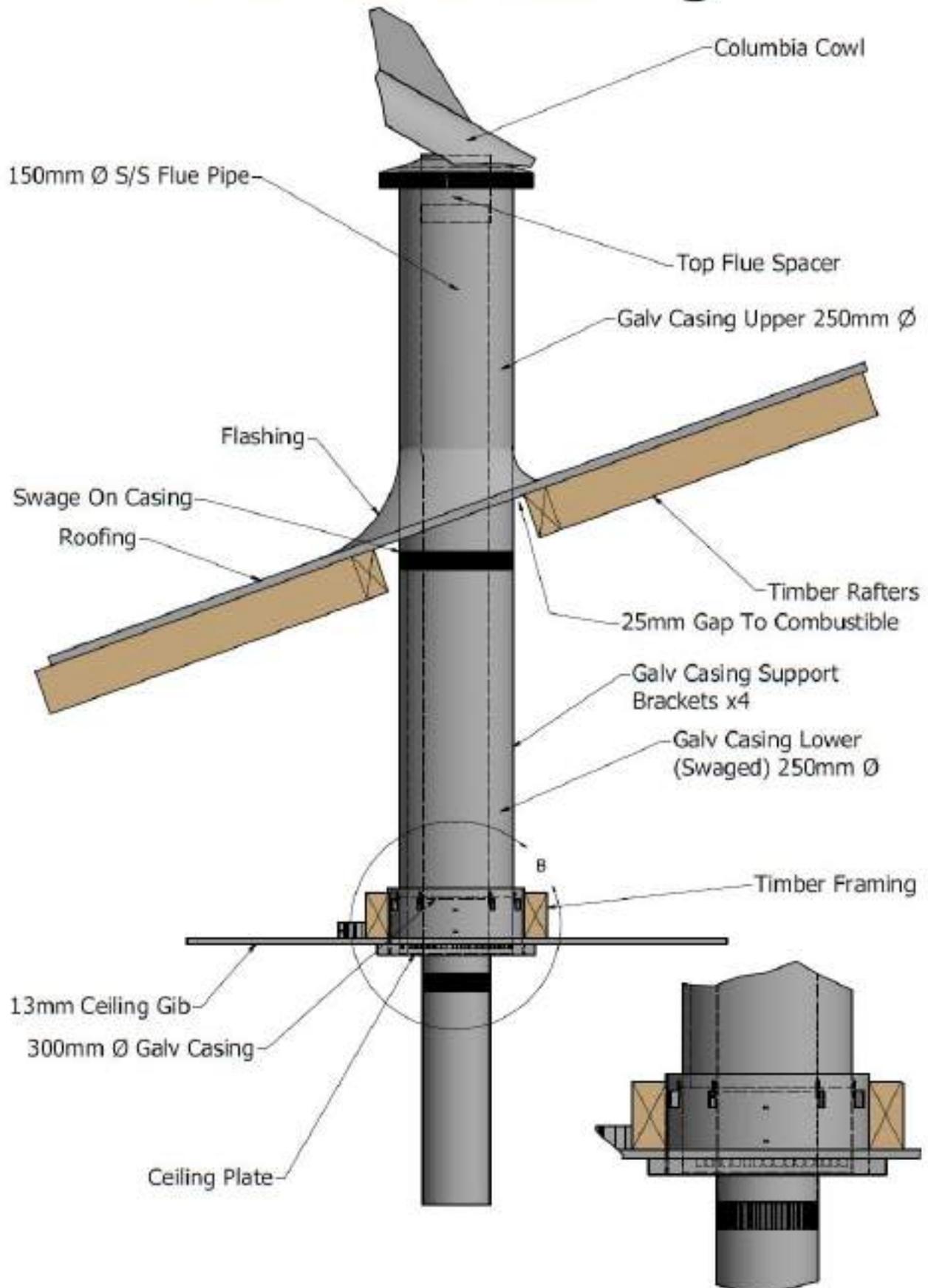
Columbia Cowl

Your Columbia Cowl is fitted with a Teflon Sleeve to reduce noise and wear. The Teflon Sleeve may need to be replaced over the life of the fire and should be checked during an annual service or when the flue is cleaned. If the shaft is dry and dirty, it should be cleaned back to a bare metal finish and a thin layer of graphite or high temperature grease applied before replacing the Teflon Sleeve. Older versions of the Columbia Cowl do not have a Teflon Sleeve and require re-greasing one to two times a year





Standard Ceiling





P.O. BOX 687, NELSON,
NEW ZEALAND

PHONE (03) 547 7347
FAX (03) 547 2909
EMAIL: info@appliedresearch.co.nz
WEB: www.appliedresearch.co.nz

Report 09/1943

January 27th, 2009

Page 1/1

Customer: W.H. Harris Ltd.
41 Braddon St.
P.O. Box 4043
CHRISTCHURCH

P701/1

COPY

Accreditation Laboratory Registration Number 395

This laboratory is accredited by International Accreditation New Zealand (IANZ). The tests reported herein have been performed in accordance with the terms of our accreditation. This accreditation does not extend to any opinions or any interpretations of test results contained in this report.



IANZ has a Mutual Recognition Arrangement (MRA) with the National Association of Testing Authorities (NATA), Australia, such that both organizations recognize accreditations by IANZ and NATA as being equivalent. Users of test reports are recommended to accept test reports in the name of either accrediting body.

Compliance Certificate

Appliance: HeatSaver 150 mm Diameter Flue Kit
Test Standard: AS/NZS2918:2001 Appendix F
Full Report: 02/749R

(The full report contains the information on the test methods, details of the appliance tested and the results of the test)

This report:

Prepared by: W. S. Webley W.S. Webley
Approved by: W. S. Webley W.S. Webley
Release Date: 2/3/09

This report must not be reproduced except in full. Results are based on material and information supplied by the client. Applied Research Services Ltd shall not be liable in respect of any loss or damage (including consequential loss or damage) resulting from the use of reports prepared by them. Results issued in electronic form are subject to confirmation by issue of final report.



HURUNUI DISTRICT COUNCIL

Application form for

DISTRICT ON DEMAND WATER SUPPLY

Appl. No. WS17218
BC No. 170482
Pty File No. 1801/18
Val. Roll No. 2143015185

I, Billie Anderson / Danica TANUM (name of owner)
of 71 Smiths rd, Leithfield (postal address)

hereby make an application for connection to the: AMBERLEY CULVERDEN
HANMER SPRINGS HAWARDEN LEITHFIELD BEACH WAIAU WAIKARI
WAIPARA On - Demand Water Supply. (circle the one that applies)

Address of Property 18 Claremont Crescent

Legal Description Lot 86 DP 485034

Contact Phone Number.BUS. _____ AH. 0274 509919

Email BillieNZ@hotmail.com

I hereby submit the connection fee (including GST) of:
\$660.00 for a domestic connection (20mm)

The connection fee includes a \$160.00 modelling fee and provides for a pipe installation from the main line to the property a distance of up to 4 metres, a toby box, valve and water meter and foot path reinstatement if required. Council advises applicants to install a gate valve on their side of the meter. A Works Order Form will be required with this application if Council staff is required to install additional water lines for distances over 4 metres. These lines may however be installed by the applicant using Council approved pipe & fittings.

NB: if the lateral to which this application applies is not within private property and excavation of the Road Reserve is required then a CAR (Corridor Access Request) request along with a traffic management plan must be applied for through a Beforeudlg application.

Applicants Signature [Signature] Date 19/9/17

For Office Use:

Receipt Number	<u>Internet payment</u>	Date	<u>9/11/17</u>
Invoice Number	<u>2665</u>	Date	<u>27/10/17</u>
Connection made by	<u>Rik</u>	Date	<u>18-1-18</u>
Meter Number	<u>MC 241130</u>	Meter Type	<u>SENSUS</u>
Meter Location	<u>Nth West Bdy</u>		
Meter Reading	<u>00000</u>	No. of digits	<u>8</u>
Rated by		Date	
Drawn on Plans by	<u>Cynthia</u>	Date	<u>19/1/18</u>

Rates
.9180
1.00 ✓
of 11/22



HURUNUI DISTRICT COUNCIL

Application form for connection to

DISTRICT SEWERAGE SCHEME

Appl. No. WS17219

BC No. 170482

Pty File No. 1801/18

Val. Roll No. 214301S185

Billie Anderson / DANIEL THURSP (name of owner)
of 71 Smiths rd, Leithfield (postal address)

Make application for connection to the: AMBERLEY AMBERLEY BEACH CHEVIOT GRETA VALLEY
HANMER SPRINGS HAWARDEN LEITHFIELD LEITHFIELD BEACH MOTUNAU BEACH WAIKARI
Sewerage Scheme. (Circle the one that applies)

Address of Property 18 Claremont Crescent

Legal Description Lot 86 DP 485034

Contact Phone No. BUS 0274509917 AH 0274509917

Email Address billienz@hotmail.com

Connection Fee \$100.00 (including GST)

Generally each property has a lateral from the sewer main to the boundary provided it was included in the original scheme. Most subdivisions since that time have also had the property connected to the main sewer line as far as the property boundary. However in the instance where this is not provided or where a different connection point is chosen then the full cost of connection to the sewer main will be met by the applicant. This work will be done by a certified drain layer and will require a Building Consent.

No work is to start on the sewer connection until building consent approval is obtained

NB: If the lateral to which this application applies is not within private property and excavation of the road reserve is required then a CAR (Corridor Access Request) request along with a traffic management plan must be applied for through a Beforeudig application.

Applicants Signature [Signature] Date 19/9/2017

For Office Use:

Receipt Number		Date	
Connection made by		Date	
Rated by		Date	
Captured on ARC by		Date	
As-builts to Utilities		Date	
Inspected by		Date	



HURUNUI DISTRICT COUNCIL

Application form for connection to

DISTRICT SEWERAGE SCHEME

Appl. No. WS17219
 BC No. 170482
 Pty File No. 1801/18
 Val. Roll No. 214301S185

Billie Anderson / DANIEL THOMPSON (name of owner)
 of 71 Smiths rd, Leithfield (postal address)

Make application for connection to the: AMBERLEY AMBERLEY BEACH CHEVIOT GRETA VALLEY
 HANMER SPRINGS HAWARDEN LEITHFIELD LEITHFIELD BEACH MOTUNAU BEACH WAIKARI
 Sewerage Scheme. (Circle the one that applies)

Address of Property 18 Claremont Crescent

Legal Description Lot 86 DP 485034

Contact Phone No. BUS 0274509919

Email Address billieanz@hotmail.com

Connection Fee \$100.00 (including GST)

Generally each property has a lateral from the sewer main to the boundary provided it was included in the original scheme. Most subdivisions since that time have also had the property connected to the main sewer line as far as the property boundary. However in the instance where this is not provided or where a different connection point is chosen then the full cost of connection to the sewer main will be met by the applicant. This work will be done by a certified drain layer and will require a Building Consent.

No work is to start on the sewer connection until building consent approval is obtained

NB: If the lateral to which this application applies is not within private property and excavation of the road reserve is required then a CAR (Corridor Access Request) request along with a traffic management plan must be applied for through a Beforeudig application.

Applicants Signature [Signature] Date 19/9/2017

For Office Use:

Receipt Number	<u>Inv # 26665</u>	Date	<u>27/10/17</u>
Connection made by	<u>Internet Payment</u>	Date	<u>9/11/17</u>
Rated by	<u>Drains Inspection</u>	Date	<u>5/3/18</u>
Captured on ARC by	<u>Kevin</u>	Date	<u>21/8/18</u>
As-builts to Utilities	<u>Cynthia</u>	Date	<u>21/8/18</u>
Inspected by	<u>Lisa Sandrey</u>	Date	<u>23/7/18</u>
	<u>Mark Milner</u>	Date	<u>5/3/18</u>

Updated 01/07/2016 Pipe Rite Ltd

.9182 1.00 from 1/7/19
 Part Charge 1/10/18 - 30/6/19 3 mths
1/7/18 - 30/6/19 12 mths
15 mths
\$531.98 p. 9/2
21/10/18
332.49

GoGet Processing Summary Report

Consent No: 170482

Site Address: 18 Claremont Crescent, Amberley

Description: Three bedroom residential dwelling with attached garage and woodburner (Woodsman ECR Novo)

Checklist/Elements	Status	Notes	Processed By
Vetting Checklist	Fail		Angus Malcolm
Building consent/PIM checklist	Fail		AXM3
Checklist (Client) *	Pass		AXM3
Deposit/Fee	Fail	Missing	AXM3
Building Consent Application (Form 2) *	Pass		AXM3
Planning Check / PIM Declaration form *	Pass		AXM3
Proof of Ownership (CT/S+P) *	Fail	S&P not signed or dated S&P missing evidence settlement has occurred	AXM3
Agent Nomination form *	Pass		AXM3
Any relevant Resource Consents *	N/A		AXM3
Design Memorandum (Form 2A)	Pass	Luke Seaford - LBP reg No: BP105868	AXM3
DRAWINGS/SPECIFICATIONS:	N/A		AXM3
Site plan *	Pass		AXM3
Floor plan *	Pass		AXM3
Elevations *	Pass		AXM3
Cross sections	Pass		AXM3
Construction details	Pass		AXM3
Drainage plan	Pass		AXM3
Bracing Plan & Schedule/Calculations	Pass		AXM3
Weathertightness Risk Matrix	Pass		AXM3
Written specifications	Pass		AXM3
Roof trusses	Pass	Design, Sched/Calcs & PS1	AXM3
Other producer statements	N/A		AXM3
Compliance schedule information	N/A	CS not required (Residential)	AXM3
Liquefaction assessment	N/A	Zone 3 - No assessment required	AXM3
Consent Issuing - Paper copies required	N/A		AXM3
APPROVAL	N/A		AXM3
Wood burner consent checklist	Pass		AXM3
Checklist (Client)	N/A	See building checklist	AXM3
Fee	N/A	See building checklist	AXM3
Building Consent Application (Form 2)	N/A	See Building Checklist	AXM3
ECAN approval	Pass	Woodsman ECR Novo Checked - Cert. No: 153733 (Dry) / 155148 (Wet)	AXM3
Proof of Ownership (CT/S+P)	N/A	See Building Checklist	AXM3
Agent Nomination form	N/A	See Building Checklist	AXM3
DRAWINGS/SPECIFICATIONS:	N/A		AXM3
Floor plan	Pass		AXM3
Photos/elevations	Pass		AXM3
Burner specifications	Pass		AXM3
Flue specifications	Pass		AXM3
Flashing details	Pass		AXM3
Wetback plumbing spec & schematic	N/A		AXM3
Subject to FAST processing	N/A		AXM3
Heritage Building Status	N/A		AXM3
APPROVAL	Pass		AXM3
Certificate of Acceptance Checklist	N/A		AXM3

I am satisfied on reasonable grounds that the provisions of the Building Code will be met if the building work in relation to the attached application is properly completed in accordance with the attached plans and specifications.

Signed: _____ Date: 21 September 2017 10:09 am
Angus Malcolm

GoGet Processing Summary Report

Consent No: 170482

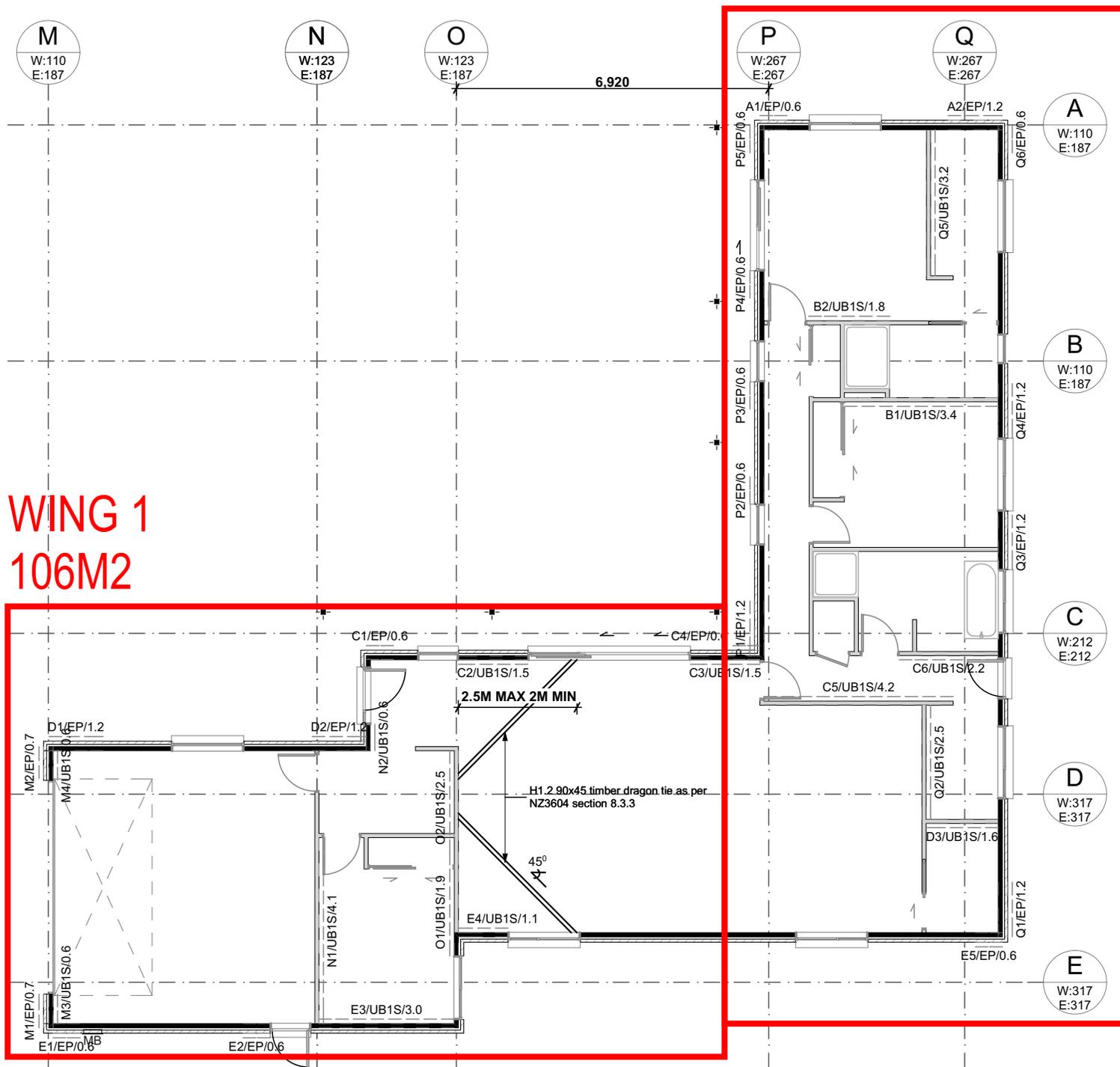
Site Address: 18 Claremont Crescent, Amberley

Description: Three bedroom residential dwelling with attached garage and woodburner (Woodsman ECR Novo)

Checklist/Elements	Status	Notes	Processed By
Vetting Checklist	Pass		Angus Malcolm
Building consent/PIM checklist	Pass		AXM3
Checklist (Client) *	Pass		AXM3
Outline Development Plan Waiver request	N/A		AXM3
Deposit/Fee	N/A	Missing	AXM3
Building Consent Application (Form 2) *	Pass		AXM3
Planning Check / PIM Declaration form *	Pass		AXM3
Proof of Ownership (CT/S+P) *	Pass	Seller CT with Agent Nomination	AXM3
Agent Nomination form *	Pass		AXM3
Any relevant Resource Consents *	N/A		AXM3
Design Memorandum (Form 2A)	Pass	Luke Seaford - LBP reg No: BP105868	AXM3
DRAWINGS/SPECIFICATIONS:	N/A		AXM3
Site plan *	Pass		AXM3
Floor plan *	Pass		AXM3
Elevations *	Pass		AXM3
Cross sections	Pass		AXM3
Construction details	Pass		AXM3
Drainage plan	Pass		AXM3
Bracing Plan & Schedule/Calculations	Pass		AXM3
Weathertightness Risk Matrix	Pass		AXM3
Written specifications	Pass		AXM3
Roof trusses	Pass	Design, Sched/Calcs & PS1	AXM3
Other producer statements	N/A		AXM3
Compliance schedule information	N/A	CS not required (Residential)	AXM3
Liquefaction assessment	N/A	Zone 3 - No assessment required	AXM3
Consent Issuing - Paper copies required	N/A		AXM3
APPROVAL	Pass		AXM3
Burner consent checklist	Pass		AXM3
Checklist (Client)	N/A	See building checklist	AXM3
Fee	N/A	See building checklist	AXM3
Building Consent Application (Form 2)	N/A	See Building Checklist	AXM3
ECAN approval	Pass	Woodsman ECR Novo Checked - Cert. No: 153733 (Dry) / 155148 (Wet)	AXM3
Proof of Ownership (CT/S+P)	N/A	See Building Checklist	AXM3
Agent Nomination form	N/A	See Building Checklist	AXM3
DRAWINGS/SPECIFICATIONS:	N/A		AXM3
Floor plan	Pass		AXM3
Photos/elevations	Pass		AXM3
Burner specifications	Pass		AXM3
Flue specifications	Pass		AXM3
Flashing details	Pass		AXM3
Wetback plumbing spec & schematic	N/A		AXM3
Subject to FAST processing	N/A		AXM3
Heritage Building Status	N/A		AXM3
APPROVAL	Pass		AXM3
Certificate of Acceptance Checklist - Building	N/A		AXM3

I am satisfied on reasonable grounds that the provisions of the Building Code will be met if the building work in relation to the attached application is properly completed in accordance with the attached plans and specifications.

Signed: _____ Date: 9 October 2017 5:46 pm
Angus Malcolm



WING 1
106M2

WING 2
101M2

reticulate to the positions shown and install angle hosecocks) and toilet cisterns and then take the main feed through an accessibly positioned cleanable in-line sediment and dirt filter.

Primary distribution from the water filter shall be in 20mm piping, reducing to 12mm for the final feed to individual items. Install conveniently located isolating valves to turn off each group of fittings, and install a small isolating valve alongside each toilet cistern not integrally fitted with one. (Note that these isolating valves and the hosecocks are not covered by the Plumbing Hardware Prime Cost Sum).

11.6.3 Hot Water System

Electric Storage, High Pressure Hot Water Cylinder

Supply the electric storage high pressure hot water cylinder noted on the drawings and install it where shown. Where appropriate install the cylinder on a safetray, with its drain discharging in a visible location.

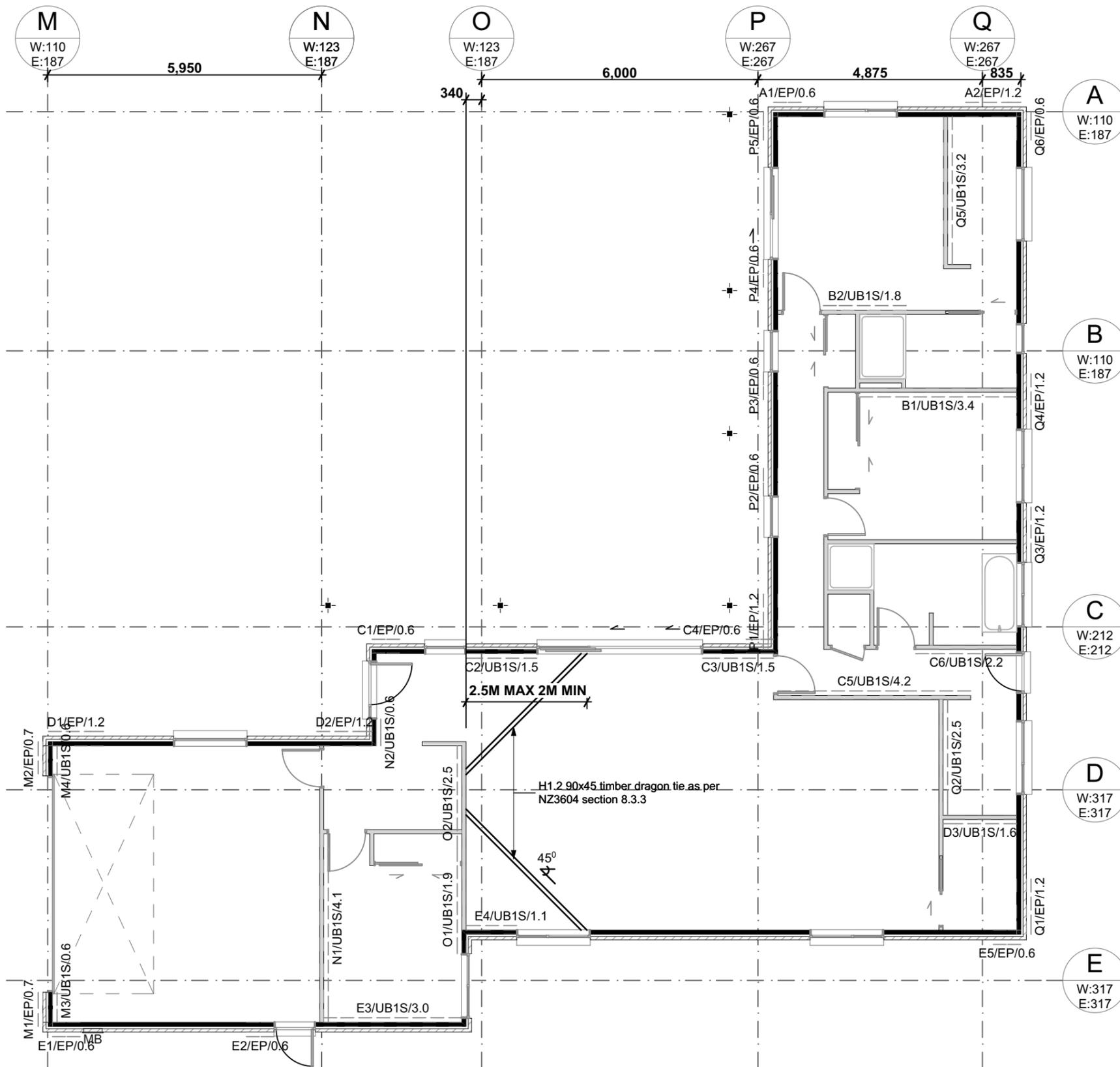
Install temperature and pressure relief valves, cold water expansion valves, flow control valves, line strainers, pressure limit valves, and non-return/isolating valves as required to leave the hot water system in full design operational order. Install a tempering valve for each cylinder to control the hot water temperature at any sanitary fixture used for personal hygiene at not more than 55°C. **Hot water pipes shall be polybutylene unless otherwise noted.**

Check that the water pressure is suitable for the cylinders operation, and install PRV's if excessive. Pressure relief discharges shall be copper and to the exterior in approved positions.

Flush all pipework before making the final connections. Lag the main distribution pipes full length with wall pipe insulation.

Showers shall have priority feeds, without 'tees', and the pipework layout shall ensure that the showers temperature and pressure remain as even as possible.

Irrespective of whether a mixing device is installed, the storage water heater control thermostat shall be set at a temperature of not less than 60°C to prevent the growth of Legionella bacteria.



BRACING CALCULATIONS			
Location of Storey	Single	Floor Load	2kPa
Floor Height to Apex	5.0 m	Roof Weight	Light
Roof Height Above Eaves	2.0 m	Cladding Weights:	
Roof Pitch	0 - 25 °	- Subfloor	Concrete Floor
Roof Style	Gable	- Wall Cladding	Heavy
Building Length (BL)	22.0 m	Room in Roof Space	No
Building Width (BW)	20.0 m	Soil Class	E - Very Soft
Wind Zone	High	Gross Plan Area (GPA)	208.0 m ²
W along	55.0 BUs/m	Earthquake Zone	3
W across	50.0 BUs/m	EQ	9.0 BUs/m ²
W along x BW	1,100.0 BUs	EQ x GPA	1,872.0 BUs
W across x BL	1,100.0 BUs		
Calculations based on NZS 3604:2011			

ALONG											
Bracing Line		Bracing Elements Provided						Wind		Earthquake	
Line Label	Min BUs W	Min BUs E	Brace No.	Brace Type	Brace Length	Brace Angle	Brace Height	Rating BUs/m	BUs Achieved	Rating BUs/m	BUs Achieved
A	110	187	A1	EP	0.6	0.0	2.4	95	57.0	105	63.0
			A2	EP	1.2	0.0	2.4	125	150.0	135	162.0
B	110	187	B1	UB1S	3.4	0.0	2.4	55	187.5	50	170.5
			B2	UB1S	1.8	0.0	2.4	55	99.0	50	90.0
C	212	212	C1	EP	0.6	0.0	2.4	95	57.0	105	63.0
			C2	UB1S	1.5	0.0	2.4	55	84.6	50	76.9
			C3	UB1S	1.5	0.0	2.4	55	84.6	50	76.9
			C4	EP	0.6	0.0	2.4	95	57.0	105	63.0
			C5	UB1S	4.2	0.0	2.4	55	230.5	50	209.5
			C6	UB1S	2.2	0.0	2.4	55	120.7	50	109.8
D	317	317	D1	EP	1.2	0.0	2.4	125	150.0	135	162.0
			D2	EP	1.2	0.0	2.4	125	150.0	135	162.0
			D3	UB1S	1.6	0.0	2.4	55	88.0	50	80.0
E	317	317	E1	EP	0.6	0.0	2.4	95	57.0	105	63.0
			E2	EP	0.6	0.0	2.4	95	57.0	105	63.0
			E3	UB1S	3.0	0.0	2.4	55	165.0	50	150.0
			E4	UB1S	1.1	0.0	2.4	55	60.5	50	55.0
			E5	EP	0.6	0.0	2.4	95	57.0	105	63.0
Totals Achieved								W	1,912.3	E	1,882.5
Totals Required								W	1,100.0	E	1,872.0

ACROSS											
Bracing Line		Bracing Elements Provided						Wind		Earthquake	
Line Label	Min BUs W	Min BUs E	Brace No.	Brace Type	Brace Length	Brace Angle	Brace Height	Rating BUs/m	BUs Achieved	Rating BUs/m	BUs Achieved
M	110	187	M1	EP	0.7	0.0	2.4	95	70.3	105	77.7
			M2	EP	0.7	0.0	2.4	95	66.5	105	73.5
			M3	UB1S	0.6	0.0	2.4	55	35.7	50	32.5
			M4	UB1S	0.6	0.0	2.4	55	35.7	50	32.5
N	123	187	N1	UB1S	4.1	0.0	2.4	55	224.9	50	204.5
			N2	UB1S	0.6	0.0	2.4	55	31.9	50	29.0
O	123	187	O1	UB1S	1.9	0.0	2.4	55	105.1	50	95.5
			O2	UB1S	2.5	0.0	2.4	55	138.1	50	125.5
P	123	187	P1	EP	1.2	0.0	2.4	125	150.0	135	162.0
			P2	EP	0.6	0.0	2.4	95	57.0	105	63.0
			P3	EP	0.6	0.0	2.4	95	57.0	105	63.0
			P4	EP	0.6	0.0	2.4	95	57.0	105	63.0
			P5	EP	0.6	0.0	2.4	95	57.0	105	63.0
			P6	EP	0.6	0.0	2.4	95	57.0	105	63.0
Q	267	267	Q1	EP	1.2	0.0	2.4	125	150.0	135	162.0
			Q2	UB1S	2.5	0.0	2.4	55	138.1	50	125.5
			Q3	EP	1.2	0.0	2.4	125	150.0	135	162.0
			Q4	EP	1.2	0.0	2.4	125	150.0	135	162.0
			Q5	UB1S	3.2	0.0	2.4	55	176.6	50	160.5
			Q6	EP	0.6	0.0	2.4	95	57.0	105	63.0
Totals Achieved								W	1,907.9	E	1,919.7
Totals Required								W	1,100.0	E	1,872.0

General Note:
 -Electric Hot Water
 -Electric Hob
 -Antislip floor coverings on all access routes (both external and internal), to comply with NZBC D1/AS1 Table 2 (accept surface areas inside entries as dry areas)
 -All down lights inside insulation envelope to be CA/80 rated
 -All bathroom and toilet areas to have an 150mm inline auto extraction fan

Shower Note:
 Showers shall have 10mm Grade A toughened safety glass shower screens and doors as shown

Internal Loadbearing wall:
 Refer to Truss manufacturer for all internal load bearing walls

Window & Door Note:
 Refer to window and door layout for positions

Kitchen Note:
 All surface finishes to the kitchen joinery, walls, etc. to comply with the requirements of NZBC G3. Kitchen layout to be confirmed prior to construction refer to the kitchen plan provided by others

Wet Area Waterproofing Notes:
 -Baths shall have a waterproofing membrane extending at least 150 mm above and beyond the top of the side and ends of the bath

Framing Note:
 Refer to the cross section for framing schedule
 All remaining framing shall comply with NZS3604:2011

Log Fire Note:
 Fire Woodsman ECR Novo wood burner installed as per manufacturers specification. Refer to supporting documents for full set of requirements. Ensure the use of the heatsaver flue as per the supporting documents and refer to supporting documents for hearth requirements

HWC Note:
 300l Hot water cylinder with seismic restraints and tempering valve set to 55°C. HWC shall be secured to the wall framing using 3/25x1mm Galv. steel straps with 1/8mm coach screw with 30x2mm washer and 2 20x2.5mm thick washers. Screws to penetrate framing a minimum of 50mm. Ensure a safetray is installed below the HWC as per the requirements of G12 AS1 NZBC section 5.2.3 page 24.

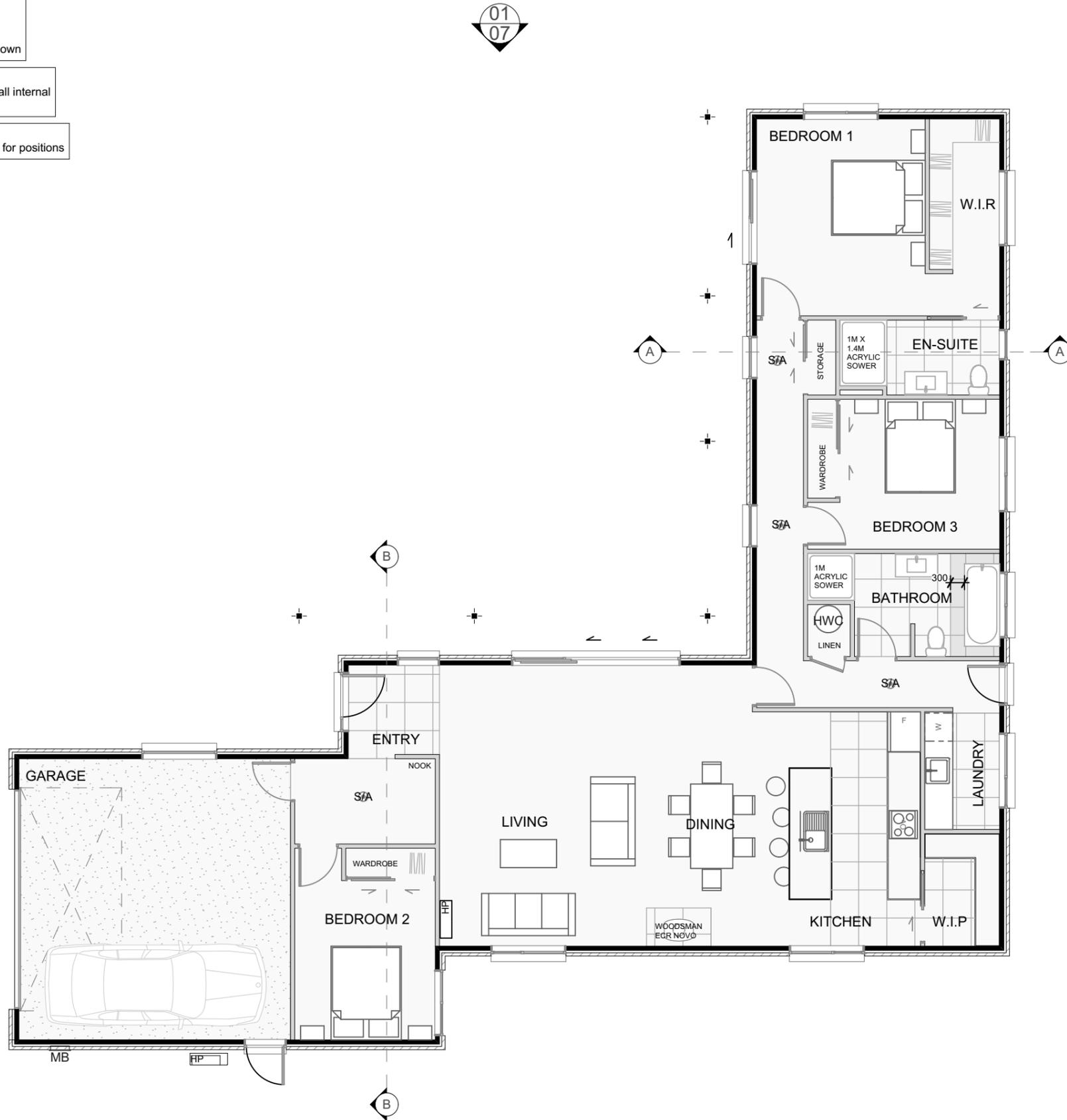
Floor Area:
 197.16 m²
 (over framing)

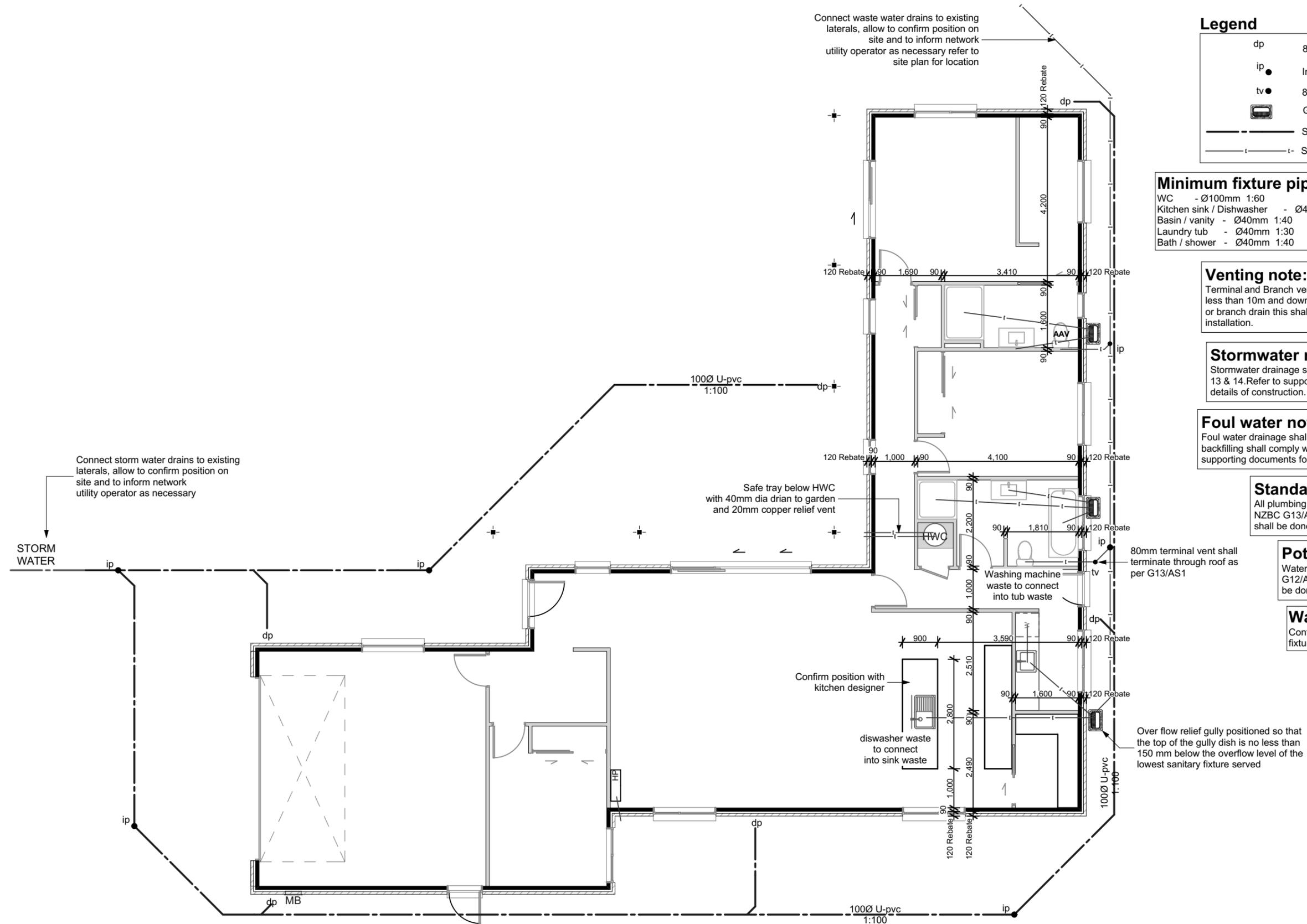
Framing Note:
 Stud height 2.420m
 Double top plate height 2.455m
 All dimensions to framing only, refer to drainage plan for foundation dimensions

Flooring Legend

-  Concrete
-  Tiles
-  Waterproof membrane

Remaining areas shall be carpet





Legend

dp	80 mm downpipe (6 Total)
ip	Inspection port
tv	80mm Terminal vent
	Gully trap
	Stormwater, dia noted
	Sanitary drain, dia noted

Minimum fixture pipe sizes & gradients:

WC	- Ø100mm	1:60
Kitchen sink / Dishwasher	- Ø40mm	1:20 or Ø50mm 1:40
Basin / vanity	- Ø40mm	1:40
Laundry tub	- Ø40mm	1:30
Bath / shower	- Ø40mm	1:40

Venting note:
Terminal and Branch vent shall be installed at a length of less than 10m and down stream from the head of the main or branch drain this shall be confirmed on site during installation.

Stormwater note:
Stormwater drainage shall comply with NZBC/E1 figures 13 & 14. Refer to supporting documents for details of construction.

Foul water note:
Foul water drainage shall comply with G13/AS2 bedding and backfilling shall comply with figures 7,8 & 13 refer to supporting documents for details of construction.

Standards note:
All plumbing and drainage shall be as per NZBC G13/AS1/AS2. Upon completion testing shall be done as per section 7.

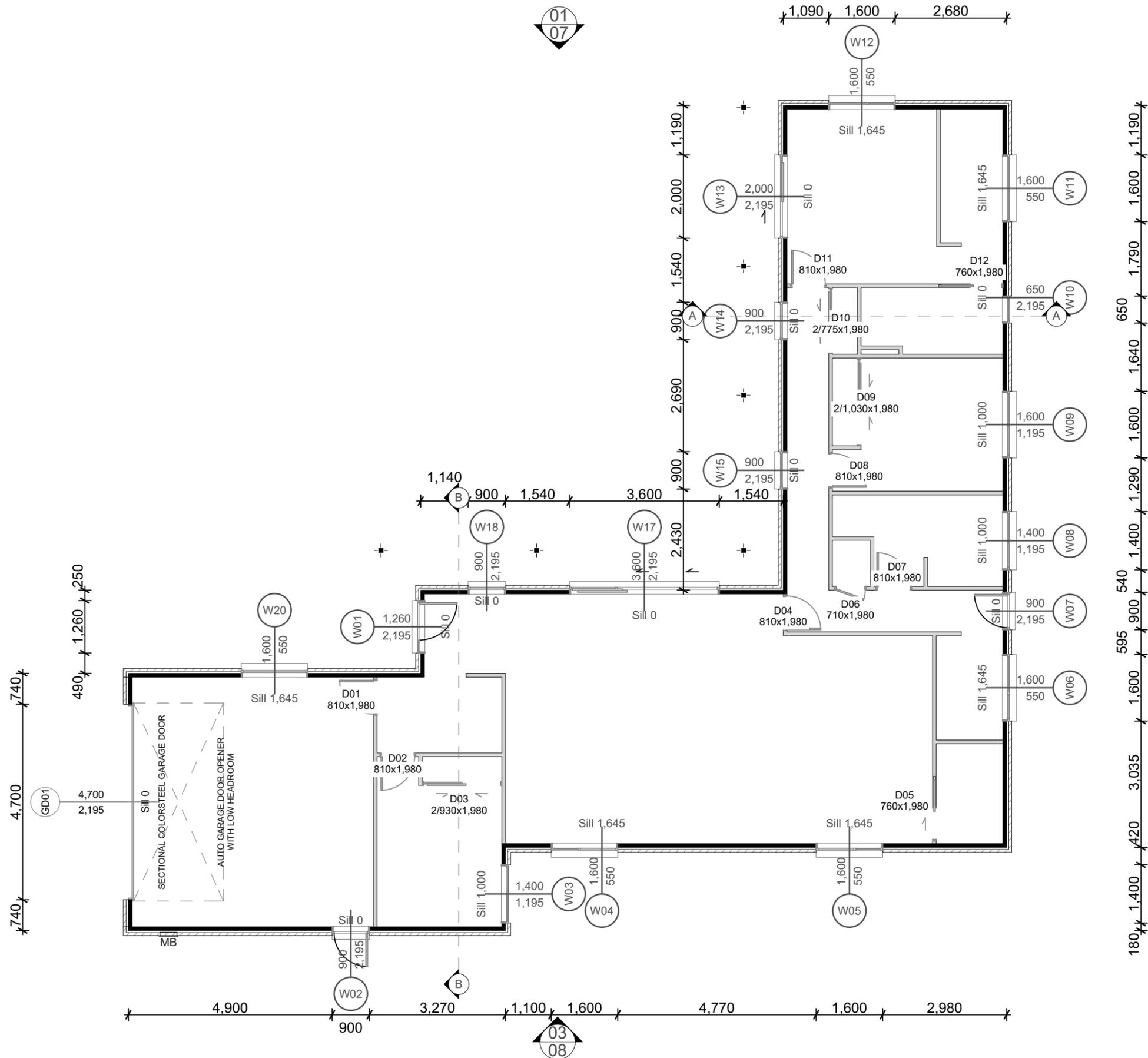
Potable water note:
Water supply shall be installed as per G12/AS1 testing upon completion shall be done as per section 7.5

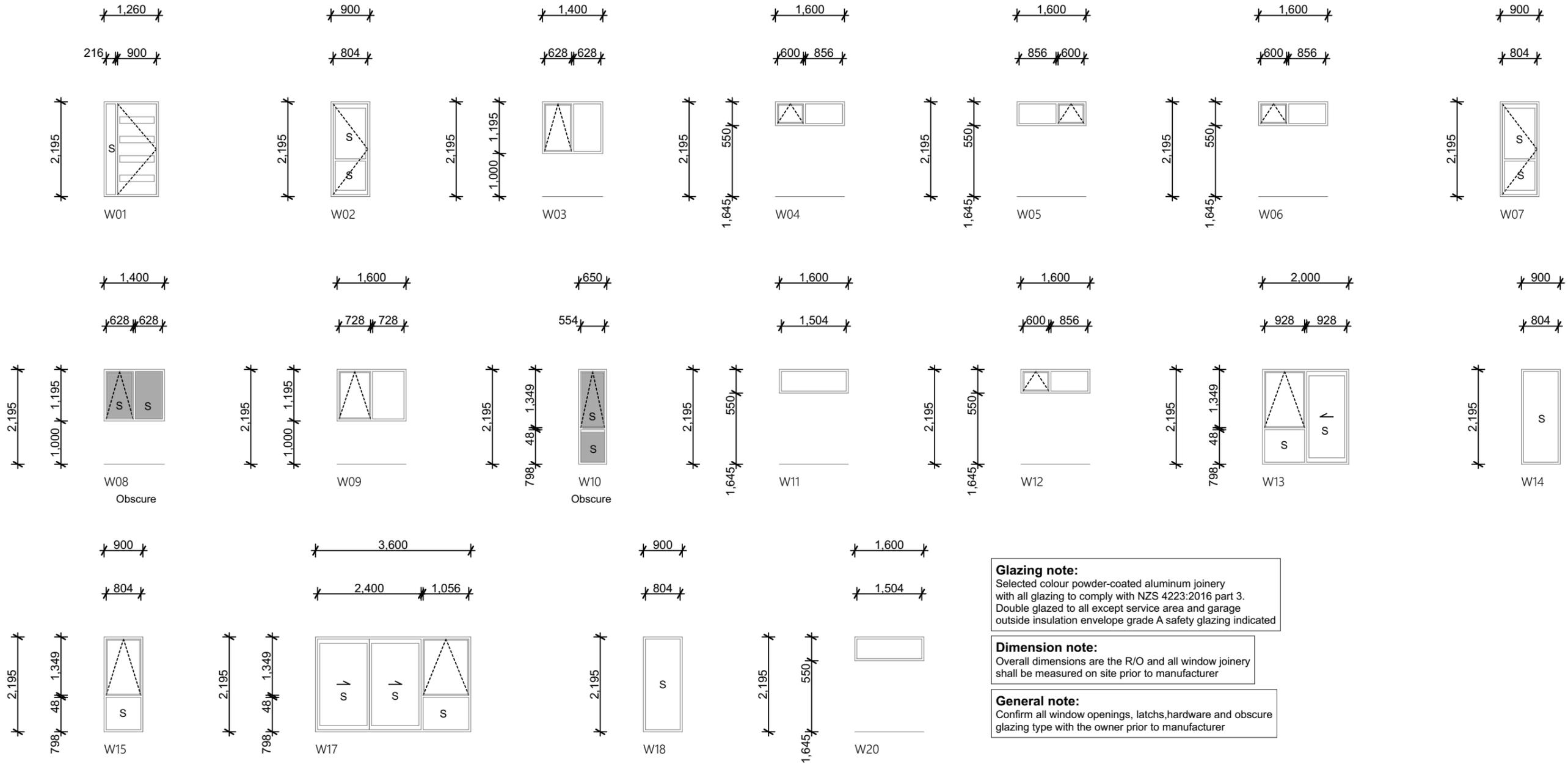
Waste Positions:
Confirm all waste positions with selected fixtures requirements.

02
07

01
07

04
08





Glazing note:
 Selected colour powder-coated aluminum joinery with all glazing to comply with NZS 4223:2016 part 3. Double glazed to all except service area and garage outside insulation envelope grade A safety glazing indicated

Dimension note:
 Overall dimensions are the R/O and all window joinery shall be measured on site prior to manufacturer

General note:
 Confirm all window openings, latches, hardware and obscure glazing type with the owner prior to manufacturer

Proprietary Anchors Minimum Capacity:

External Walls;

- (a) Horizontal loads in the plane of the wall 2kN
- (b) Horizontal loads out of the plane of the wall 3kN
- (c) Vertical loads in axial tension of the fastener 7kN

Internal Walls;

- (a) Horizontal loads in the plane of the wall 2kN
- (b) Horizontal loads out of the plane of the wall 2kN

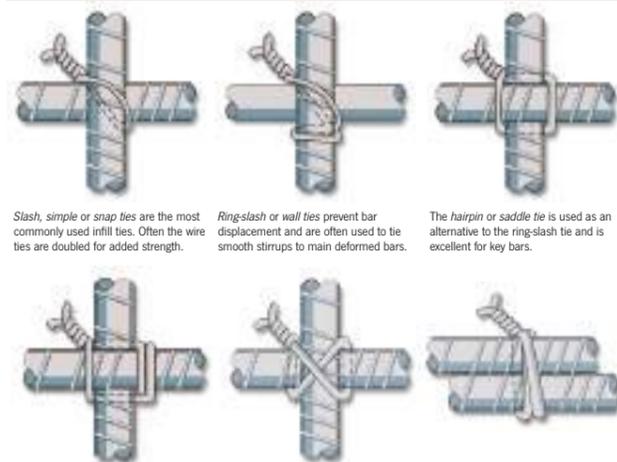
Conrim all proprietary min edge and embedment requirements with the selected manufacturer.

Minimum concrete cover to steel reinforcement shall be:

- (a) 75 mm when concrete is placed directly on or against the ground;
- (b) 50 mm in all other situations where the concrete is placed in formwork provided the concrete specifications follow the provisions of 4.5.2;
- (c) 30 mm from the top of a wall or floor slab which is in a closed area or 50 mm from the top of any exposed wall or floor slab.

Table 5: Minimum bend diameters in mm for rebar (rounded up to the nearest 10 mm). From NZS 3101:2006 Tables 8.1 and 8.2 and clause 8.4.2.

Rebar type	Bar diameter (mm)								
	6	10	12	16	20	25	28	32	40
Plain bars	30	50	60	80	100	150	170	200	240
Deformed bars	30	50	60	80	100	150	170	200	240
Plain bars (stirrups and ties)	20	20	30	40	40	80	-	-	-
Deformed bars (stirrups and ties)	30	40	50	70	80	150	-	-	-



Slash, simple or snap ties are the most commonly used infill ties. Often the wire ties are doubled for added strength.

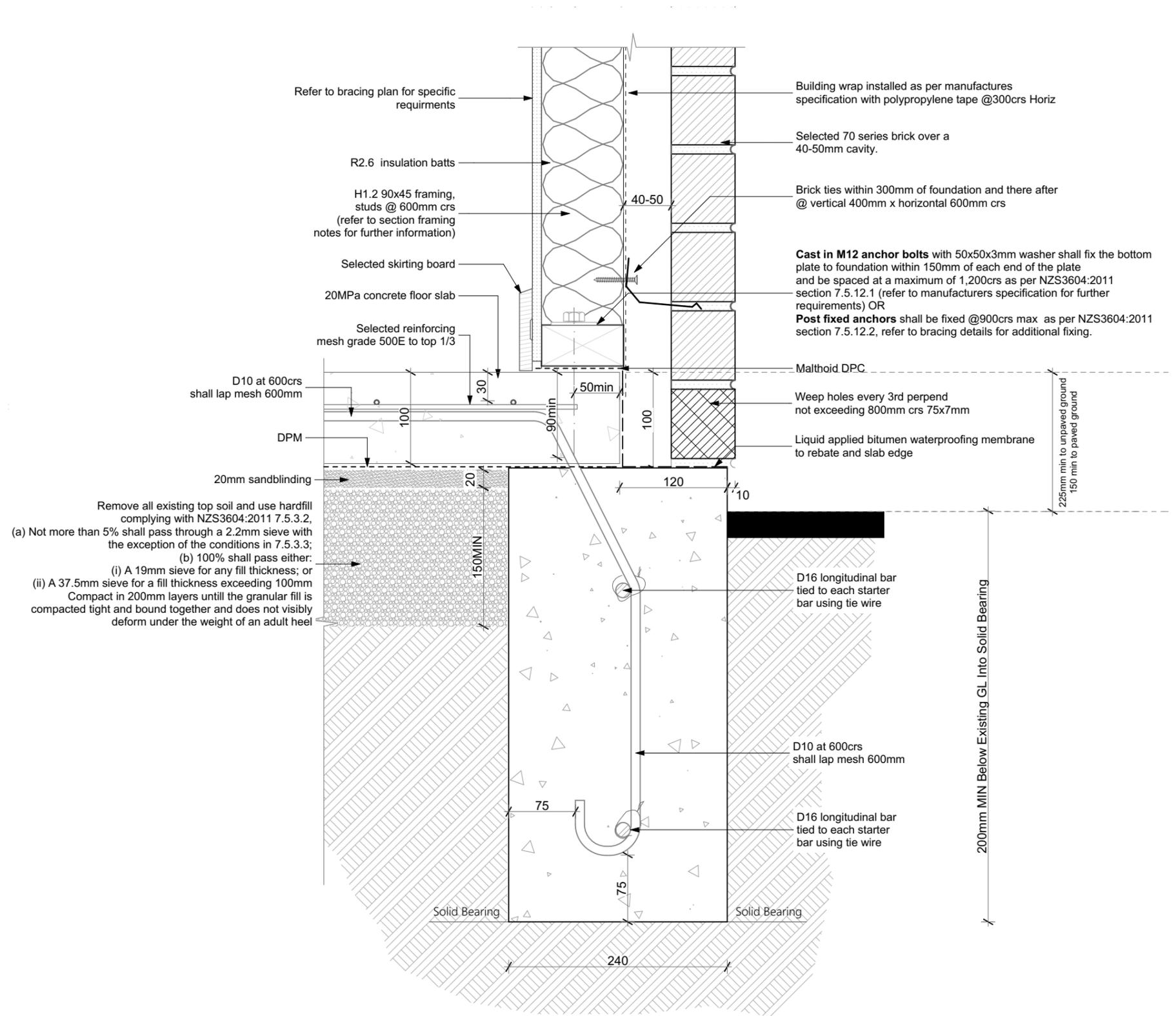
Ring-slash or wall ties prevent bar displacement and are often used to tie smooth stirrups to main deformed bars.

The hairpin or saddle tie is used as an alternative to the ring-slash tie and is excellent for key bars.

The ring-hairpin or saddle tie with a twist is sometimes used to tie main bars and to prevent bar displacement.

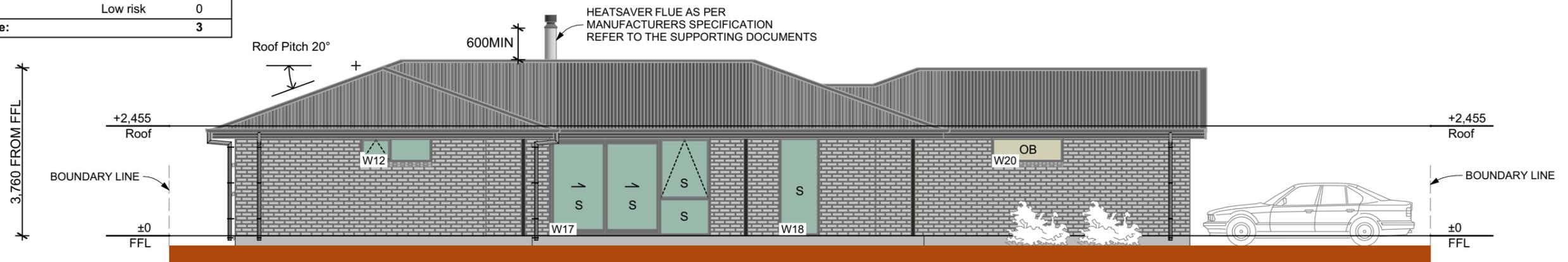
Crown tie, cross tie or figure-eight tie is a common tie used on main bars for setting up and tying springy bars.

The splice tie is used when tying lapped lengths of rebar etc.



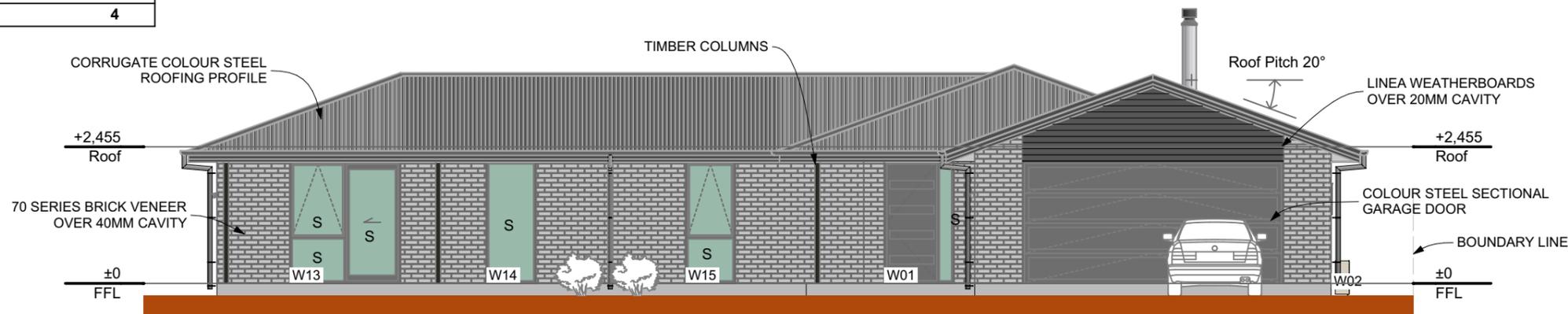
D-01 Brick Foundation 1:5

BUILDING ENVELOPE RISK MATRIX		
North Elevation		
Risk Factor	Risk Severity	Risk Score
Wind zone (per NZS 3604)	High risk	1
Number of storeys	Low risk	0
Roof/wall intersection design	Low risk	0
Eaves width	High risk	2
Envelope complexity	Low risk	0
Deck design	Low risk	0
Total Risk Score:		3



01 NORTH ELEVATION 1:100

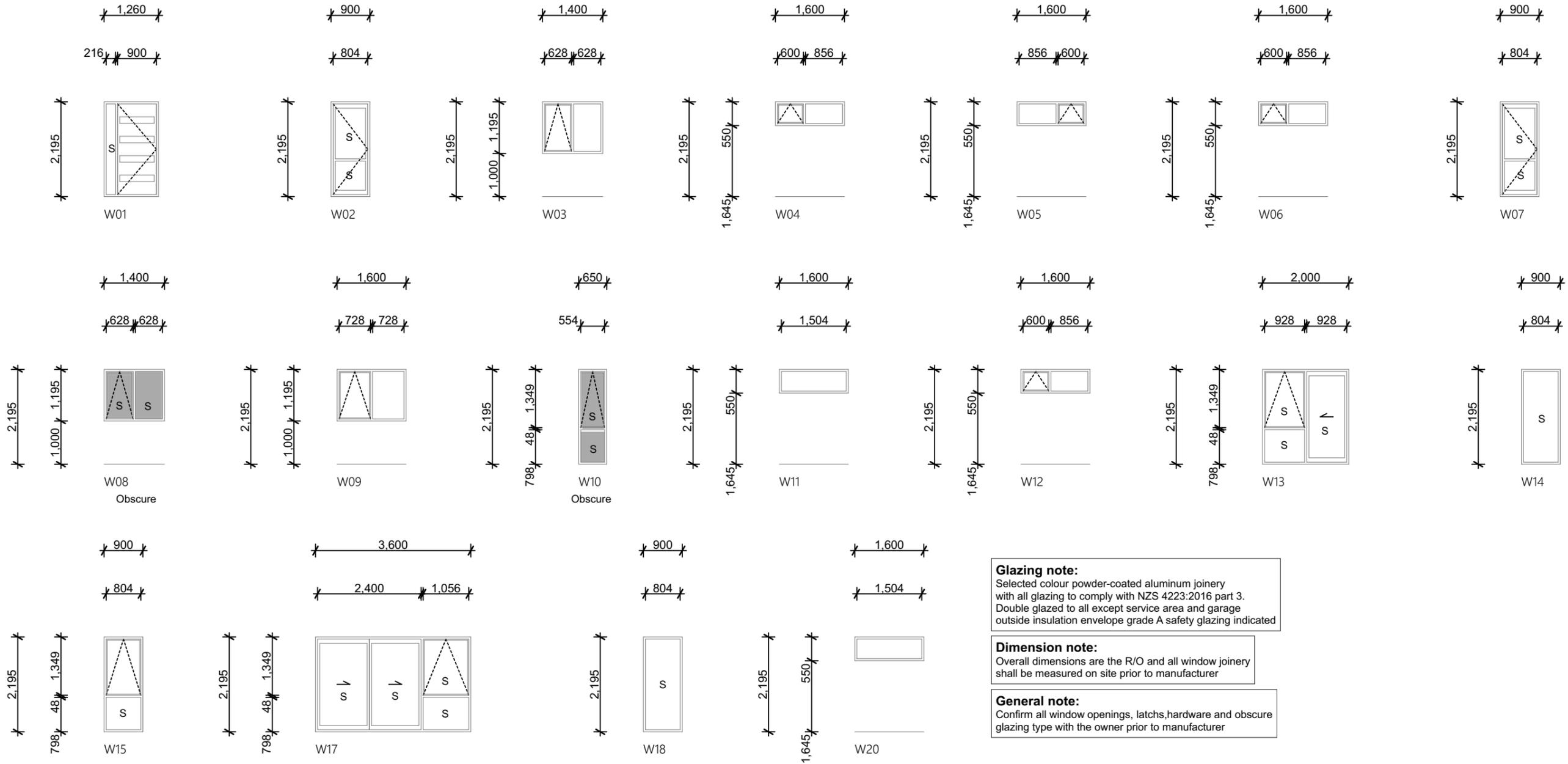
BUILDING ENVELOPE RISK MATRIX		
West Elevation		
Risk Factor	Risk Severity	Risk Score
Wind zone (per NZS 3604)	High risk	1
Number of storeys	Low risk	0
Roof/wall intersection design	Low risk	0
Eaves width	High risk	2
Envelope complexity	Medium risk	1
Deck design	Low risk	0
Total Risk Score:		4



02 WEST ELEVATION 1:100

Legend:
 S: Safety Glass
 OB: Obscure Glazing

NZBC H1 Calculation: (Schedule Method 4218)		
	Wall	Windows
North:	38m ²	11m ²
West:	50m ²	12m ²
South:	38m ²	3.6m ²
East:	50m ²	12m ²
Totals:	176m²	38.6m²
Window Area:22%		
Combined Window Area for E - W- S Elevations		
Wall:138m ²		
Window:27.6m ²		
Percentage:20%		



Glazing note:
 Selected colour powder-coated aluminum joinery with all glazing to comply with NZS 4223:2016 part 3. Double glazed to all except service area and garage outside insulation envelope grade A safety glazing indicated

Dimension note:
 Overall dimensions are the R/O and all window joinery shall be measured on site prior to manufacturer

General note:
 Confirm all window openings, latches, hardware and obscure glazing type with the owner prior to manufacturer



RFI Response

Hurunui District Council
Reference Number: 170482
18 Claremont Crescent, Amberley
Three-bedroom residential dwelling with attached garage and
woodburner (Woodsmen ECR Novo)

Attention Steven Laird

Date: 24th October 2017

Issue: A

Dear Steven,

Below is a detailed list of what I have done regarding the points in your letter dated 18th October 2017.

Building

1. Please amend the foundation detail to comply with NZS3604.2011 (bottom hook on the D10)

Please refer to the revised detail now showing the hook as requested sheet 21.

2. On Sheet 17 please amend W13 and W17 to include safety glass in the top of the side panels.

Please refer to the revised schedule I have lifted the Transom to remove the need for safety glass to the upper panels please refer to sheets 16 and 17.

3. Please confirm the use of the unnamed room next to the garage

This area will be used for storage.

4. Bracing calculations to be in wings.

I have reviewed the bracing calculations, if the current bracing elements are broken into wings (please see attached mark up) each wing would represent the following;

wing 1- 51% and wing 2 - 49%. I have then gone onto check the allocated bracing units to ensure the distribution is balanced to the floor area and believe the current layout complies with this requirement.

5. Please provide details for the HWC size and safe tray

Please find attached the additional information requested now shown on sheet 04 and 10.

6. Please amend the specification to include hot and cold pipe material

Please refer to page 77 section 11.6.2 which notes the cold water requirements. I have added additional information please see attached sheet now noting the hot water pipe requirement as polybutylene.

7. All soil fixtures must be vented in accordance with G13/AS1 Table 5. Please amend

I have updated sheet 10 now showing the en-suite toilet with a AAV valve the remaining toilet is vented via the terminal vent.

8. Please amend drawings to comply with G13/AS1 4.2

Thanks for spotting this I have now added the additional information to sheet 10.

Regards

Luke Seaford

