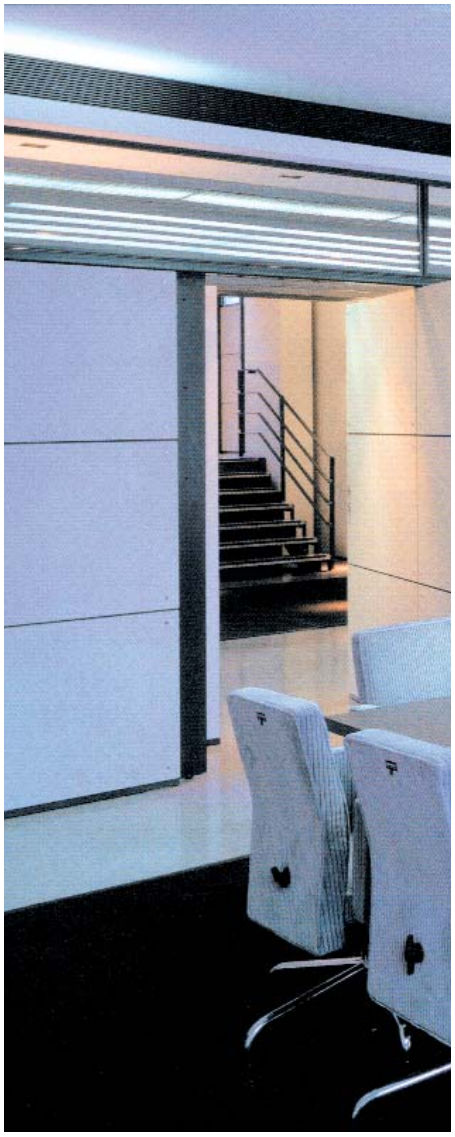
ETERPAN® Technical Manual



Eternit
ASIA PANELS

an Etex GROUP company

10 Good Reasons to Use ETERPAN[fi] Boards

1. Resistant to fire
2. Resistant to water
3. Space saving structures and constructions
4. Lightweight
5. Good thermal and sound insulation properties
6. Time saving installation
7. Easy to decorate
8. Provides space to accommodate cables, wiring or ductwork
9. Asbestos free and non hazardous
10. Excellent durability

ETERPAN[fi] is manufactured under a quality management system certified in accordance with ISO 9000: 2000.

CONTENT PAGE

Please turn to next page.

CONTENT PAGE

CONTENT PAGE

ETERPAN[fi] board is a fibre cement flat sheet which is known for its strength, versatility and durability. The product is produced by Eternit factories in Asia.

1.1 Product Composition & Production

ETERPAN[fi] board is manufactured from a homogeneous mixture of cement, organic cellulose fibres and selected mineral fillers. Cement and quartz are the principal elements of the mixture. These react during the autoclaving process, and build the strength of product.

Fibres are added to enhance the strength of ETERPAN[fi] board by means of the interaction of fibres, cement and quartz matrix. The mineral fillers provide intrinsic strength for the board and are important for product characteristics.

This asbestos-free board is autoclaved to form the dimensionally stable finished product, with the ETERPAN[fi] trade mark and production information printed on the back surface.

Note should be taken that there are two types of board. These are ETERPAN-MD and ETERPAN-LD. The acronym MD stands for medium density product and LD stands for low density product. Each has its area of application which is detailed in the following sections.

1.2 Field of Applications

The versatility of ETERPAN[fi] board is boundless. It has a wide range of applications and is usually classified as being a multipurpose construction board.

The use of ETERPAN[fi] board covers both external and internal applications, such as the following:

- Thermal insulation constructions;
- External or internal wall linings;
- Sound insulation/absorption constructions;
- Wet area constructions;
- Table tops;
- Composite panels;
- Demountable partition systems;
- Ductwork and E&M enclosures;
- Steelwork cladding panels;
- Soffit and eaves;
- Ceiling board;
- Fencing panels
- Sign boards, etc.

IMPORTANT NOTE:
ETERPAN[fi] -LD is recommended for interior applications only, such as partitioning, ceiling etc. Use ETERPAN[fi] -MD for external applications.

Please note that the information below indicates the average production values and should be used as reference only. If a specific value is important to an application, please consult Eternit Asia Panels for precise figures and values.

2.1 Available Format & Finishing

Item	ETERPAN[fi]-MD	ETERPAN[fi]-LD
Thickness (mm)	4.5 / 6 / 7.5 / 9 / 12 / 15 / 20	6 / 9 / 12
Size (mm x mm)	1220 x 2440 and 1200 x 2400	1220 x 2440
Edge treatment	Square, bevelled, recessed, chamfered (subject to thickness requirements)	

2.1.1 ETERPAN[fi]-MD Format & Finishing

Three types of board finishing are available in accordance with customer requirements, these are UNFINISHED, FINISHED and TOP SANDED.

UNFINISHED board refers to a board which is cut in the wet on the production line and dried without further trimming. There may be some deviation in the squareness and straightness of the board edges due to movement upon autoclaving and drying.

FINISHED boards are those with the edges re-cut after drying to ensure squareness and straightness of the edges, but subjected to tolerances as tabulated below. These boards can be supplied with bevelled, chamfered or recessed edges.

TOP SANDED are as per finished boards, including edge treatments, but with the top face of the boards being sanded to provide a slightly better surface finish.

The tolerances of the board in terms of length, width and thickness are as follows:

Item	Unfinished	Finished / Top sanded
Length, L	–5mm	–2mm
Width, W	–5mm	–2mm
Thickness, d: d < 9mm d > 9mm	 –0.5mm –0.8mm	Top sanded only –0.4mm –0.4mm
Squareness	–3mm/m	–2mm/m

2.1.2 ETERPAN[fi]-LD Format & Finishing

Low density ETERPAN[fi] board is available only in standard smooth finishing. Similarly this board is subjected to tolerances as detailed below and could be supplied with bevelled or recessed edges.

All measurements stated are standard size and thickness. Special board size or thickness are available upon request. Certain conditions may apply. Please consult Eternit Asia Panels for details.

The tolerances of the board in terms of length, width and thickness are as below:

Item	Standard
Length, L	–5mm
Width, W	–5mm
Thickness, d	–0.5mm
Squareness	–3mm/m

2.2 Packing Specifications

ETERPAN[fi] board is packed on flat pallets for delivery locally or overseas. The packing specifications are as detailed below.

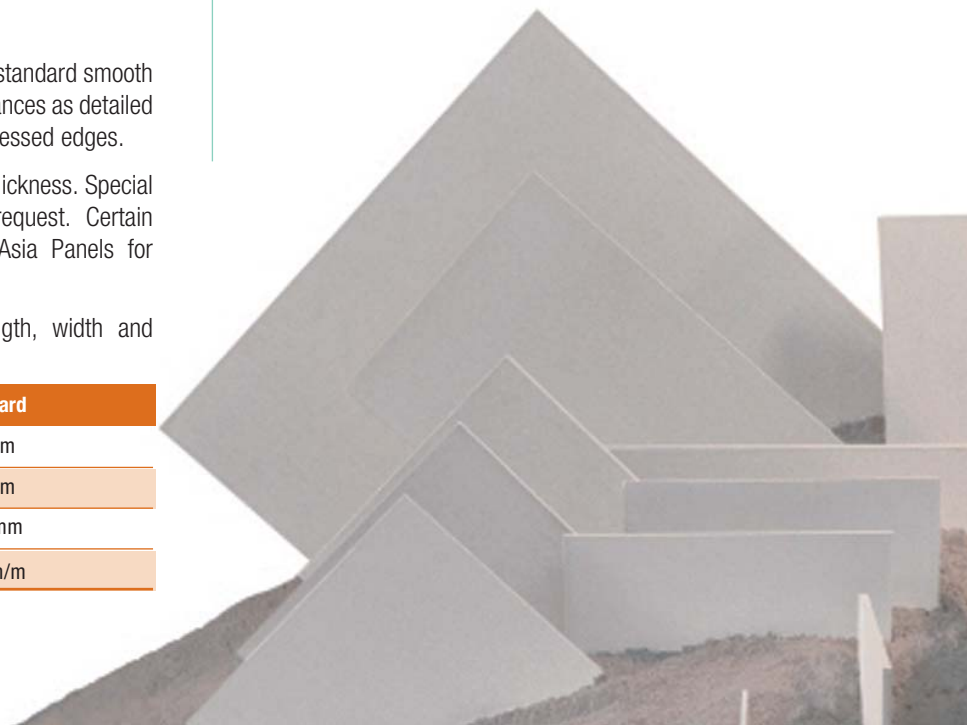
2.2.1 ETERPAN[fi]-MD Packing Specifications

Thickness (mm)	No. of sheet/pallet	No. of sheets / 20 container	
		Pieces	m²
4.5	120	960	2858
6.0	90	720	2143
7.5	72	576	1715
9.0	61	488	1453
12.0	46	368	1095
15.0	37	296	881
20.0	27	216	643

2.2.2 ETERPAN[fi]-LD Packing Specifications

Thickness (mm)	No. of sheet/pallet	No. of sheets / 20 container		No. of sheets / 40 container	
		Pieces	m²	Pieces	m²
6	90	720	2143	1170	3483
9	61	488	1453	793	2361
12	46	368	1095	598	1780

There will be 8 pallets in a 20 container, being 6 horizontal pallets and 2 vertical pallets, with 13 pallets in a 40 container, being 12 horizontal pallets and 1 vertical pallet. Note that a 40 container is not recommended for ETERPAN[fi]-MD boards due to the weight limitations of the containers.



2.3 Product Characteristics

It should be noted that the values stated in the following tables are average values of the product obtained under normal conditions, and may subject to change without prior notice. Please consult Eternit Asia Panels for more specific details.

2.3.1 Physical Properties

Description	ETERPAN[fi]-MD	ETERPAN[fi]-LD
Density (oven dry)	Nominal 1300kg/m^3	Nominal 950kg/m^3
Combustibility (in accordance to BS 476: Part 4)	Non-combustible	Non-combustible
Surface spread of flame (in accordance to BS 476: Pt 7)	Class 1	Class 1
Building regulations classification	Class 0	Class 0
Value of pH	11	11
Moisture content (at EMC)	10% by weight	10% by weight
Moisture movements: - Normal to oven dry - Normal to saturated	 1.30 mm/m 0.60 mm/m	 1.00 mm/m 0.45 mm/m
Water absorption capacity (by weight)	30%	56%
Thermal expansion	6 x 10^{-6} m/m•K	5 x 10^{-6} m/m•K
Thermal conductivity (20-300 C)	0.35 W/m•K	0.28 W/m•K
Thermal shrinkage (4hr/500 C): - Length / width - Thickness - Weight loss	 0.56% 0.78% 10.50%	 0.39% 0.91% 9.03%
Resistance to continuous freezing	-30°C	-30°C
Resistance to continuous heating	150°C	150°C

2.3.2 Mechanical Properties

Description	ETERPAN[fi]-MD	ETERPAN[fi]-LD
Bending strength (oven dry): - Lengthwise - Widthwise	 12 N/mm^2 9 N/mm^2	 8.5 N/mm^2 5.5 N/mm^2
Bending Modulus (oven dry): - Lengthwise - Widthwise	 9500 N/mm^2 7500 N/mm^2	 6000 N/mm^2 5000 N/mm^2
Delamination strength (air dry)	1 N/mm^2	0.7 N/mm^2
Screw retention strength* (self-tapping screws 5 x 32mm)	980 N (average)	Not applicable

* For reference only; as the retention strength may vary depending on types of screw used.

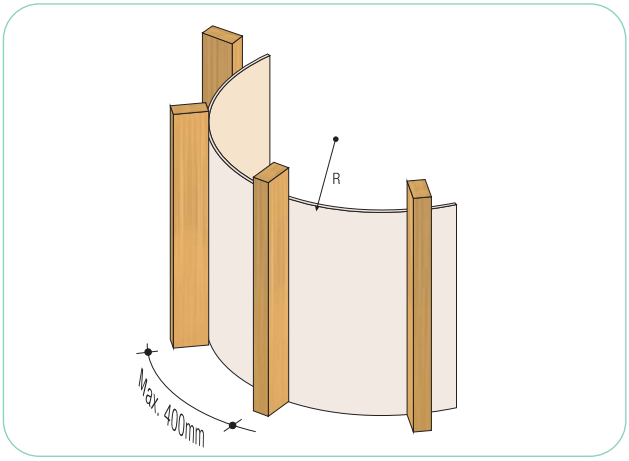
Generally, ETERPAN[fi] board can be used at curved sections. However, there is a limitation on the bending curvatures.

All curved sections should be supported with appropriate elements. The table on the right has been prepared for easy reference.

ETERPAN[fi] board can be installed to form a convex or concave curve on site. Generally it will form to the curve more readily. The curve is along the length of the board, not its width.

Begin fixing the sheet at one end and continue progressively towards the other end, fixing the sheets completely onto every framing member, gradually bowing the sheets. Do not start fixing from the middle of the sheet. See **FIGURE 1**.

FIGURE 1 ***Installation of curved section for ETERPAN[fi] boards***



The following points should be noted if curve sections are to be constructed.

a) Ensure the structure is designed and fastened to a substrate which can withstand the forces generated when fixing ETERPAN[fi] board to a curve.

b) Ensure that timber or steel framings are properly set out to form the curve.

c) Distances of framing are to be installed at maximum 400mm centres around the curve.

d) Ensure the fixings at the ends and in the middle of the sheet are able to accommodate the curving stresses.

e). Ensure that the curvature is within the radius limitation of ETERPAN[fi] board, as detailed below.

2.3.3 Allowable Radius of Curvature

ETERPAN[fi]-MD: As a general rule of thumb, it can be bowed to a degree where the minimum radius of curvature is 720 times its thickness (t) along the board's length and 744 times across the length.

Thickness (mm)	Minimum bending radius, R (m)	
	Lengthways	Widthways
4.5	3.24	3.35
6.0	4.32	4.46
7.5	5.40	5.58
9.0	6.48	6.70
12.0	8.64	8.93

ETERPAN[fi]-LD: As a general rule of thumb, it can be bowed to a degree where the minimum radius of curvature is 804 times its thickness (t) along the board's length and 912 times across the length.

Thickness (mm)	Minimum bending radius, R (m)	
	Lengthways	Widthways
6.0	4.82	5.47
9.0	7.24	8.21
10.0	8.04	9.12
12.0	9.65	10.94

2.4 Test Evidences

Under the continuous product development scheme of Eternit Asia Panels, ETERPAN[fi] board has been widely tested under different standards for consistency of its physical properties. Highlighted below are some of the many tests carried out in testing laboratories throughout the world. This list is meant for reference only. Should further details be required, please consult Eternit Asia Panels Technical Department.

2.4.1 Tests performed on ETERPAN[fi]-MD in accordance with various standards

Reference No.	Description	Results
AS 1530.3: 1989	Ignitability, spread of flame, heat evolved, smoke developed.	Each obtaining index 0.
AS 3991: 1992	Dimensions/ Modulus of rupture/ Density/ Water-tightness/ Resistance to hot water soaking, to heat or rain, to freeze or thaw	ETERPAN[fi]-MD complies with category 2 of Type A and B of AS 2908.2-1992.
ASTM C447: 1976	Thermal shrinkage (4 hours at 300°C)	Length/Width: 0.28%; Thickness: 0.28%.
ASTM C518: 1976	Thermal conductivity	0.258 W/m•K at 52°C.
BS 874: 1973	Thermal conductivity	0.265 W/m•K at 300°C.
ASTM C1185: 1995	For Density/ Moisture content/ Water absorption/ Bending strength or modulus/ Hydric movement/ Thermal movement/ Porosity, please consult Eternit Asia Panels Technical Department.	
ASTM D256: 1981	Shock resistance	2.04 kJ/m^2 (saturated).
ASTM D1037: 1978	For Compressive strength or modulus/ Delamination strength/ Tensile strength/ Bending strength/ Impact strength, please consult Eternit Asia Panels Technical Department.	
ASTM G26: 1990	Weather O meter	No visible damage.
BS 476	Part 4: 1970 Non-combustibility	Non-combustible.
	Part 6: 1989 Fire propagation for products	Index, I = 0.3; sub-index, i = 0.1.
	Part 7: 1971 Surface spread of flame	Class 1 material.
	Part 11: 1982 Heat emission	Temperature rise average 73°C on specimen and 5°C within furnace.
BS 4624: 1981	Watertightness (24 hours at 250mm water head)	No water droplets were observed.
BS 5669	Part 1: 1989: Clause 21 Impact strength	29.5mm/mm (mean) at average drop height of approximately 270mm.
CNS 6532	Combustibility classification	Grade 1 (non-combustible).
GB 6566: 1986	Clause 2: Asbestos emission	Comply with requirements.
ISO 1182: 1990	Non-combustibility	Non-combustible.
ISO 8335: 1987	For Density/ Moisture content/ Swelling in water/ Modulus of elasticity/ Bending strength/ Screw-holding power, please consult Eternit Asia Panels Technical Department.	
NIOSH 9002	Asbestos detection	No asbestos fibre was found.

2.4.2 Tests performed on ETERPAN[fi]-LD in accordance with various standards

Reference No.	Description	Results
ASTM C447: 1976	Thermal Shrinkage (4 hours at 300°C)	Length/Width: 0.26%; Thickness: 0.23%.
ASTM C518: 1976	Thermal conductivity	0.213 W/m•K at 52°C.
BS 874: 1973	Thermal conductivity	0.215 W/m•K at 300°C.
ASTM C1185: 1995	For Density/ Moisture content/ Water absorption/ Bending strength or modulus/ Hydric movement/ Thermal movement/ Porosity, please consult Eternit Asia Panels Technical Department.	
ASTM D256: 1981	Shock resistance	2.37 kJ/m^2 (saturated).
ASTM D1037: 1978	For Compressive strength or modulus/ Delamination strength/ Tensile strength/ Bending strength/ Impact strength, please consult Eternit Asia Panels Technical Department.	
BS 476	Part 4: 1970 Non-combustibility	Non-combustible.
	Part 6: 1989 Fire propagation for products	Index, I = 0.6; sub-index, i = 0.5.
	Part 7: 1071 Surface spread of flame	Class 1 material.
	Part 11: 1982 Heat emission	Average temperature rise for specimen is 60.8°C and 2.6°C within furnace.
ISO 1182: 1990	Non-combustibility	Non-combustible.
NIOSH 9002	Asbestos detection	No asbestos fibre was found.

ETERPAN[fi] boards are easy to handle and work using conventional tools. However, basic standard safety precautions should be taken at all times during installation. Highlighted is some general guidance for reference.

3.1 Loading & Unloading

ETERPAN[fi] boards are supplied on pallets suitable for fork lift unloading. If crane off loading by slings is envisaged, care should be taken to avoid damaging edges of boards.

All pallets and crates can be safely handled by using a barge lift or hoisting equipment and straps. Steel cables should not be used as it will damage both the pallet and the boards.

Where the crates have to be removed from a box container, care should be taken not to subject the crates or pallets to any impact shock, as this could possibly result in cracking of the boards.

3.2 Transport on Site

Always drive the delivery vehicle as close as possible to the point where the boards are to be used. When transporting the boards it is essential to firmly secure the pallets to prevent sliding.

The panels should be off-loaded using either a crane with straps or a fork lift truck. No steel cables should be used as they may damage the timber pallets. If the boards are subsequently moved around the site the boards should be placed on a rigid base for the forklift tines. ETERPAN[fi] should be stored on a rigid base.

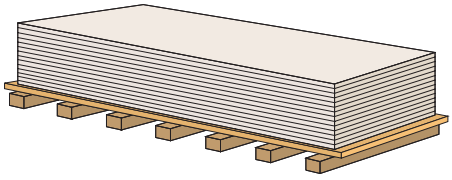
3.3 Storage

ETERPAN[fi] boards are supplied with protective plastic sheet wrapped around the timber crates. This protection should not be removed until the boards are ready to be used.

In general, the following steps should be taken to ensure that the boards remain in good condition during storage.

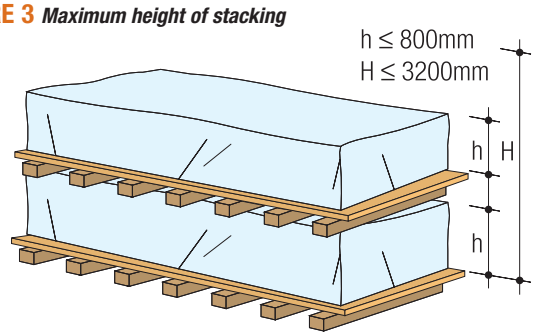
a) ETERPAN[fi] boards should be stored on a covered dry-level ground, away from the working area of mechanical plant.

FIGURE 2 ***Stacking of ETERPAN[fi] boards***



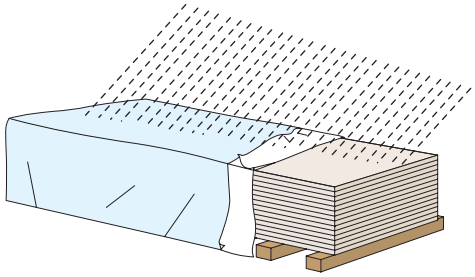
b) Pallets should be a maximum of 800mm high, on firm level ground. If two or more pallets are stacked, the total stack height must be less than 3200mm.

FIGURE 3 ***Maximum height of stacking***



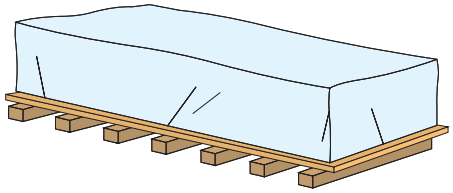
c) The boards must be protected from inclement weather.

FIGURE 4 ***Protection of ETERPAN[fi] boards***



d) The boards must be stored under cover.

FIGURE 5 ***Storage of ETERPAN[fi] boards***

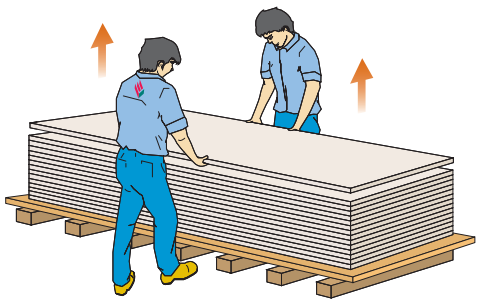


3.4 Handling

The following recommendations must be always taken into account when handling the panels.

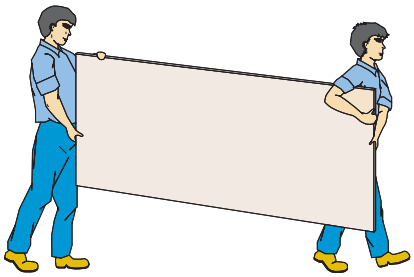
i) Wherever possible, always lift boards from the stack below rather than slide board on board. This will prevent damage or scratches occuring to the lower boards.

FIGURE 6 ***Lifting of ETERPAN[fi] boards***



ii) Always carry the boards on edge but do not store on edge.

FIGURE 7 ***Carrying ETERPAN[fi] boards***



3.5 Cutting

There are a wide variety of applications and fixing methods possible with ETERPAN[fi] boards. The method to be used is dependant on a number of factors, amongst which are:

1) The shape of boards, be they square, rectangular, circular, etc.;
2) The location where the work is to be carried out, be it industrial, commercial, on site or off site, etc.;
3) The quality of workmanship required.

ETERPAN[fi] boards can be cut on site fairly easy. However, if a large amount of boards are to be cut, it is recommended that cutting is carried out off site under controlled conditions as much as possible to ensure good quality of finished edges, etc.

The few general rules should be observed when working with ETERPAN[fi] boards, these are as follows.

- For industrial and extended cutting life of tools, working with diamond tipped saws is recommended. Experience shows that tools with carbide teeth will provide an adequate cut but the tools will wear at a faster rate.
- High speed electric tools generate very fine dust. Inhaling fine dust can be harmful to health. Therefore, dust extraction or wet cutting is necessary. Although ETERPAN[fi] boards contain no harmful fibres, inhalation of excessive nuisance dust can be detrimental to health and therefore we would recommend that when cutting or drilling any fibre cement products appropriate face masks should be worn.
- Slow running tools produce coarse dust or chips but are not so efficient at cutting.
- The speed of cutting will be determined by:
  - thickness of the board;
  - hardness of the board;
  - condition of the blade.
- The boards must be held firm during cutting to avoid slippage and vibration which can lead to chipping of the board edges.
- The choice of the most appropriate tool for use in each country will depend on custom, practice and local regulations.
- A saw for universal use does not exist.
- Each saw has its own limits and special field of use.

3.5.1 Industrial Machines

Industrial machines are used for continuous cutting over long periods of time, for large quantities and for high efficiency. The following types can be identified.

Guillotine

The knife of the guillotine is parallel to the board support so that the cut is made at the same moment over the entire length of the board. Up to a maximum thickness of 6mm, a very neat, square cut can be achieved but the edge remains rough. The machine cuts the sheets one by one and is not suitable for textured surfaces.

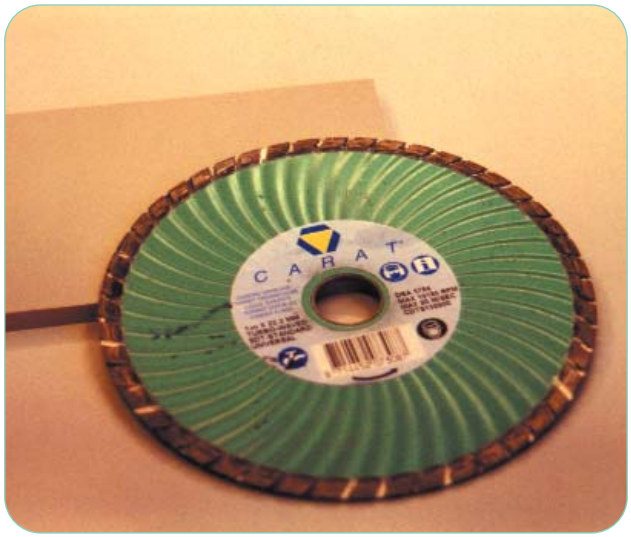
Cutting with Diamond Tipped Blades

Cutting with diamond tipped blades is carried out using high speed electric motor (2500-3000 rpm/min. depending on the diameter of the blade). There are 2 types of cutting machine:

1) Machine with fixed table and moving saw support;
2) Machine with fixed saw support and moving table.

The saw support can be equipped with several parallel saws for multi cutting in a single pass of the blades over the boards. A diamond tipped blade can be used in either a wet or dry state.

FIGURE 8 ***Diamond tipped blade***



The disadvantage of wet cutting is the generation of a cement slurry which forms from the mixture of the dust and water, which must be drained off in an appropriate way. In addition, it is necessary to rinse the saw after each use to maintain the cutting quality.

The boards should be cleaned after cutting to avoid leaving any dust particle on the surface. The wet diamond saw is the most convenient method of continuous cutting of ETERPAN[fi] board as well as other thick compressed or autoclaved panels, such as GLASAL[fi], etc. It can be used to cut more than one board at a time depending on the diameter of the saw blade.

Continuous dry cutting of medium or low density products is carried out with a diamond tipped blade, dust may adhere to the diamonds on the teeth of the blade due to the high working temperatures. A few cuts of highly abrasive stone will clean the blades effectively. In all cases dust extraction equipment is necessary. The cutting can also be combined with a milling cutter.

Cutting with Carbide Blades

Tungsten carbide tipped saws can be used with either a high or low speed electric motor. The cutting is done in a dry state so dust extraction is essential. The tungsten carbide teeth of the saw have a shorter life span than diamond tipped blades but they can be re-sharpened.

3.5 Cutting *continued from page 9*

3.5.2 Semi-industrial Machines

The semi-industrial machine described below is for dry cutting only. The machine will work with both high and low speed electric motors.

The high speed electric motor with diamond tipped blades can be used for other building materials such as concrete, natural stone, brick etc, while the low speed motor with tungsten carbide tipped blades for fibre cement materials.

Cutting ETERPAN[fi] boards using this machine provides a neat cut and smooth edges.

FIGURE 9 ***Kolb cutting machine***

The major advantages of this machine are:

- Dry cutting;
- High efficiency;
- High quality of cutting;
- Several boards can be cut at once;
- The boards need not to be secured during sawing.

3.5.3 On-site Machines

Generally while working at site, hand tools and low speed electric tools are recommended. When high speed electric tools are used, dust extraction is then essential.

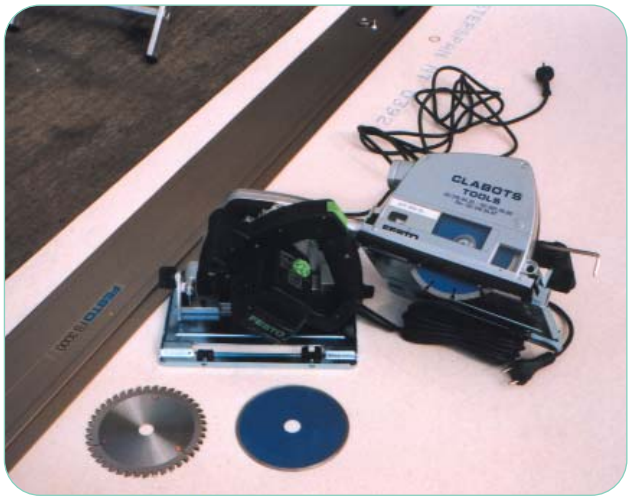
Power Tools with Dust Extraction Equipment

A sawing machine such as FESTO, Bosch, Makita, etc. works with a tungsten carbide tipped saw blade on a low speed electric motor (250 rpm) and moves over a fixed working table.

It is a typical machine for occasional use on site producing very good results, and is capable of cutting boards with maximum thickness up to 20mm.

A vacuum cleaner is recommended for use whilst cutting especially when using power saws. As an additional safety precaution, always wear eye, ear and dust protection when using power tools of any description.

FIGURE 10 ***FESTO circular saw***



A portable version of the working table is available for the convenience of board cutting at site, as shown in figure below.

FIGURE 11 ***Portable cutting table***

While working with power saws, the following important points should be noted:

- Ensure that the boards to be cut are continuously and well supported on either side of the cut.
- A straight edge should be clamped in position to guide the cutting operation.
- Care must be taken to ensure the tool remains against the straight edge during the cutting operation.
- The cutting rate should be such that the blade is not labouring or over-heating. Normally the feed speed should be slower than for natural timber.

3.5 Cutting *continued from opposite page*

Scoring Knife

This tool is equipped with a Tungsten Carbide tipped point. It is suitable to use for panels up to 5mm thick. Several passes are required on the board surface to produce a groove; then a straight edge is used to guide the knife. The final break is obtained by applying pressure on the unsupported part of the board. The cut is relatively neat but the edge should be finished with glass paper or a plane.

FIGURE 12 ***Scoring knife***

Jigsaw

This is applicable for panels up to 20mm thick. The panels can be cut easily with a jigsaw to form various shapes. Saws with special hardened teeth are available for cutting fibre cement such as ETERPAN[fi] boards. As with all power tools, care should be taken to cut within the capacity of the tool and blade, do not force the cutting speed.

FIGURE 13 ***Jigsaw***

Hand Saw

Hand sawing is suitable for general cutting operations and for small cuts, notchings or small penetrations. However, this method of cutting is somewhat time consuming. As always, the fastest method of cutting is to allow the saw to work at its own speed. Trying to force the tool to cut faster merely blunts the teeth.

Hand Guillotine

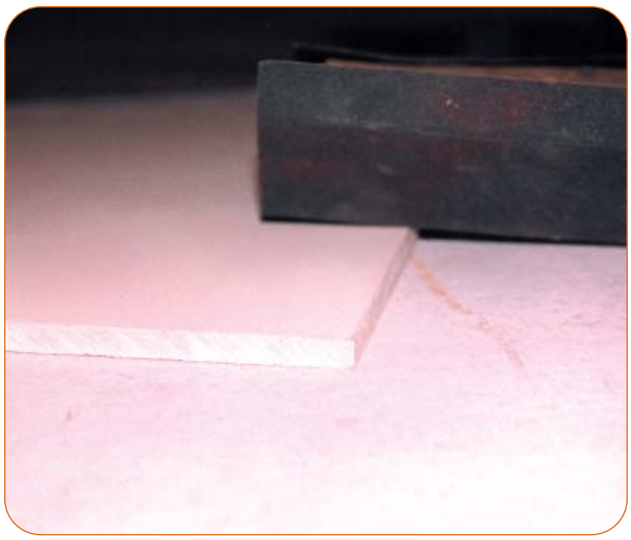
The hand guillotine or parallel shears can cut flat sheets 6mm thick. Care should be taken when cutting near corners to avoid cracking occuring.

FIGURE 14 ***Hand guillotine***

Rasp/Surform

A rasp or surform can be used for edge finishing where necessary in order to trim away rough edging. For fine edge finishing, dress the edges with fine glass paper, as shown in the figure below.

FIGURE 15 ***Glass paper***



Drilling

Drilling can be carried out either by hand or any conventional power drill with or without dust extraction. For best results, the boards should be firmly supported behind the location of the holes.

Generally when working on fibre cement products, the use of tungsten carbide tipped drills with point angles of 60^{0} to 80^{0} rather than the more usual 120^{0} type, are preferable and more efficient.

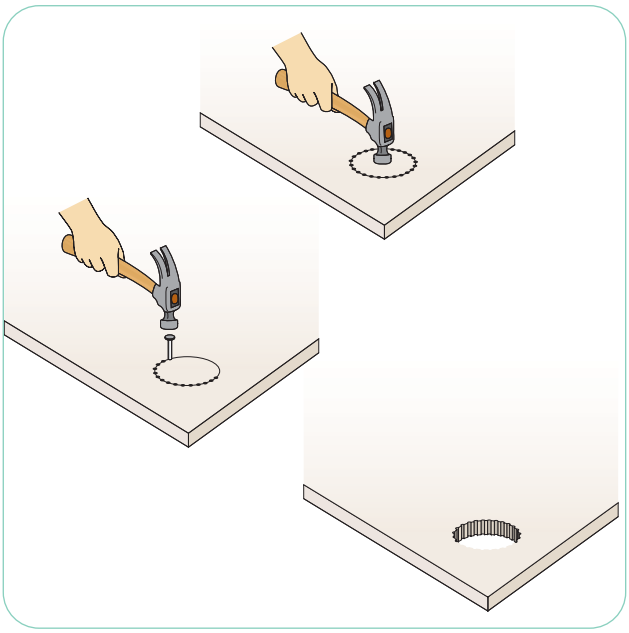
3.6 Holes Forming

It is very often that apertures need to be cut within a board in order to allow for penetration of services such as switchboxes, lights, access panels, etc. Therefore, the following procedures would serve as general guidelines to achieve this.

i) For smooth, clean cut circular holes:
- Mark the centre of the hole on the board.
- Pre-drill a hole to be used as a guide.
- Cut the hole to the require diameter using a hole saw fitted to a heavy duty electric drill where the central bit is inserted into the pre-drilled hole.

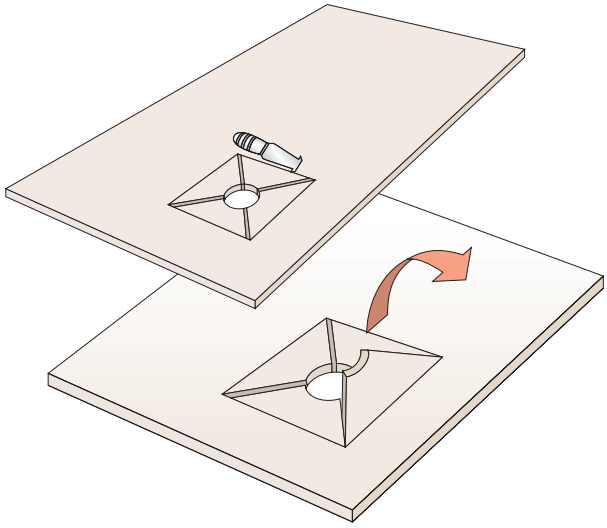
ii) For small irregular holes:
- Small rectangular aperture can be achieved by forming a series of small holes (using a drill) around the perimeter of the opening.
- Tap out the waste piece from the panel face carefully. Make sure that the edges are properly supported in order to avoid damage to boards.
- Rough edges can be cleaned up with a rasp or 40 grit glass paper.

FIGURE 16 ***Nailing and hammering for openings***



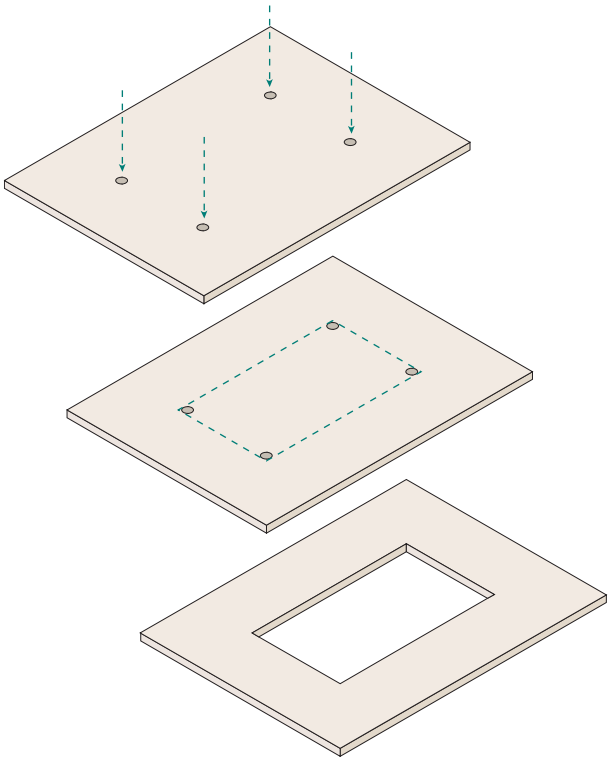
iii) For large openings or apertures:
- Score deeply around the perimeter of the opening using a sharp tool.
- Form a large round hole in the centre using the method previously described.
- Saw cut from the centre towards the corners of the opening.
- Tap waste pieces from the face side and if necessary, clean rough edges with a rasp or with at least 40 grit sand paper. Radius corners with a half round rasp to eliminate any stress points.

FIGURE 17 ***Apertures***



Alternatively, for neater openings:
- Pre-drill a hole of at least 10mm diameter at the 4 corners of the openings. Mark lines between hole to hole (forming a rectangular shape) as guide and cut along the lines using Jigsaw or hand saw.
- Cleaning the rough edges of the hole can be done by using a rasp.

FIGURE 18 ***Apertures opening using alternate method***



NOTE: Never make holes by using heavy hammers, cold chisels or any other aggressive methods. This will damage the underside of the boards.

3.7 Fixing of ETERPAN[fi] Boards

The type of fixings used when installing ETERPAN[fi] board are important as they determine the support of joints and stability of a structure. In general, a fixing should meet the following rules/requirements.

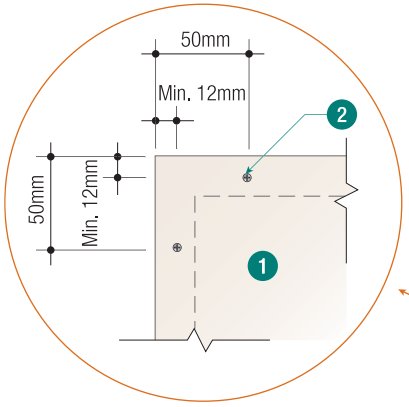
i) Corrosion resistant.

ii) Stainless steel or galvanised nails are recommended for timber framing. Do not use screws when the board forms part of the structural bracing.

iii) Stainless steel, zinc or other plated self-drilling screws are recommended for steel framing. Avoid using screws when the board forms part of the structural bracing.

iv) Fixing points should be located at least 12mm (preferably 15mm) from the sheet edge and 50mm from sheet corners. The nominal centres of fixing are generally recommended at 200mm and 300mm throughout this manual when fixed using nails and screws respectively. See **FIGURES 19 & 20**.

FIGURE 19 ***Fixing distances from edge and corner of board***



When fixing ETERPAN[fi] board using nails, the following should be noted clearly.

- Do not over-drive the fixings, as this may reduce the holding capacity of the fixing to the board.
- Fixings should be drive straight into the board and at best embedded 0.5mm below the board surface.
- Do not damage the board around the fixing or its edges. Cracked sheets should be replaced.

When fixing ETERPAN[fi] board, especially to steel frames using screws, the following should be noted.

- Always pre-drill fixing holes unless using specially designed self-drilling screws for fibre cement to steel.
- Use a high-torque variable-speed screw gun with a maximum speed of 2500 rpm fitted with a depth gauge.
- Do not over-drive, as this may reduce the holding capacity of the board to steel. Reduce drill speed as the screw pulls the ETERPAN[fi] board against the framing.

Note should be taken that when fixing to steel framing, always fix to the open side of the flange first to maintain a flush outside face. **FIGURES 21 & 22** illustrates the correct sequence of installation.

ANNOTATION DETAILS THIS PAGE

1. ETERPAN[fi] board of appropriate thickness
2. Stainless steel or galvanised fixings, of appropriate size and length.
3. Steel stud of appropriate size

FIGURE 20 ***Layout of fixing points***

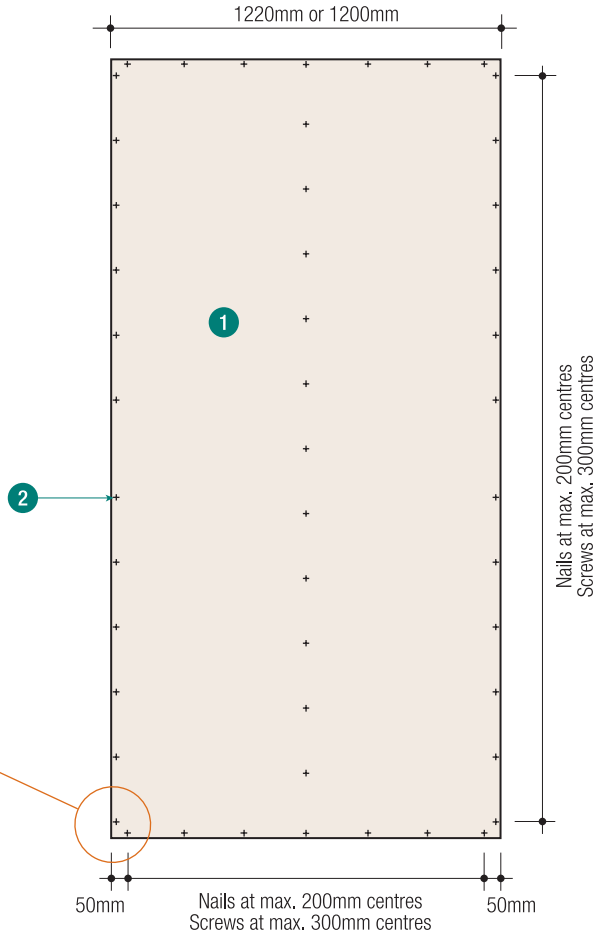


FIGURE 21 ***INCORRECT sequence of fixing to steel stud***

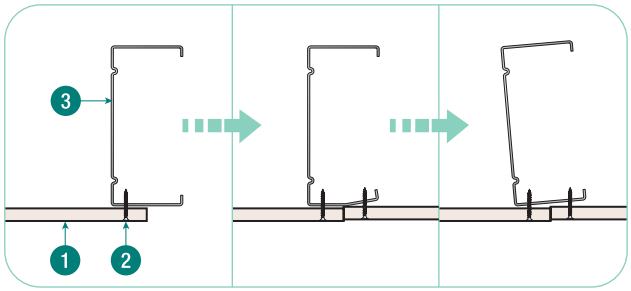
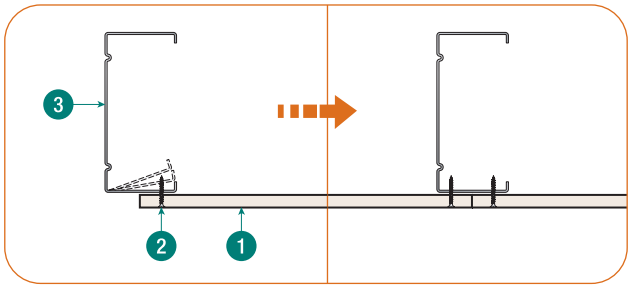


FIGURE 22 ***CORRECT sequence of fixing to steel stud***



3.8 Flush Jointing

Flush jointing is applicable to most partition and ceiling constructions. However, in some instances it may be also applicable to external wall constructions (see Section 5.1 for more details).

Generally installations of concealed framed ceiling and partition systems require crack-free flush jointing. The method of constructing flush joints depends very much on the skills and know-how of the installer, as well as the stability of the supporting construction. It is recommended that the thickness of panels used for flush jointing should be of at least 6mm thick. Thinner boards are allowed only when they are to be rendered with synthetic binders or textures at a later stage. Following are some guidelines for joint finishing in order to achieve the required appearance. For further information, please consult Eternit Asia Panels Technical Department.

To obtain a flush joint it is important that all panels must have bevelled or recessed edges at the side where they abut other panels. Note that when a panel is cut to size on site, the bevel or recess edge is often cut away. If a flush finish is required, the bevel or recess must be re-applied.

When the boards are ready for joint treatments, follow the steps below to obtain the required finish:

a) After the installation of the boards, wait until the moisture content in the sheet is equivalent with that of the air. This would normally take approximately 24 hours to achieve. Once this equilibrium moisture content is achieved, moisture induced movement will be lower, thus there will be less risk of joints cracking.

b) Clean the surface of the joint area and apply an acrylic-based primer on the area of the joint (approximately 300mm wide). This will prevent the absorption of moisture by the board from the filler which is to be applied later and thus enhance the strength of the joint. Recommended primers are such as the follows:
- Transparent Alfa Dispersiegrond by Akzo Nobel;
- White Planiprim by Akzo Nobel;
- Acraprime 501/2 solvent based by Orica Coatings;
- Water repellent CFC sealer by Orica Coatings;
- EP 1662 by SEA;
- Flexicure 500 by Special Finishes Ltd.;
- Hitchins Joint Filler by Hitchins Gunac Ltd.;
- Others may be acceptable subject to prior testing.

c) Always work with clean tools and containers.

d) The work should be carried out in environment where the ambient air temperature is at least 5°C or above.

e) Prepare the joint filler as per instruction prescribed by the manufacturer. Always use clean water where appropriate.

f) Fill the bevel with sufficient joint filler, see below figure.

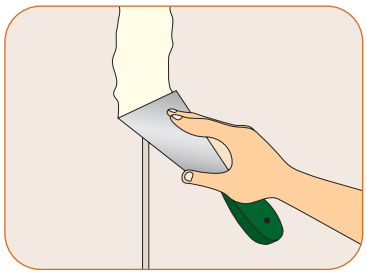
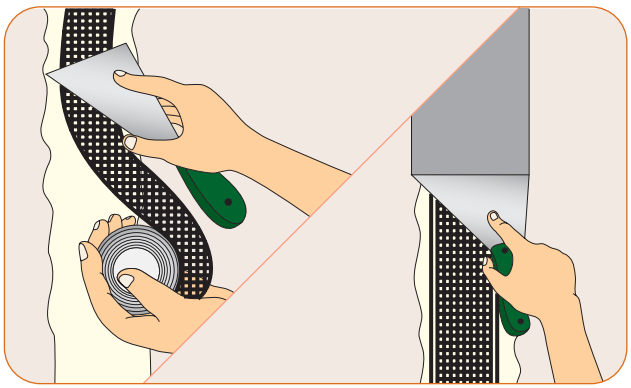


FIGURE 23 ***Filling the joint***

g) Apply a layer of reinforcing paper tape in the filler and cover the complete surface of the tape with excessive amount of joint filler (well-embeded) using a spatula.

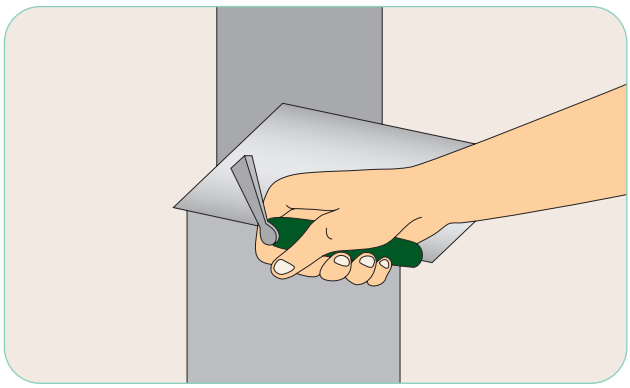
FIGURE 24 ***Applying reinforcing tape / Covering the tape***



h) Let dry completely and sand the surface slightly with fine-graded sandpaper.

i) Apply a second layer of joint filler with wide trowel.

FIGURE 25 ***Joint finishing***



j) Wait until it is completely cured and sand the surface again slightly with same grade of sandpaper.

k) Depending on the level of finishing that is required one can eventually use a last layer of joint finisher applied with a 280mm wide trowel (preferably curved trowel).

Normally joint fillers manufactured for use with plasterboards are suitable for flush jointing of ETERPAN[fi] board when installed within dry areas.

If primer is not to be used, it is recommended that the areas to which the filler is to be applied should be pre-wet so that when the boards gradually dry out it will create tensile stresses into the joints with sufficient adhesion.

Pre-wetting the boards also ensures they do not rapidly absorb the moisture from the filler, thus avoiding cracks in the joint occuring.

A well designed cladding system is essential for buildings in order to provide a comfortable living or working environment as well as security for occupants. Other than the design, this involves proper handling, cutting, treating and installation of the materials. Therefore, the following should be considered when working with ETERPAN[fi] -MD.

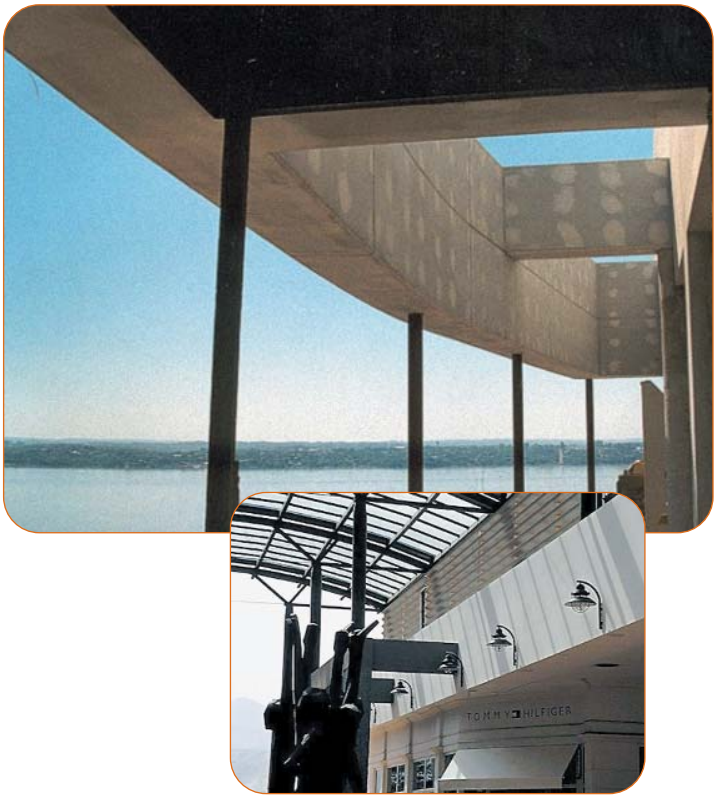
4.1 Advantages & Durability of ETERPAN[fi] -MD in External Wall

For external applications, ETERPAN[fi] -MD in general provides the following advantages and performances.

- Weatherproof;
- Durable;
- Dimensionally stable;
- Rot and termite resistant;
- Strength and properties remain unchanged after occasional wetting;
- Non-combustible and Class 0 building material, in accordance with BS 476: Part 4, 6 and 7 respectively.
- Achieved 0 index on ignitability, spread of flame, heat evolved and smoked developed respectively in accordance with AS 1530: Part 3.

The durability of ETERPAN[fi] -MD is warranted by Eternit Asia Panels for the following periods of time for all systems discussed below:

- 50 years in structural bracing and non-structural applications when sealed, stopped and coated with proprietary coating systems. The serviceable life of the coated product will be 50 years provided the coating system is properly maintained to prevent water entry.
- 15 years externally if uncoated.



However, please do take note that the described warranty only apply when the use of ETERPAN[fi] -MD complies with the following general conditions.

1) The waterproof coating system on ETERPAN[fi] -MD is maintained over the service lifetime in order to remain impervious to liquid or water.
2) All joints and profiles, apertures and cut-outs are adequately sealed to prevent any water ingress. All joint sealing systems are adequately maintained to prevent deterioration and subsequent water ingress.
3) Fungal growth on the sheet is not allowed to occur in structural bracing applications. Thus, ETERPAN[fi] -MD should not be exposed to conditions where it will remain almost permanently damp; e.g. below ground or in contact with heavy lush foliage.
4) ETERPAN[fi] -MD must be used with the appropriate ground clearances (minimum 100mm in paved areas and 175mm in unpaved areas). Appropriate edge overhang along the bottom plate must be used to prevent capillary action forcing water behind the material, and appropriate coating on edges must be maintained to avoid wetting.
5) The fastener system does not degrade or suffer from corrosion. At least type 316 stainless steel fasteners should be used rather than hot dip galvanised steel when construction is located in the following areas:
   a) Areas within 500 metres of the high tide mark where there are regular strong onshore winds.
   b) Areas within 200 metres of the high tide mark where there are occasional strong onshore winds, or regular weaker onshore winds.
   c) All areas within 100 metres of the high tide mark. Note that tidal estuaries should not be counted as part of the coast, but sea harbours should.

For orientation, it is recommended that ETERPAN[fi] -MD is installed vertically at all times. However, in certain instances, such as installation of spandrel panel, parapet or where height is 1200mm or less, horizontal fixing is permitted. Please consult your local dealer or Eternit Asia Panels Technical Department for specific installation requirements.

While installing, one should ensure that the joints are correctly located at specific locations and the board edges are fully supported with consideration of movement control joints.

It is important to construct staggered vertical joints in order to minimise the visual effect of any imperfections if sunlight strikes the wall.

4.2 Sealing of ETERPAN[fi] -MD

A layer of sealer painted to a distance of 300mm up from bottom edge (front and back) of ETERPAN[fi] -MD used at bottom of the building prior to installation is essential. This provides additional protection against moisture entry when exposed to a wet environment. The task can be done quickly by using a roller or brush while the boards are still stacked on pallets.

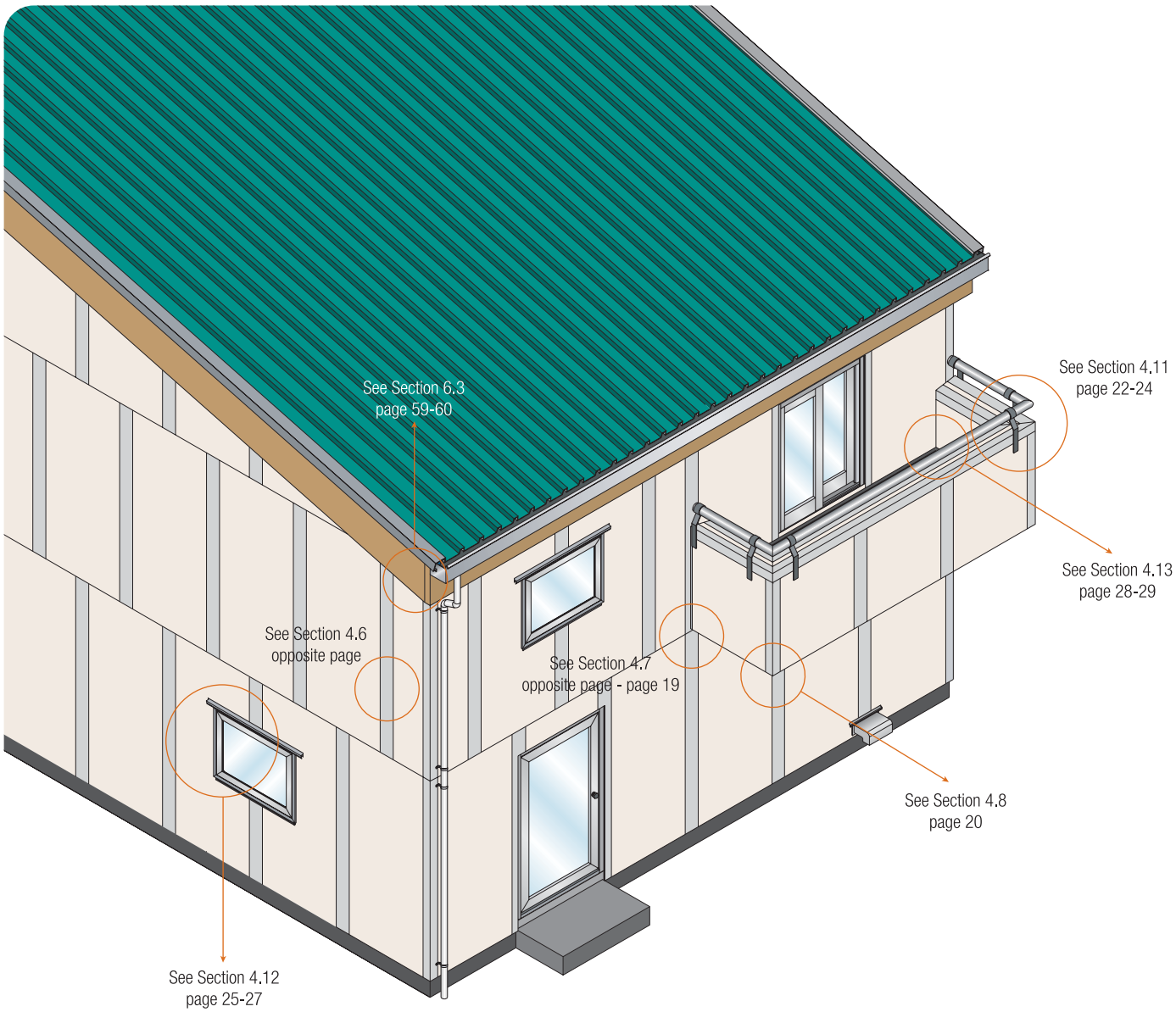
Note that the sealer coating must be compatible with the joint filling compounds and the texture coating system, if any to be applied at a later stage.

4.3 General Installation Considerations

When installing ETERPAN[fi] -MD external wall linings, the following details should be attended to.

- Always install the board over breather-type building paper, building wraps or flexible sarking.
- Treat the framing as required for the type of movement control joint detail being used.
- Avoid using damaged boards during installation for smaller areas.
- Avoid using stained boards as the stain may show through the finished texture.
- Always ensure all cutting or trimming around openings is carried out in a neat and precise manner to ensure the correct fit is maintained.

FIGURE 26 ***Wall cladding general external applications***



4.4 Joints & Junctions Construction

Proper construction for joints and junctions are critical in determining the safety and life span of a building. A range of different types of joints or junctions can be constructed, with or without texture-coated system, some of which are detailed below.

- Flush-stopped Joints
  Generally installed vertically and not designed to accommodate movement. It can be filled with flexible or rigid exterior stopping compound.
- Vertical Movement Control Joints
  Designed to accommodate thermal, moisture and structural movements.
- Horizontal Non-movement & Movement Joints
  The later is designed to accommodate thermal, moisture and structural movements.
- Relief Joints
- Internal & External Corners
- Butt Joints with Other Materials
- Openings for Windows, Doors etc

4.5 Joint Layout

The layout of joints should be planned in advance to ensure that framing is set out to suit the board size and that the joints (be they for movement control, inter-storey etc) are located in the right positions. This will helps to minimise the number of joints and board wastage.

Care should be taken that no joints are to be located directly above the jamb of window openings unless it is constructed as a movement control joint. We would recommend that the joint is to be located at least 150-200mm in from the jamb, in order to stay away from any area with great stress.

4.6 Non-movement Joints

Generally, flush-stopped joints are known as non-movement joints. During installation, it is recommended that ETERPAN[fi] -MD is firmly joined without gap:

ETERPAN[fi] -MD with rebated or tapered edge finishing should be used when constructing flush-stopped joints. Should the product be cut on site, applying new tapered edges must be performed prior to installation.

Also, it is recommended that when ETERPAN[fi] -MD boards are fixed horizontally, vertical joints should be staggered. Should the installed structure connect to an existing wall element, such as a masonry wall, block wall, etc., a gap of at least 8mm should be provided between ETERPAN[fi] -MD and the existing wall element to allow for a movement control joint.

4.7 Movement Control Joints

It is common for movement to occur on all built structures. Types of movement are as follow.

i) Thermal movement due to temperature changes. All materials expand and contract as external temperatures rise and fall.

ii) Moisture movement due to shrinkage or expansion. A reversible dimension changes occur in fibre cement board in response to changes in the relative humidity of air, and also for timber if it is used as framing.

iii) Structural movement due to wind and earthquake loadings.

Although ETERPAN[fi] -MD is dimensionally stable, it is however recommended and important to include appropriate movement control joints in order to prevent the bowing, cracking or formation of peaks at joints due to movement of other elements.

Movement control joints are to be constructed both in vertical and horizontal orientations.

4.7.1 Vertical Movement Control Joints

Generally movement control joints are installed at 3 metre centres along the length of wall. In a wall with long length, both relief and vertical movement control joints are recommended such that one is constructed followed by another, at appropriate distance. Also a movement control joint should be used when whenever there is a structural change, for instance the building framing change from concrete slab to timber-framed.

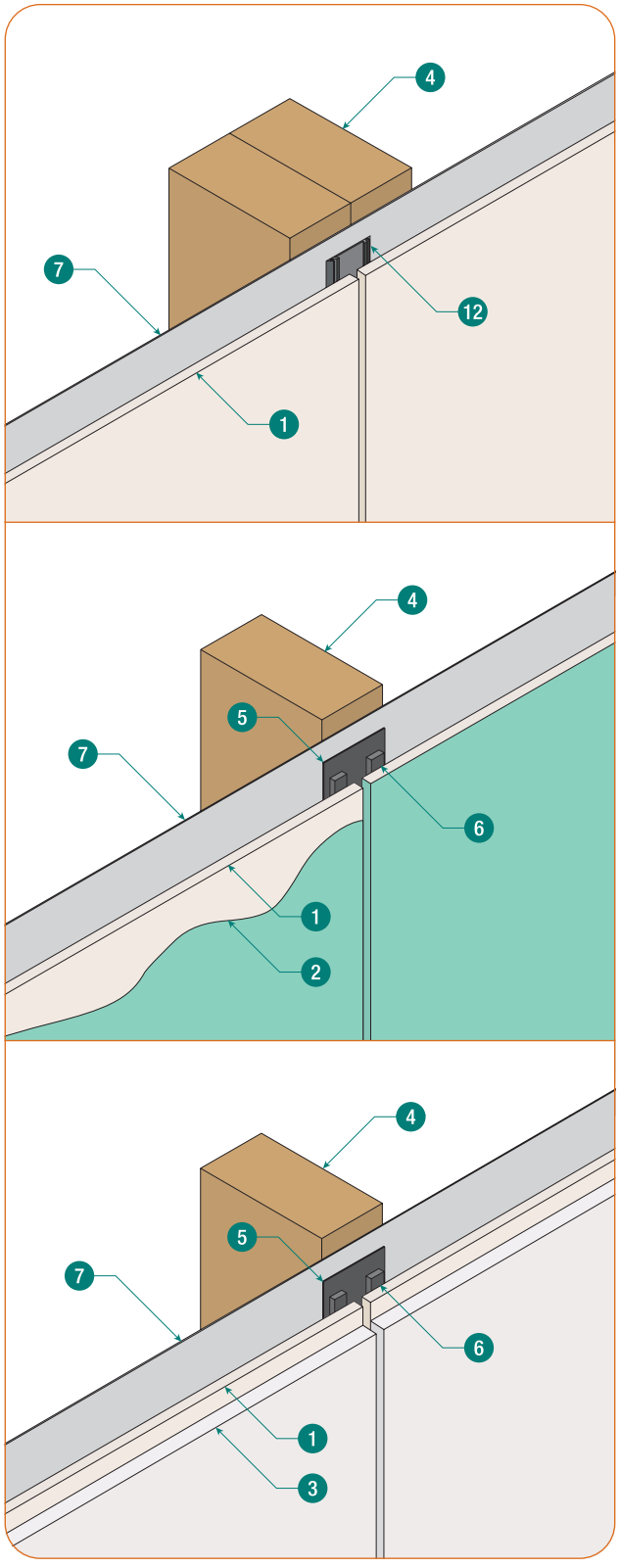
Careful planning of joint locations prior to installation could allow these to be designed to be obscured by other building elements such as water piping to reduce the visual impact in terms of appearance, or to be left intact as part of the design.

A number of options for the construction of movement joints are shown on the next page.

4.7 Movement Control Joints *continued from page 17*

Open-drained Expressed Joints

FIGURE 27 ***Expressed vertical movement control joint***

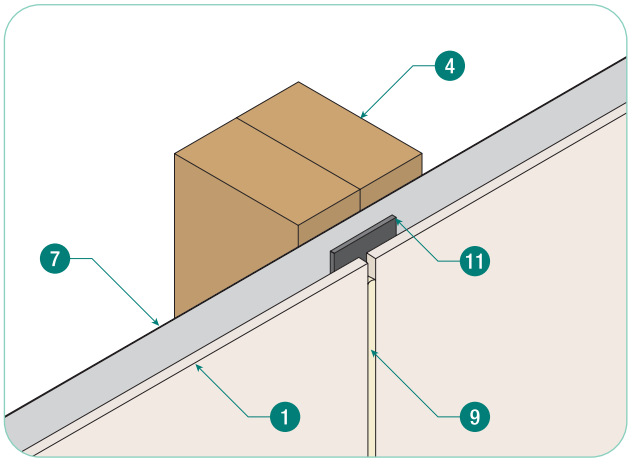


ANNOTATION DETAILS THIS PAGE

1. ETERPAN[fi] -MD with appropriate thickness
2. Proprietary acrylic paint coating
3. Proprietary texture coating
4. Timber or steel framing requirements, according to design
5. Butyl strip
6. Foam tape
7. Building paper
8. PVC jointer
9. Proprietary flexible sealant
10. Proprietary flush jointing material
11. Proprietary backing strip
12. Proprietary sealing strip

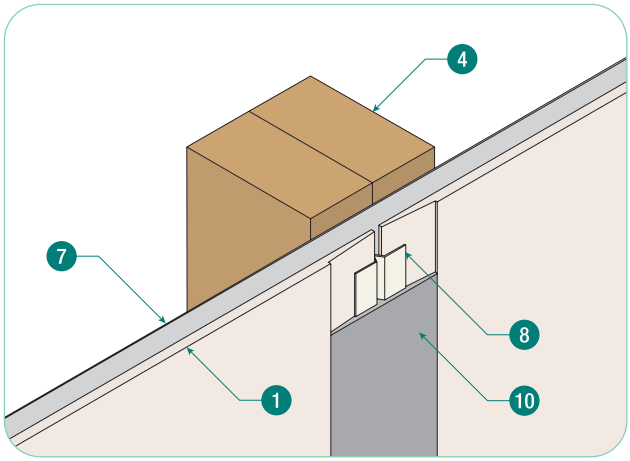
Sealant-filled Joints

FIGURE 28 ***Sealed vertical movement control joint***



Proprietary PVC Inserts

FIGURE 29 ***Proprietary PVC vertical movement control joint***



Joints with Protective Cover Board or Strip

For instructions or more details on joints finishing, please consult your local dealer or Eternit Asia Panels Technical Department.

4.7 Movement Control Joints *continued from opposite page*

4.7.2 Horizontal Movement Control Joints

It is equally important to consider horizontal movement control joints in terms of their location within a structure. For instance, inter-storey joints where ETERPAN[fi] -MD crosses the timber floor joists of the first or subsequent floors. Note that these joists should be located at every floor, or to a maximum distance of 4.8m centres.

It is often that untreated and non kiln dried timber floor joists are installed. These will experience significant shrinkage especially for those deeper than 200mm. Thus, installing horizontal control joints makes allowances for this movement without compromising the weathertightness of the cladding or causing damage to the textured coating.

General requirements for horizontal control joints are different for joints in same plane and overlapping joints. They are as follows:

a) For joints in the same plane:

- Provide a gap of at least 8mm between the ends of the boards to allow for joist shrinkage.
- Incorporate either metal or PVC flashing.
- Protect any sealant from direct exposure to weather.
- Create a drip edge with any decorative trim.
- Fixed decorative trims to the top sheet of ETERPAN[fi] -MD.
- Lap the upper building paper, building wrap or flexible sarking over the flashing upstand.

b) For overlapping joints:

- Provide a cover or overlap of at least 50mm.
- Allow a 6mm anti-capillary gap which also allow for drainage when necessary.
- Do not block the anti-capillary gap with the textured coating, should this be applied at later stage.

The following construction methods for horizontal control joints can be used.

ANNOTATION DETAILS THIS PAGE

1. ETERPAN[fi] -MD with appropriate thickness
2. Building paper
3. Flooring
4. Metal or plastic flashing, with maximum 8mm gap between
5. EPS
6. Sealant filled with joint

FIGURE 30 *Flashed horizontal joints with PVC or metal flashing*

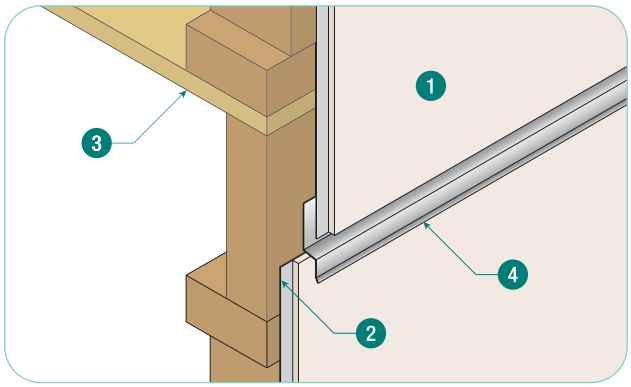


FIGURE 31 *Flashed horizontal joints with PVC or metal flashing behind a planted-on polystyrene or other cover moulding*

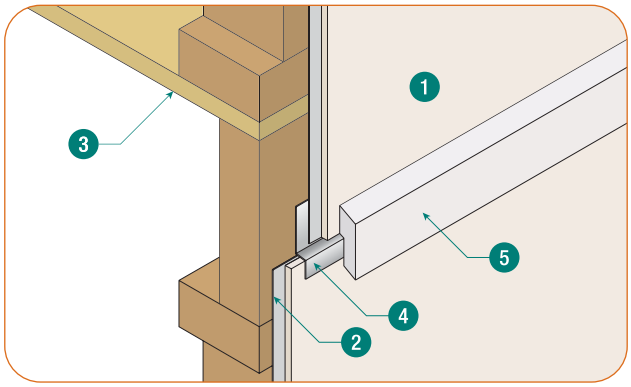


FIGURE 32 *Sealant-filled movement control joint with EPS weather/UV shield*

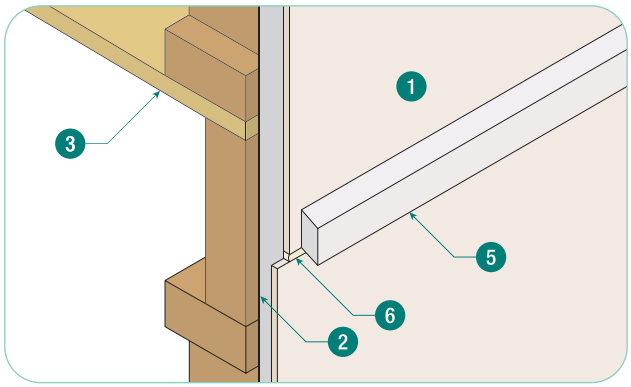
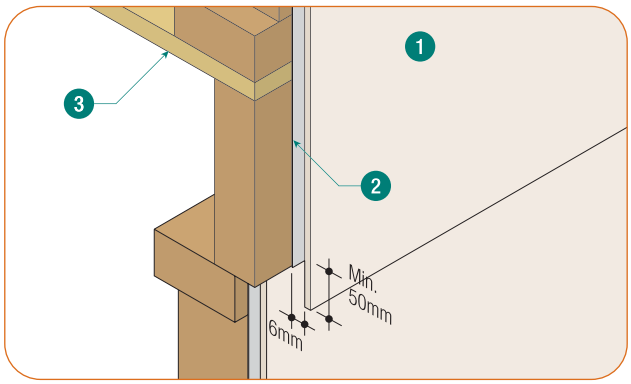


FIGURE 33 *Over-lapped sheets*

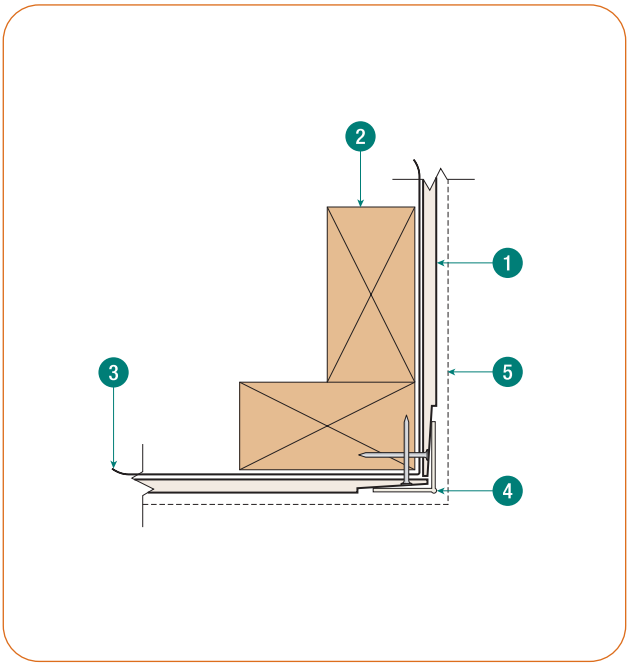


4.8 Corner Treatments

4.8.1 External Corner

i) Use two rebated sheets plus a PVC or stainless steel reinforcing angle, incorporating reinforcing mesh into the stopping compound. See example in picture below.

FIGURE 34 *External corner with reinforcing mesh stopping*



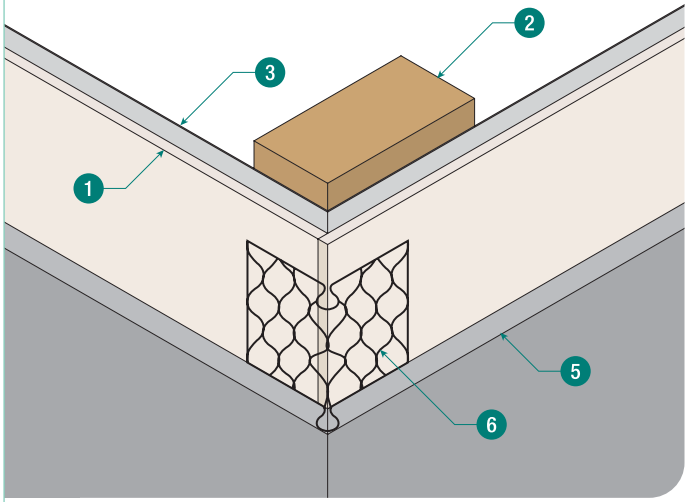
ANNOTATION DETAILS THIS PAGE

1. ETERPAN[fi] -MD with appropriate thickness
2. Timber or steel framing, size according to design
3. Building paper
4. PVC or stainless steel reinforcing angle
5. Proprietary textured coating
6. Reinforcing wire mesh
7. Back flashing made of butyl, metal or foam tape.

ii) Use two rebated sheets and ensure that any texture coating is reinforced with mesh at the corner.

iii) Close butt square-edged sheets and ensure any texture coating is reinforced with mesh at the corner.

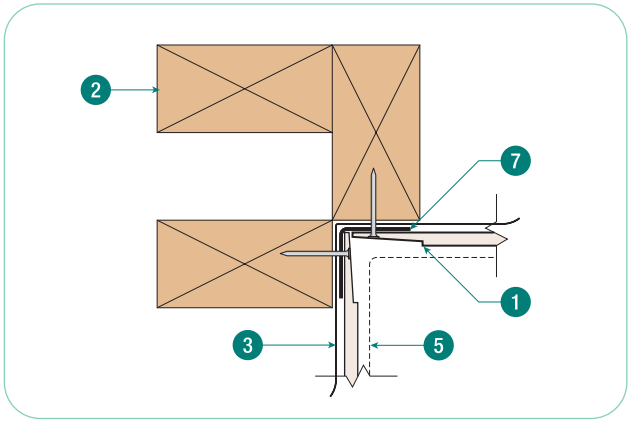
FIGURE 35 *External corner with reinforcing mesh texture coating*



4.8.2 Internal Corner

A commonly used method is to provide a back flashing, made of either butyl, folded metal or foam tape, behind the ETERPAN[fi] -MD board. The boards are then installed with rebated edges into the corner and allow a maximum 2mm gap between the boards.

FIGURE 36 *Internal corner with back flashing*



For more details please refer to Section 5.1, page 30.

4.9 Junctions

ETERPAN[fi] -MD is often installed in a position where it is connected with other materials such as timber, masonry, concrete block, stucco, exterior finishing systems and etc. Junctions such as these must be detailed carefully to prevent water from penetrating through the joint.

For more details on installation of such junctions, please consult your local dealer or Eternit Asia Panels Technical Department.

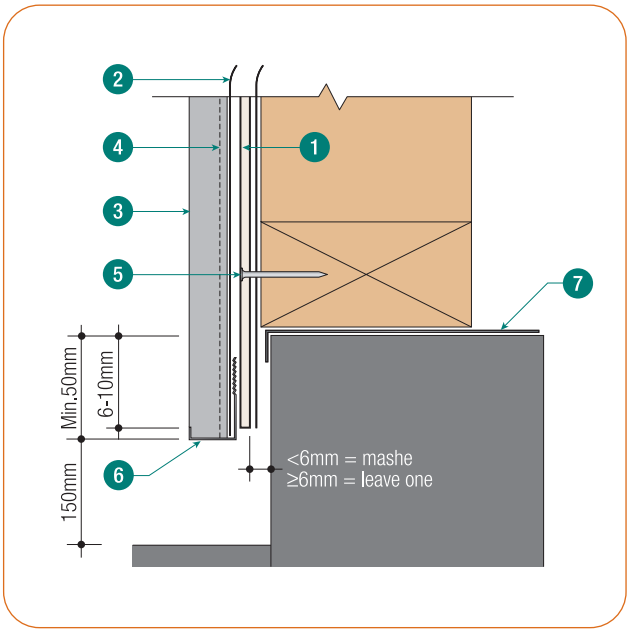
4.10 Bottom Treatment for ETERPAN[fi] -MD

The bottom edge of the ETERPAN[fi] -MD must be protected from moisture uptake and thus be designed to:

- Prevent capillary moisture uptake by spacing ETERPAN[fi] -MD off the structure to provide an air gap behind the bottom of the board.
- Provide an edge for surface water to drip off the cladding and be prevented from migrating into the structure by capillary action, gravity or wind pressure.
- Allow surface water to drain.
- Allow access to the edge for future maintenance of the textured coating, if necessary.
- Have flashing correctly applied.
- Ensure the bottom edge of the material is coated when texture coating system is applied.

The most common method by far is placing a strip of sealed cell foam or applying sealant to the bottom edge of the back of the board prior to installation.

FIGURE 37 ***Anti-capillary gap***



ANNOTATION DETAILS

1. ETERPAN[fi] -MD with appropriate thickness
2. Building paper
3. Solid plaster 21mm
4. Mesh reinforcing spaced off ETERPAN[fi] -MD approx. 10mm
5. Galvanised steel clout 40mm x 2.5mm
6. Drip bead
7. Damp proof course

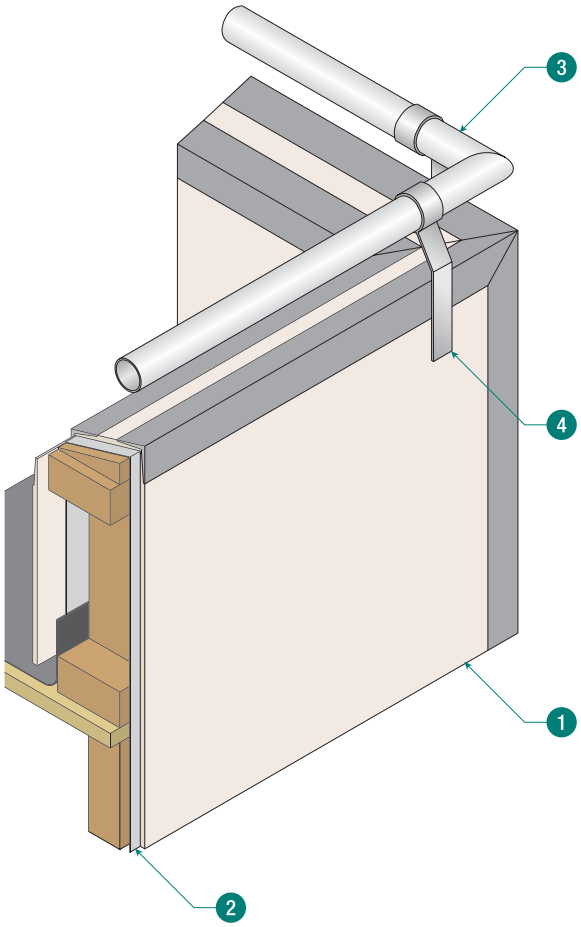
Ground clearances should always be considered. When in contact with soil, the ground moisture may be absorbed by the ETERPAN[fi] -MD board and creates the risk of fungal attacking or affecting the internal framing.

Furthermore, blistering and peeling of coatings are possible. See example in picture below.

It is therefore recommended that a ground clearance of at least 150mm should be provided for ETERPAN[fi] -MD cladding systems. This additional ground clearance also allows for termite detection for timber framed walls.

4.11 Parapets & Balcony Walls

FIGURE 38 ***Parapet or balcony wall***



Generally the top of parapets or balcony walls can be constructed in the following manner.

i) Form the top with ETERPAN[fi] -MD board, and texture coat if required. A layer of waterproofing membrane is recommended prior to applying texture coating to the wall, as this will improve the water resistance performance along the top of the balcony or parapet wall, and prevent water ingress to the framing.

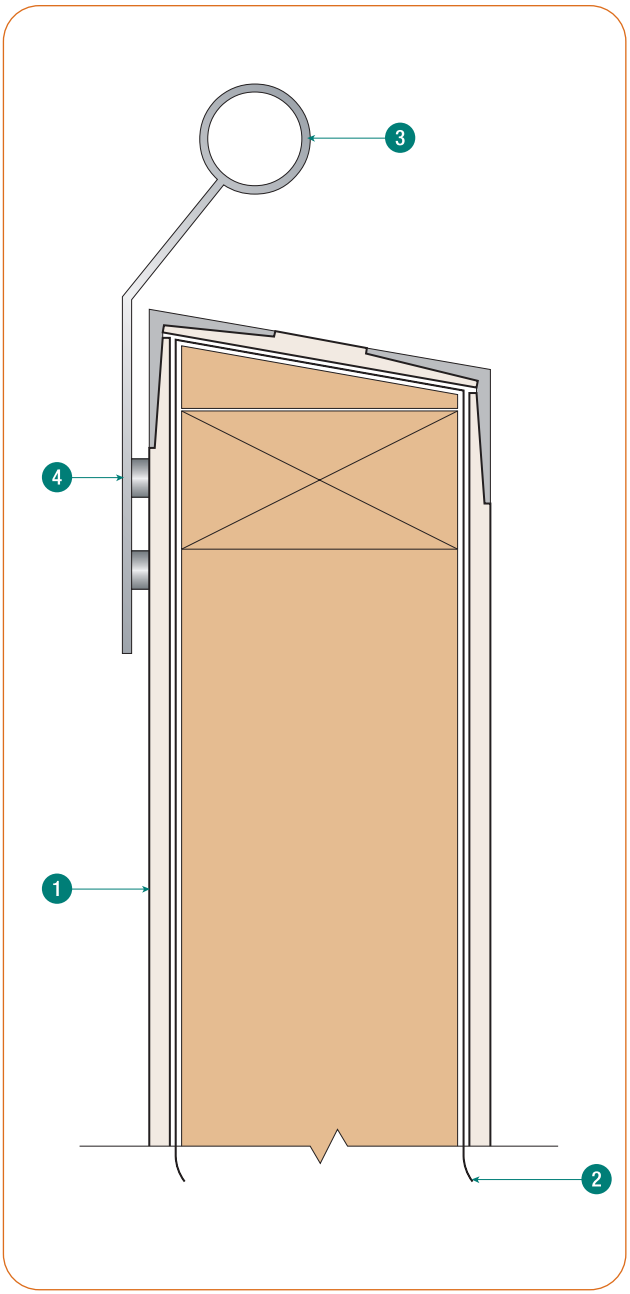
ii) Cover the top with a custom-made flashing.

In the latter case, the flashing should be installed in such a way that it is sloped at least 15° so that the water can drain off easily. Also, there should be no fixings or penetrations through the top of the flashing. Handrails should be mounted on a bracket which is then fixed to the side of the upstand wall, as illustrated in figure on the right.

ANNOTATION DETAILS THIS PAGE

1. ETERPAN[fi] -MD with appropriate thickness
2. Building paper
3. Handrail mounted on bracket
4. Fix into side of upstand

FIGURE 39 ***Parapet or balcony wall with handrail***



4.11 Parapets & Balcony Walls *continued from opposite page*

Detailed here are some common areas where flashings are utilised. Note that most of these details provide drip edges to the lower edges of the vertical sections.

ANNOTATION DETAILS THIS PAGE

1. ETERPAN[fi] -MD with appropriate thickness
2. Building paper
3. Timber studs or structures
4. Flashing, to divert water out from wall
5. Metal flashing upstand
6. Proprietary fixing through sides

FIGURE 40 ***Back-flashed junction between balcony/parapet wall and adjacent wall***

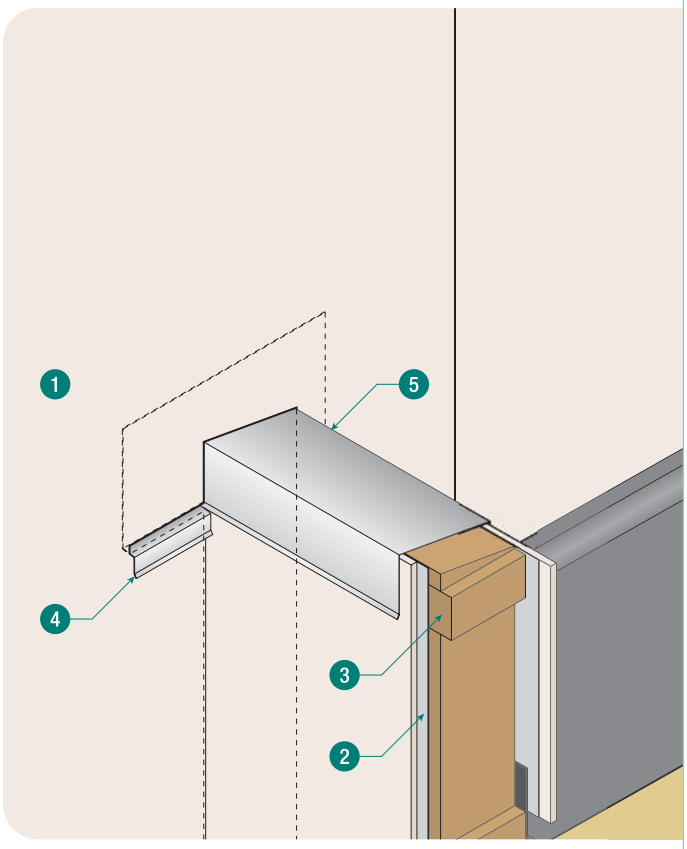
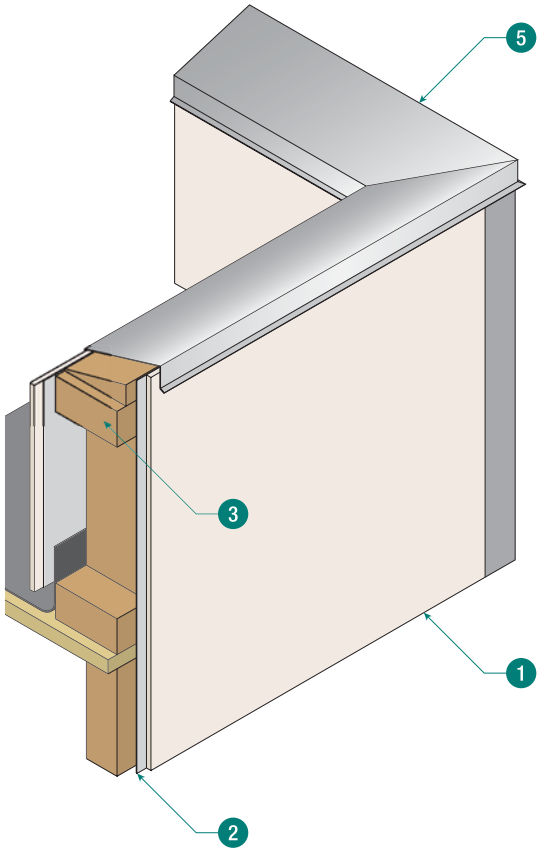
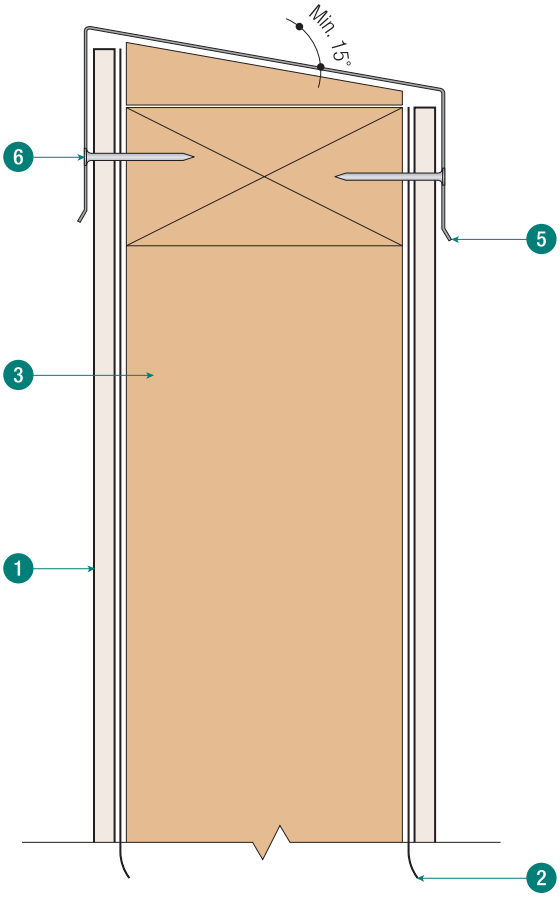


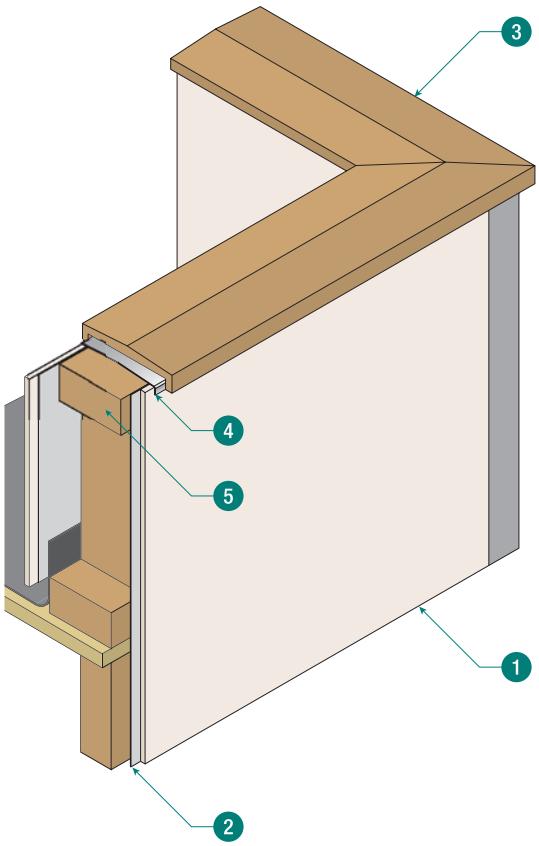
FIGURE 41 ***Flashed parapet or nib***

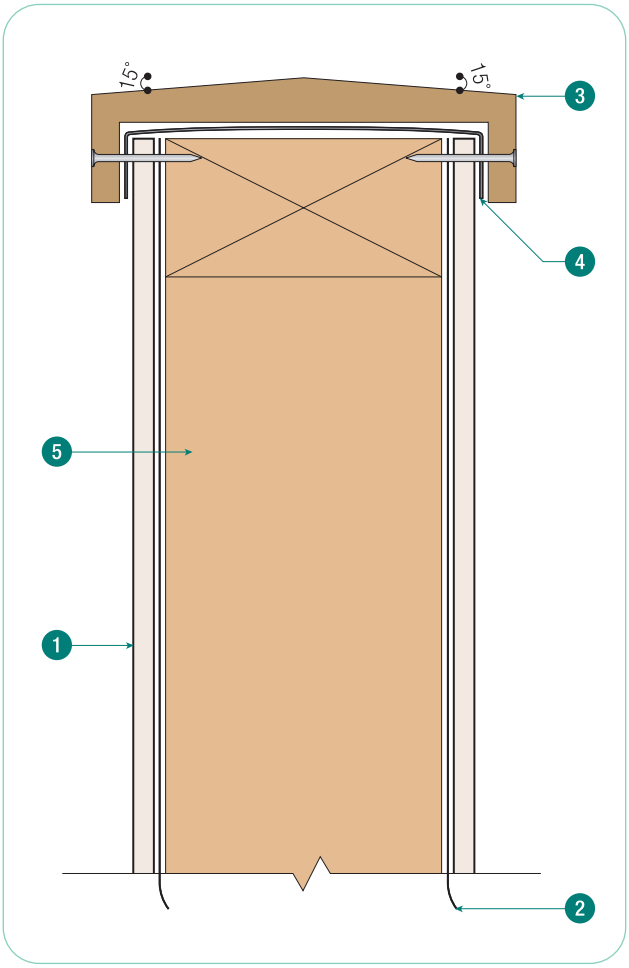




4.11 Parapets & Balcony Walls *continued from page 23*

FIGURE 42 ***Capped parapet wall***





ANNOTATION DETAILS THIS PAGE

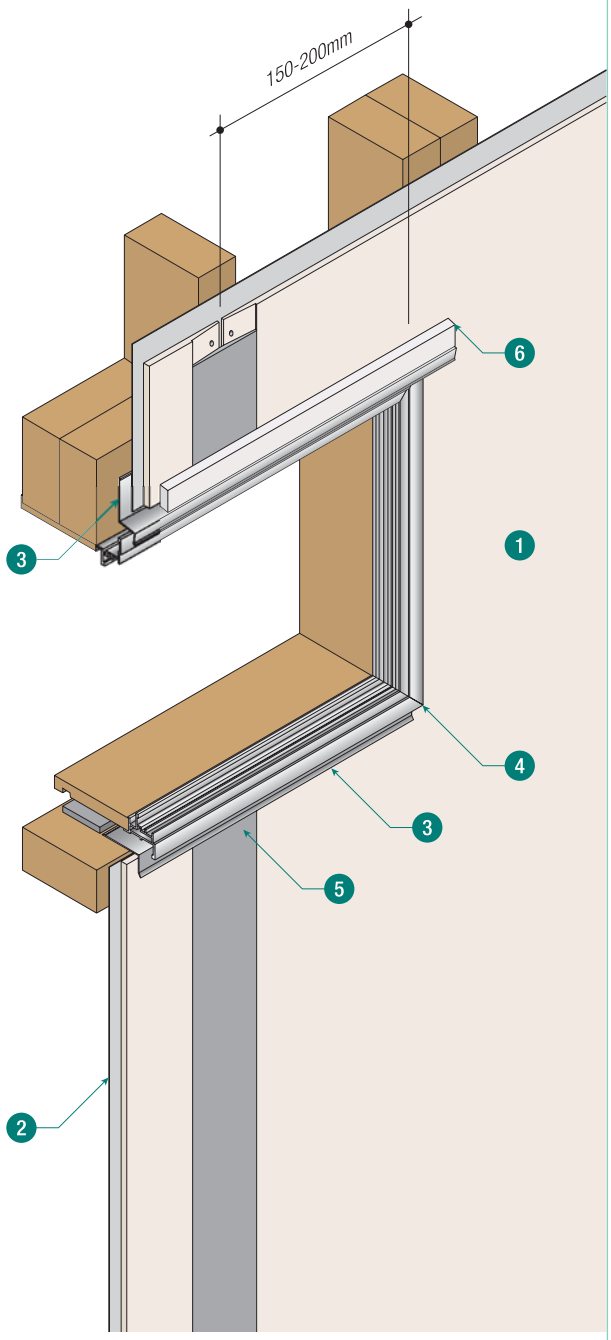
1. ETERPAN[fi] -MD with appropriate thickness
2. Building paper
3. Timber cap with sloped top surface
4. Butyl flashing
5. Timber studs or structures

4.12 Windows & Doors

ANNOTATION DETAILS THIS PAGE

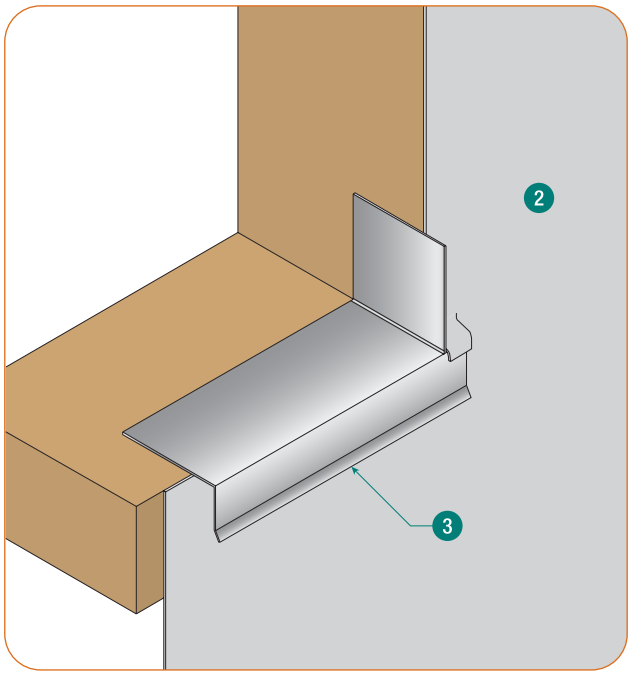
1. ETERPAN[fi] -MD with appropriate thickness
2. Building paper
3. Flashing
4. Timber, uPVC or aluminium window framing
5. Flush joint finishing
6. EPS

FIGURE 43 ***Window openings***



Water penetration around windows and doors has been a common problem in building constructions due to poor design or construction. One simple method to solve the problem is to include back-up elements such as flashing so that any water penetration is caught by the flashing and drained to the outside before causing damage to the building components.

FIGURE 44 ***Flashing at window opening***

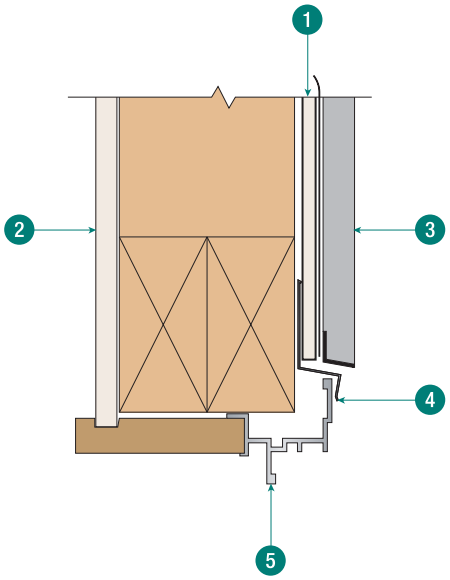


Generally, windows are constructed with either aluminium, uPVC or timber. Aluminium framed windows can be installed as either face fixed, where the flange or facing is installed over the ETERPAN[fi] -MD, or recess fixed, where the window is set back within the reveals. See example in picture below.

4.12 Windows & Doors *continued from page 25*

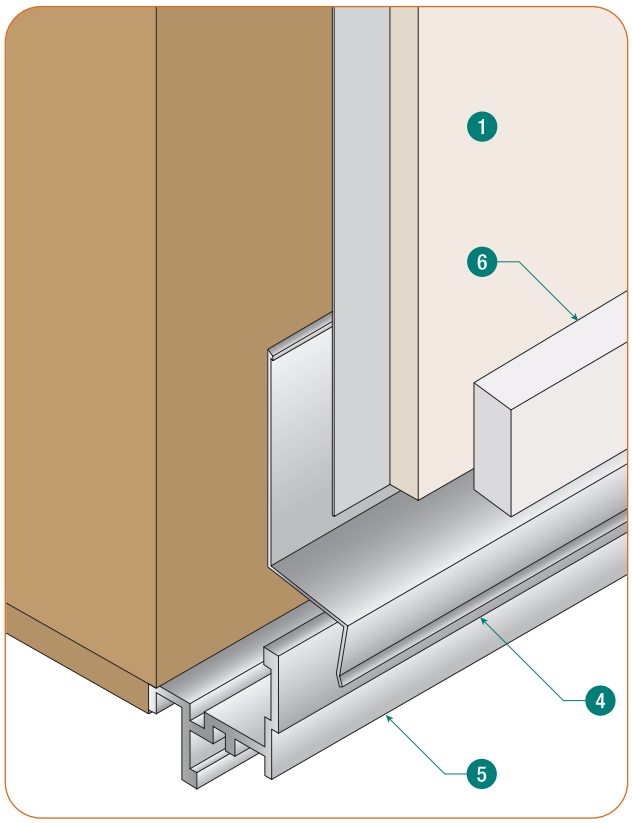
When referring to face fixed aluminium windows, a head flashing that projects a minimum of 15mm past each edge of the window facing or flange should be installed. It is recommended that the front edge at the ends of the flashing be bent slightly to increase protection to the top of the window.

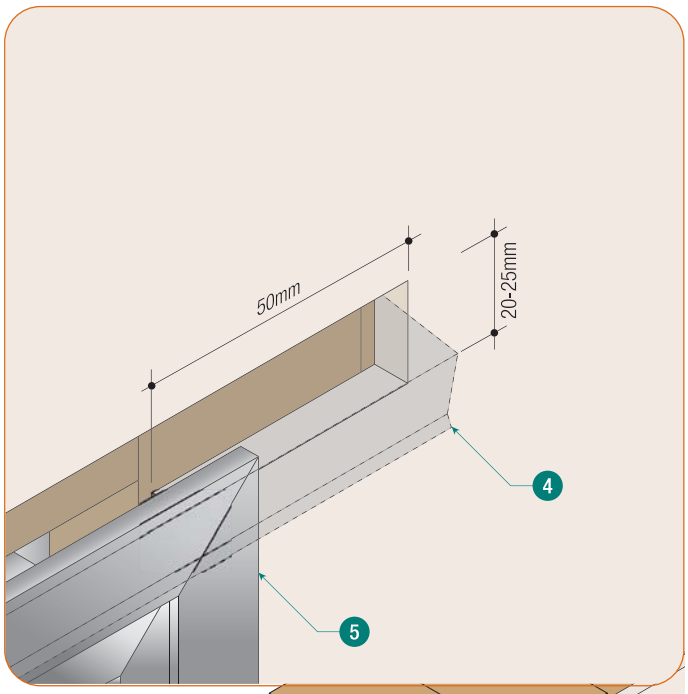
FIGURE 45 ***Head flashing***

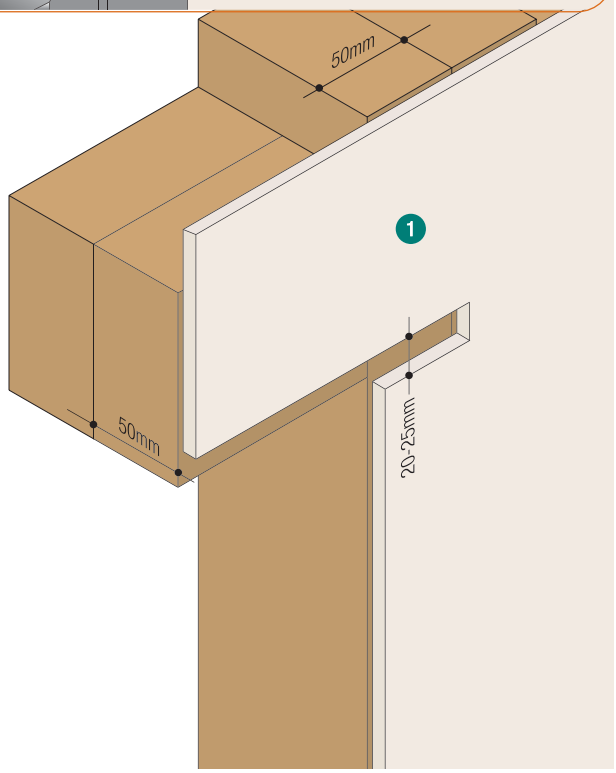


ANNOTATION DETAILS THIS PAGE

1. ETERPAN[fi] -MD with appropriate thickness
2. Interior wall lining
3. Textured coating
4. Plastic or metal flashing
5. Window framing
6. EPS (optional)







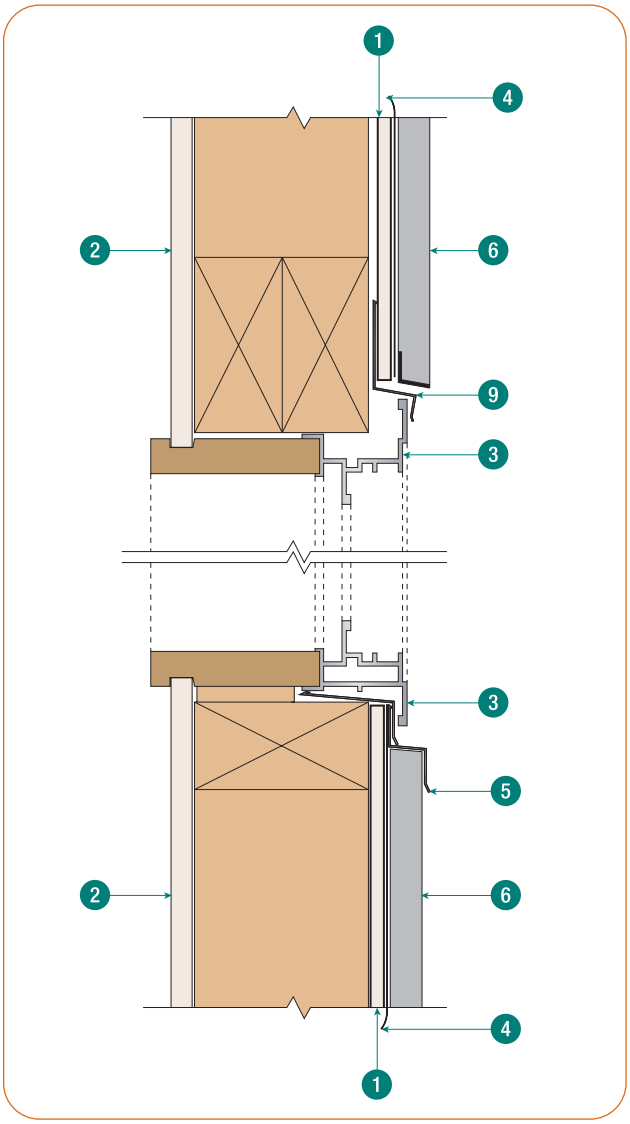
4.12 Windows & Doors *continued from opposite page*

ANNOTATION DETAILS THIS PAGE

1. ETERPAN[fi] -MD with appropriate thickness
2. Internal wall lining
3. Window framing
4. Building paper
5. Cill flashing
6. Textured coating
7. Jamb flashing
8. Proprietary flexible sealant
9. Head flashing

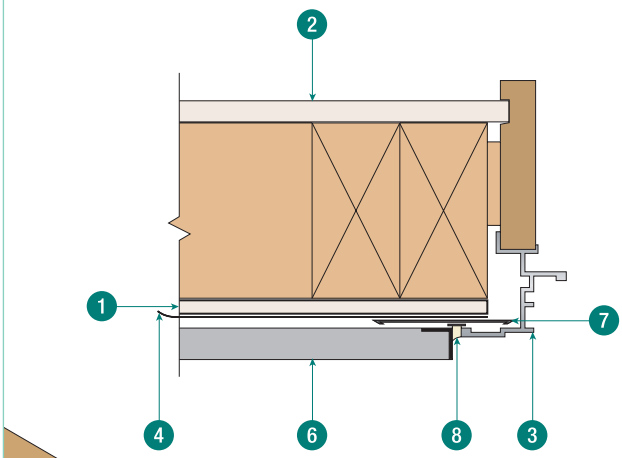
A cill flashing should be installed to collect and discharge water that may enter through the window or door joinery or around the window jambs.

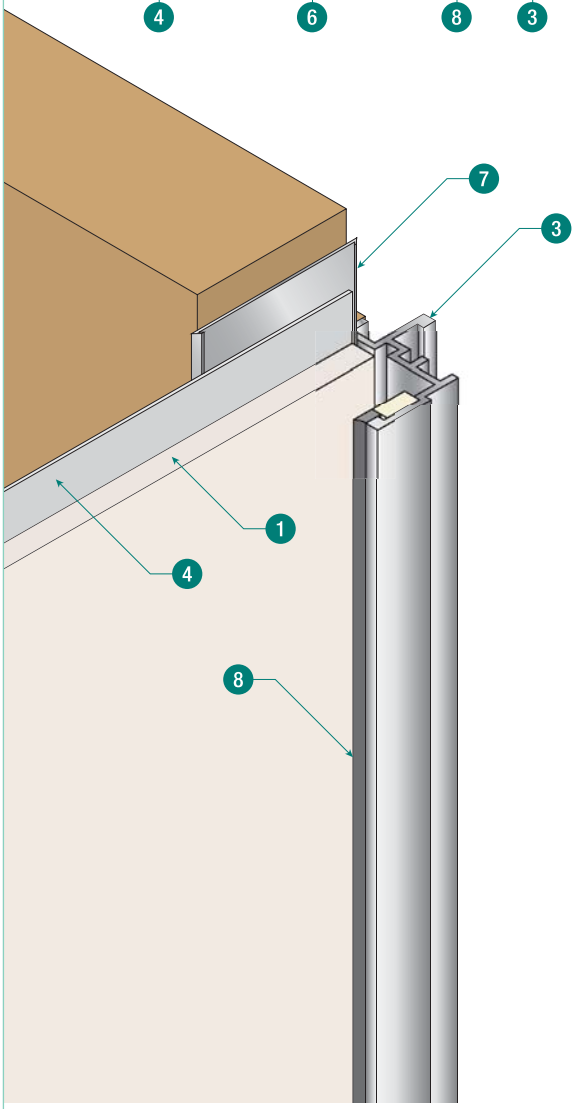
FIGURE 46 ***Head flashing and cill flashing***



As for the window or door jambs, proprietary sealant should be used to seal the jamb facing to ETERPAN[fi] -MD, as illustrated below. Do not seal the cill facing to the cill flashing as it needs to allow water that gets into the joinery system to drain freely.

FIGURE 47 ***Jamb flashing***





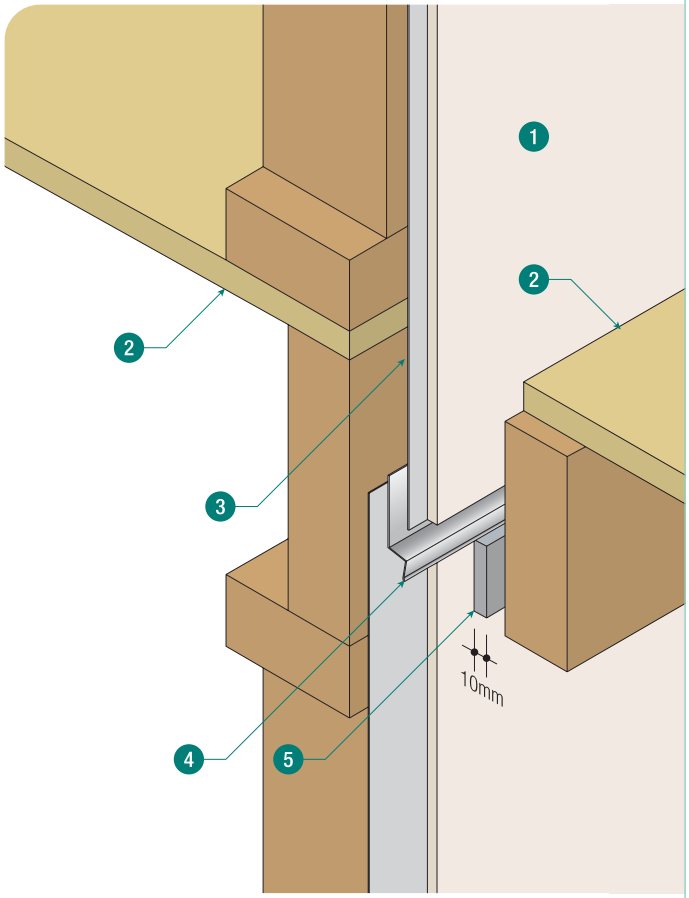
For details about timber-framed windows installation, please consult your local dealer or Eternit Asia Panels Technical Department.

4.13 Other Detailing

In addition, the following areas need careful attention. Note that the following drawings are for illustration purposes only. For more specific details, please consult your local dealer or Eternit Asia Panels Technical Department.

a) Attachment of deck to cladding.

FIGURE 48 ***Timber deck attached to ETERPAN[fi] -MD cladding***

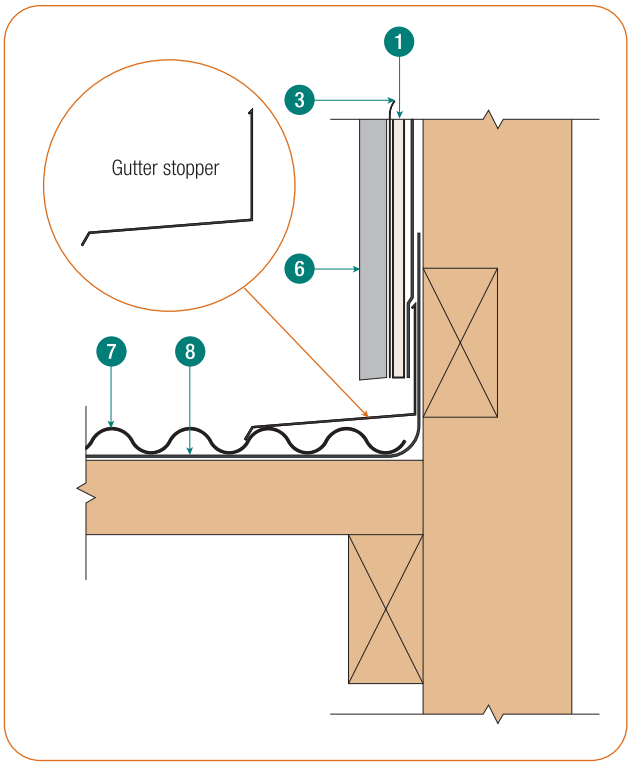


ANNOTATION DETAILS THIS PAGE

1. ETERPAN[fi] -MD with appropriate thickness
2. Internal flooring
3. Building paper
4. Flashing
5. At least 10mm packer (at each fixing)
6. Textured coating
7. Corrugated roofing
8. Apron flashing
9. Water proof membrane for roofing
10. Furring section

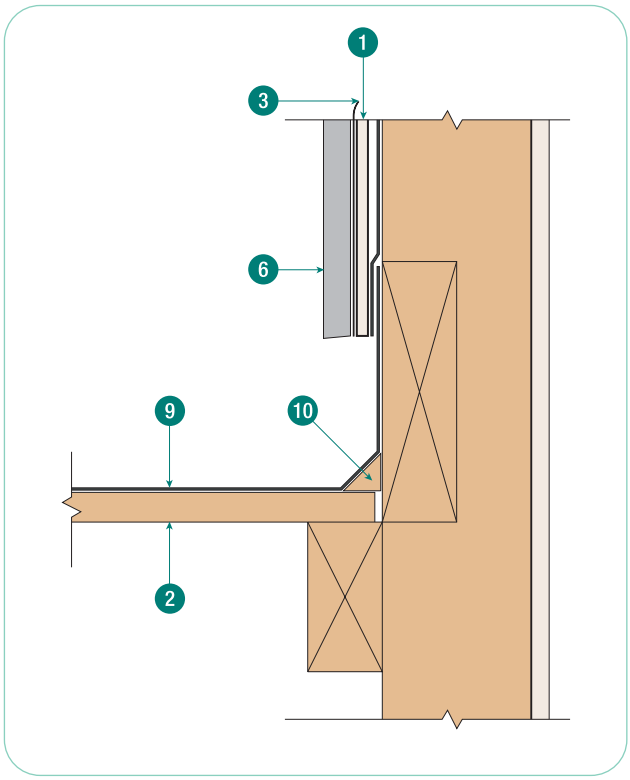
b) The ends of roof apron flashings and the guttering stop end abuts a wall surface.

FIGURE 49 ***Apron flashing***



c) Waterproof deck abuts the bottom of a wall.

FIGURE 50 ***Wall and waterproof deck junction***



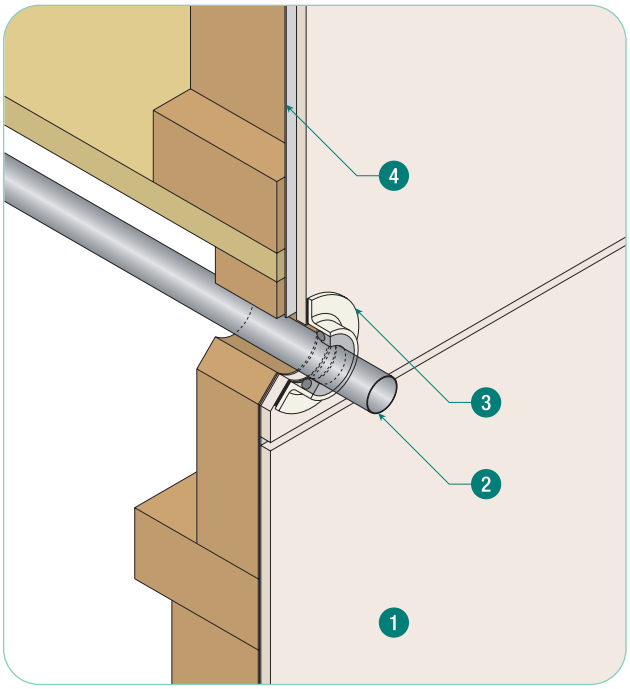
4.13 Other Detailing *continued from opposite page*

ANNOTATION DETAILS THIS PAGE

1. ETERPAN[fi]-MD with appropriate thickness
2. Pipe services
3. Sealing collar
4. Building paper
5. Sealant
6. Ductwork
7. Flashing
8. Pipe brackets

d) Penetrations through the cladding system (below and right).

FIGURE 51 ***Pipe penetrations***



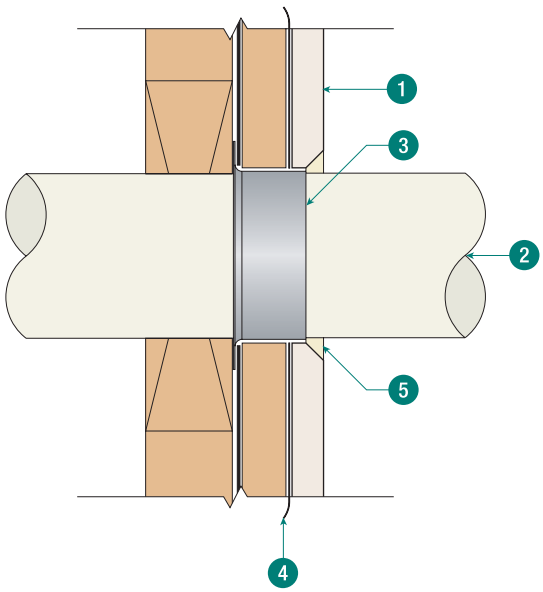
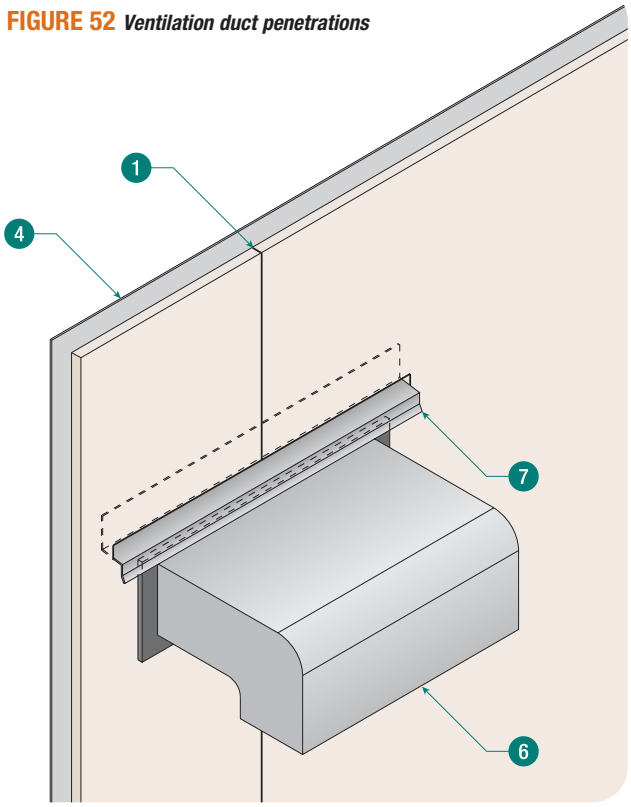
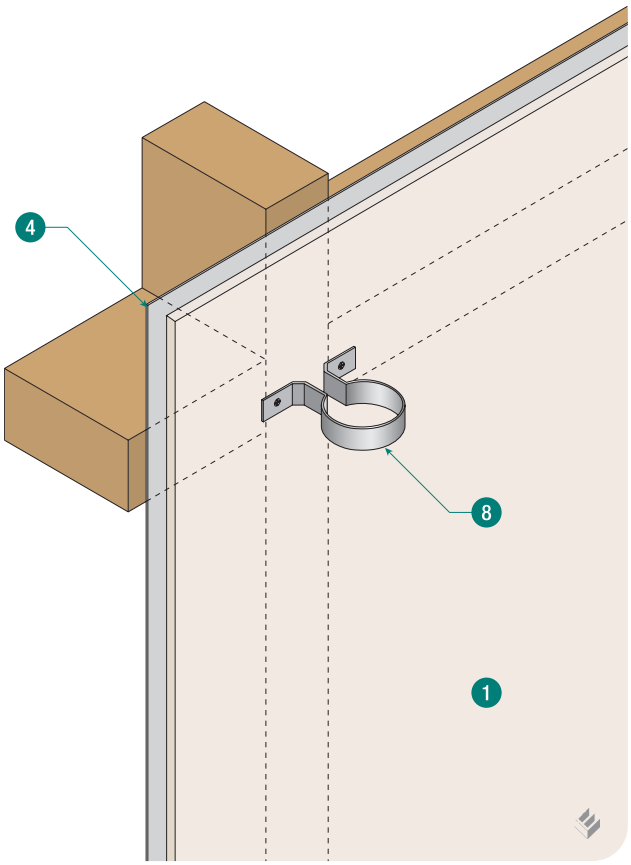


FIGURE 52 ***Ventilation duct penetrations***



e) Attachment of downpipes or other accessories to the building wall.

FIGURE 53 ***Downpipe bracket fixing***

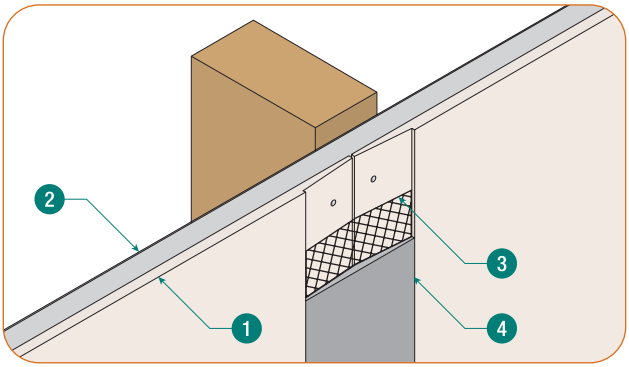


The use of specially developed joint stopping compound on joints except the defined movement control joints, will provide a flat surface on which the texture can be applied later to give a monolithic and aesthetic appearance.

5.1 Joint Stopping

There are essentially two types of jointing compound that can be used; namely acrylic jointing compound and cement-based stopping compound, depending on the installation requirements. Please consult your local dealer or Eternit Asia Panels Technical Department for recommendations. The basic procedures for joint stopping ETERPAN[fi] -MD at equilibrium moisture content condition are as follows.

FIGURE 54 ***Joint stopping system***

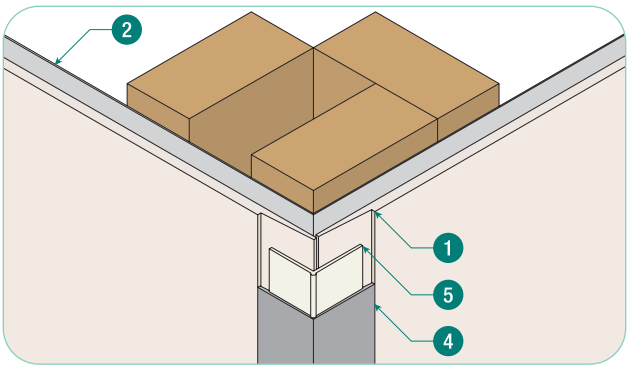


- Apply a layer of compound to fill the rebate and let dry and allow any shrinkage to occur.
- Apply a layer of reinforcing mesh or joint tape to the joint.
- Cover with second layer (mesh coat) of compatible taping or flushing compound.
- Apply a final layer of tape or flushing compound as required once the mesh coat has dried.
- When dried, sand the joint areas using fine sand paper to give a smooth and flat joint surface.

For movement control joints, it is recommended that these be sealed using weatherproof silicone or polyurethane sealants. Prior to the application, it is advisable to provide a bond-breaking (polyethylene) tape to the back of the joint as sealant will accommodate movement better when it is not bonded to the back of the filled joint. Priming of the joint is good practice especially when ETERPAN[fi] -MD has been cut on site. It will ensure the sealant will bond properly to the sheet edge.

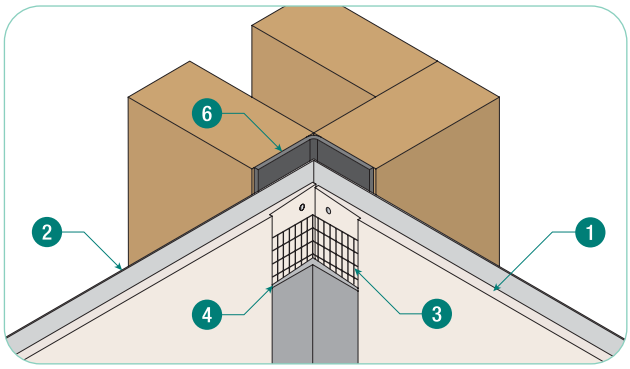
When working external corners of a building, it can be flush stopped by installing a plastic or stainless steel corner reinforcing angle vertically up the corner and cover with stopping compound, as shown in figure below.

FIGURE 55 ***Plastic or stainless steel corner angle installed prior to stopping***



For internal corners, they are formed using boards having rebated edge that is then filled and reinforced as for a straight joint. Note that the reinforcing mesh must be formed around the corner.

FIGURE 56 ***Internal corner stopping***



ANNOTATION DETAILS THIS PAGE

1. ETERPAN[fi] -MD with appropriate thickness
2. Building paper
3. Reinforcing wire mesh
4. Joint stopping compound
5. Plastic or stainless steel corner angle
6. Back flashing

5.2 Texture Coating System

There is a wide variety of texture coating system available in the market, ranging from acrylic or polymer based to polymer-modified cement based plasters. Preparation and application of texture coating may be different from each manufacturer, as well as their requirements. Thus, it is advisable to obtain advice from the manufacturer or supplier prior to commencing application of the coating.

When ETERPAN[fi] -MD is used in conjunctions with texture coating, the claddings provide the following features:

- A lightweight cladding with a monolithic appearance.
- A wide range of colour and texture options.
- A substrate which is relatively stable and resistant to moisture and insect damage.
- A wide range of shaped decorative accessories that can be adhered, after having all surfaces sealed or plastered, to the wall prior to coating/texturing.
- Cost effectiveness.

Over the years ETERPAN[fi] -MD has been successfully used in conjunction with many joint stopping/textured coating and most have proven to be compatible. For recommendations of appropriate components, please consult your local supplier or Eternit Asia Panels Technical Department.

6.1 ETERPAN[fi] -MD Backing Board for Solid Plastering

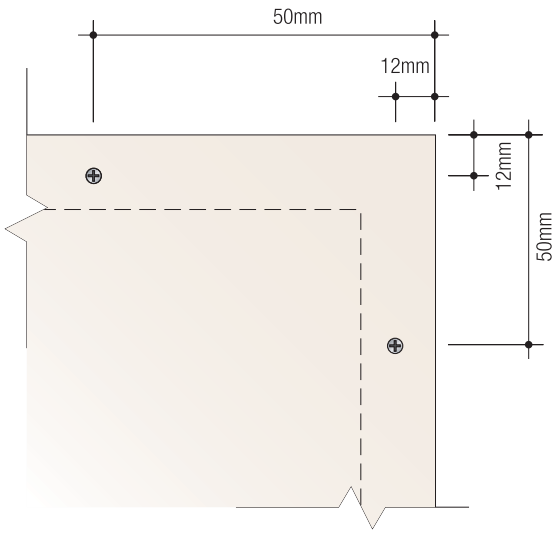
This installation method utilising a board thickness of 4.5mm as backing board and cover with reinforcing mesh and solid plaster. Details are further illustrated in the following pages.

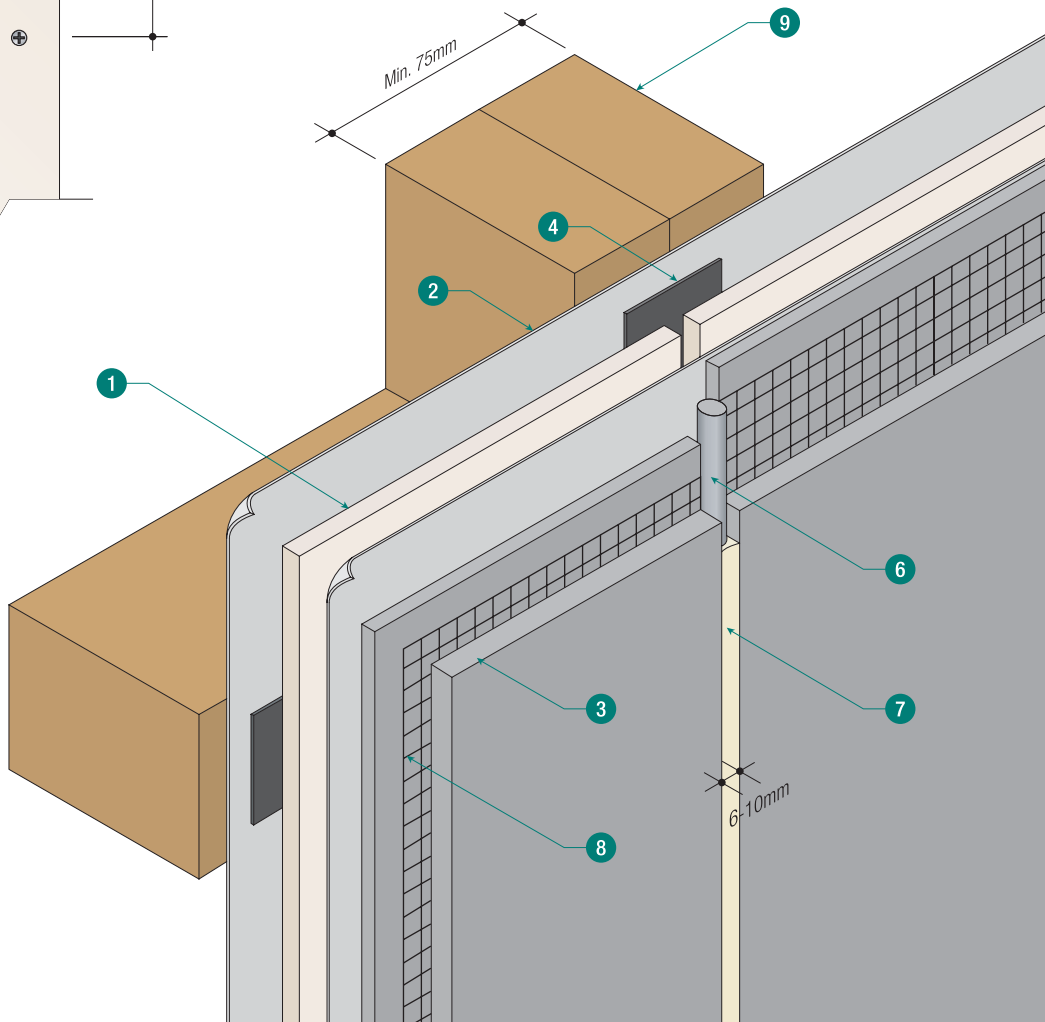
FIGURE 57 ***Solid Plastering general arrangement and vertical joint***

1. ETERPAN[fi] -MD 4.5mm thick
2. Building paper
3. Solid plaster
4. Foam tape 50mm x 1.5mm
5. Galvanised steel nails 40mm x 2.5mm
   Distance from edge 12mm
   Maximum centres 200mm
   Distance from corner 50mm
   See note (5) in Section 4.1, **page 15**
6. Polyethylene backing rod
7. Polyurethane flexible sealant
8. Mesh reinforcing spaced approx. 10mm off ETERPAN[fi] -MD
9. Timber framing

NOTE: Vertical control joints for solid plastering are required at maximum 4m centres, however the ETERPAN[fi] -MD board joint does not need to be coincident with the control joint. Control joint can be cut after solid plastering.

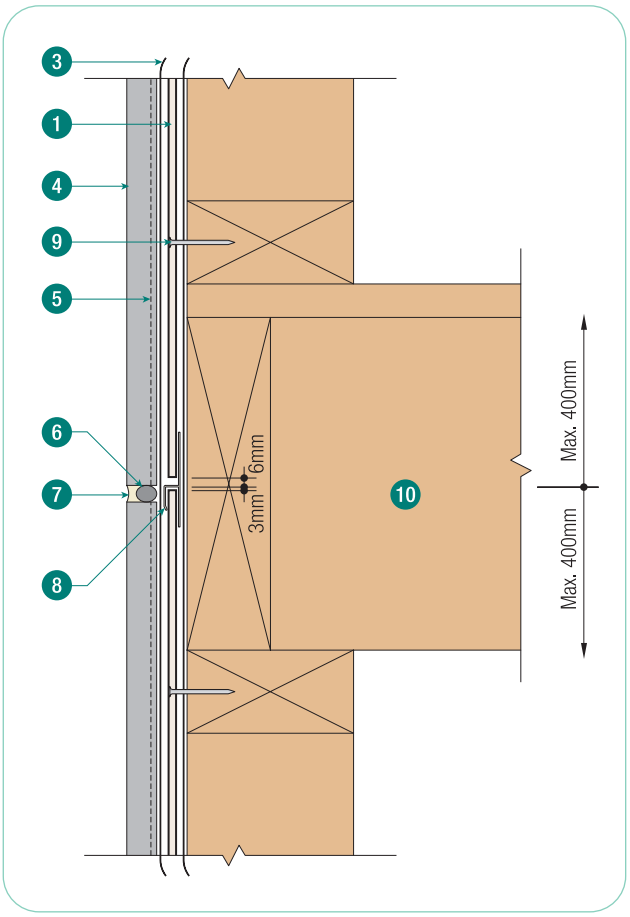
Corner detail of fixing





6.1 ETERPAN[fi]-MD Backing Board for Solid Plastering *continued from page 31*

FIGURE 58 ***Solid plastering - Horizontal control joint***



ANNOTATION DETAILS THIS PAGE

1. ETERPAN[fi]-MD 4.5mm thick
2. Foam tape 50mm x 1.5mm
3. Building paper
4. Solid plaster
5. Mesh reinforcing spaced off ETERPAN[fi]-MD approx. 10mm
6. Polyethylene backing rod
7. Polyurethane flexible sealant
8. Relief or control joint high build coating
9. Galvanised steel nails 40mm x 2.5mm
   Distance from edge 12mm
   Maximum centres 200mm
   Distance from corner 50mm
   See note (5) in Section 4.1, **page 15**
10. Timber framing

FIGURE 59 ***Solid plastering - Expansion joint***

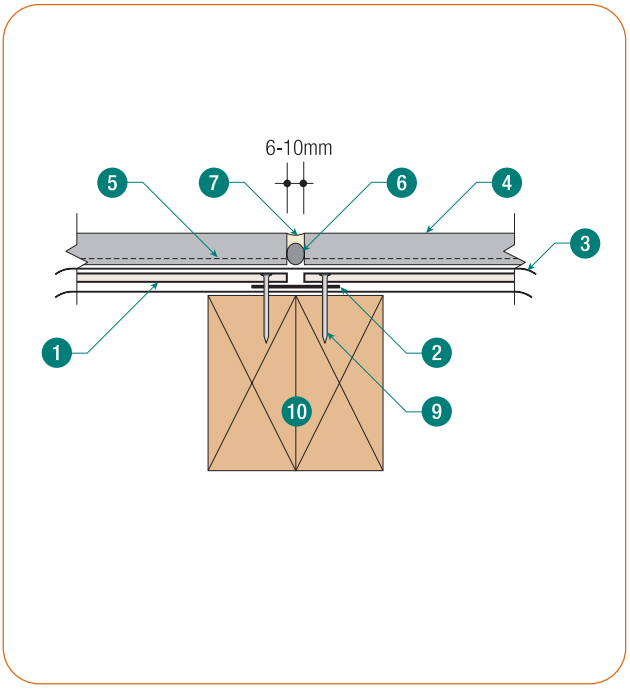
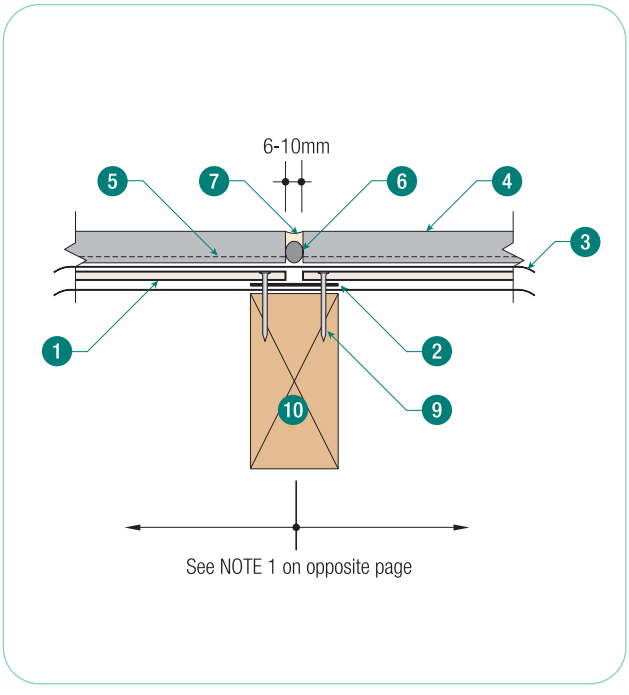


FIGURE 60 ***Solid plastering - Vertical control joint***



6.1 ETERPAN[fi] -MD Backing Board for Solid Plastering *continued from opposite page*

FIGURE 61 ***Solid plastering - Fixing lath to board***

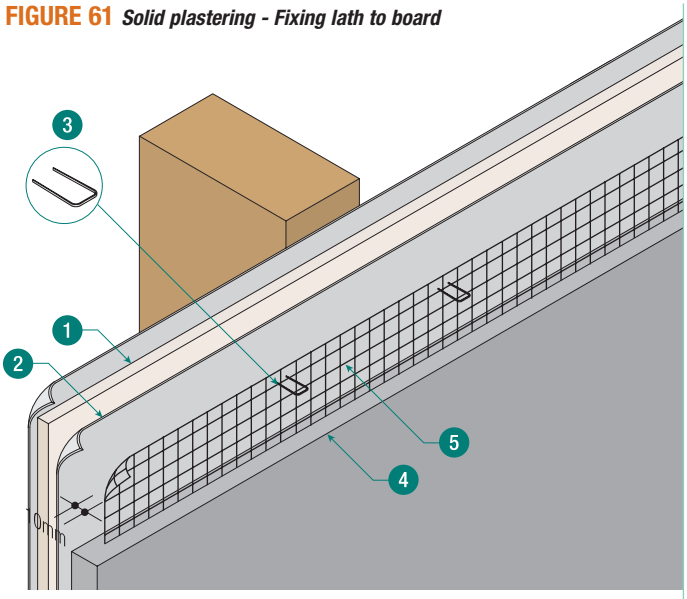


FIGURE 62 ***Solid plastering - Control joint***

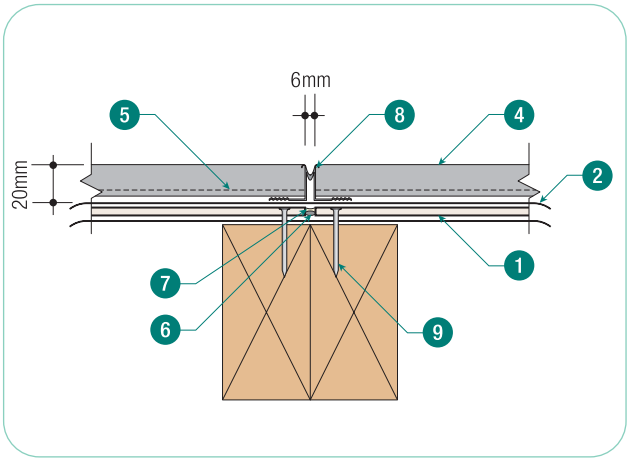
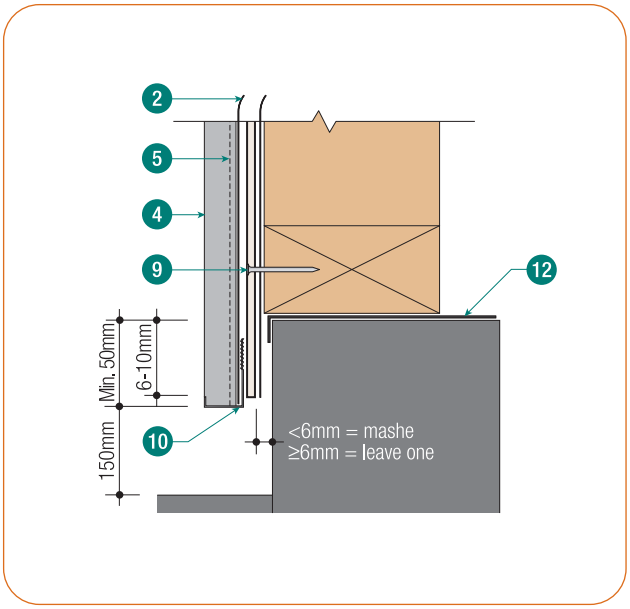


FIGURE 63 ***Solid plastering - Drip bead***

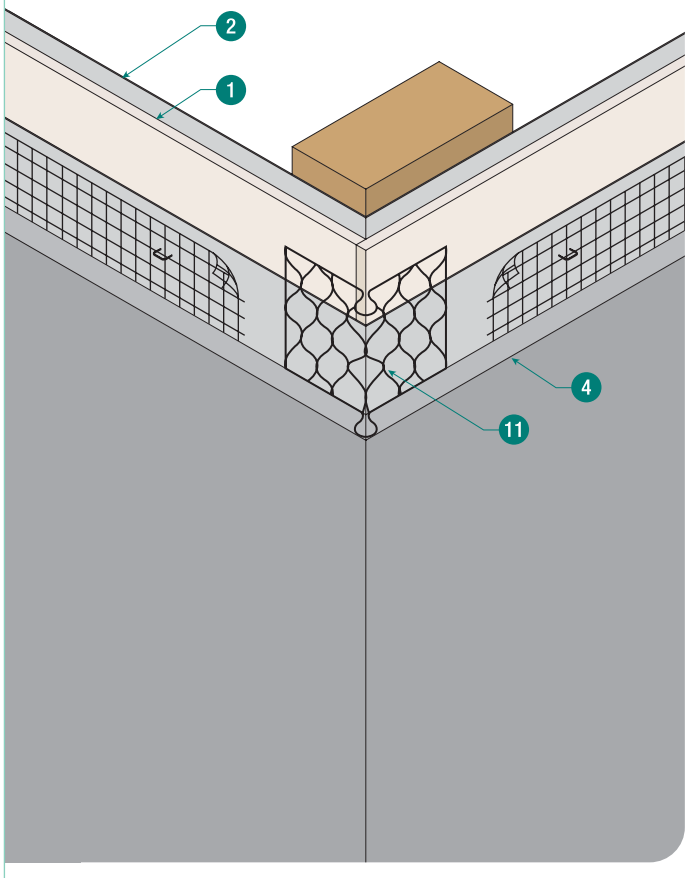


ANNOTATION DETAILS THIS PAGE

1. ETERPAN[fi] -MD 4.5mm thick
2. Building paper
3. Staples or fixings minimum 35mm length
4. Solid plaster
5. Mesh reinforcing spaced off ETERPAN[fi] -MD approx. 10mm
6. Polyethylene backing rod
7. Polyurethane flexible sealant
8. Galvanised control joint e.g. Keene XJ15-3
9. Galvanised steel nails 40mm x 2.5mm
   Distance from edge 12mm
   Maximum centres 200mm
   Distance from corner 50mm
   See note (5) in Section 4.1, **page 15**
10. Drip bead
11. Proprietary angle bead
12. Damp proof course

NOTE: Dimension from permanently paved ground to height of finished floor level to be 150m, and for unpaved ground to be 225mm.

FIGURE 64 ***Solid plastering - External corner***



6.1 ETERPAN[fi]-MD Backing Board for Solid Plastering *continued from page 33*

FIGURE 65 ***Solid plastering - Aluminium window head***

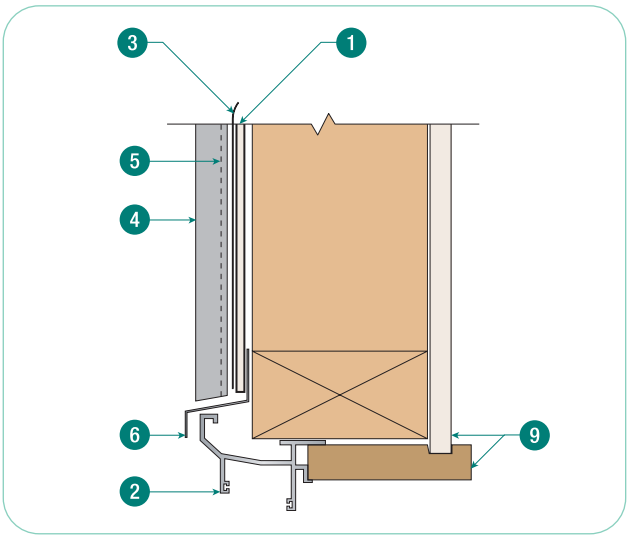


FIGURE 66 ***Solid plastering - Aluminium window jamb***

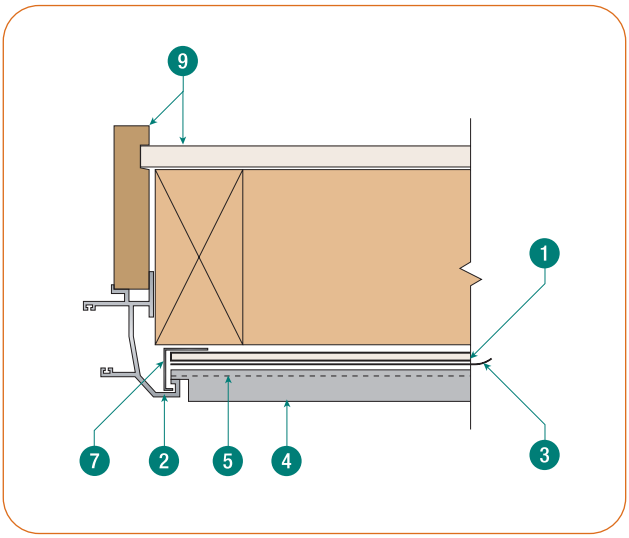
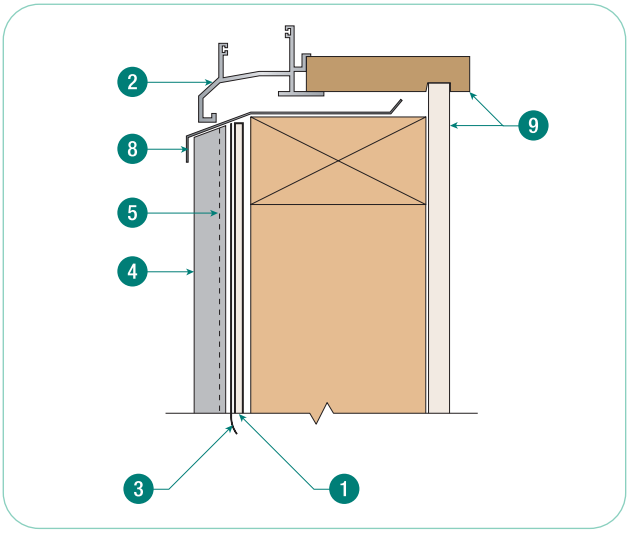


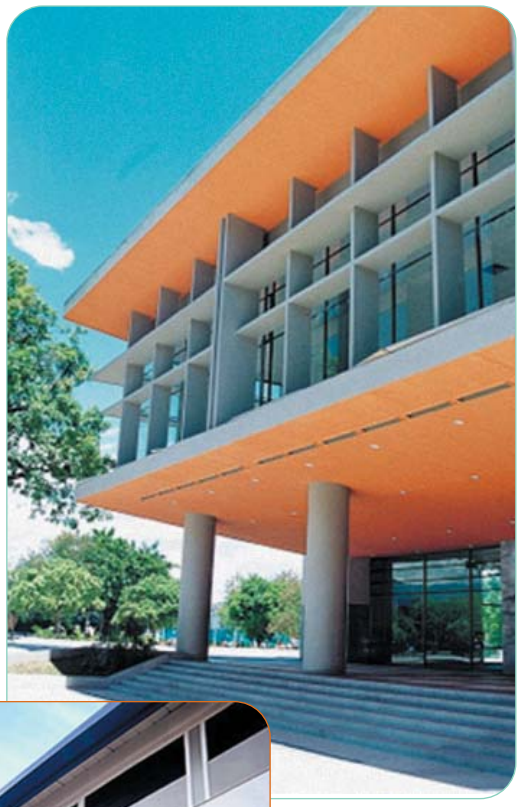
FIGURE 67 ***Solid plastering - Aluminium window cill***



ANNOTATION DETAILS THIS PAGE

1. ETERPAN[fi]-MD 4.5mm thick
2. Proprietary aluminium window joinery
3. Building paper
4. Solid plaster
5. Mesh reinforcing spaced off ETERPAN[fi]-MD approx. 10mm
6. Head flashing behind ETERPAN[fi]-MD and extended past plaster
7. Jamb flashing behind ETERPAN[fi]-MD and behind window reveal
8. Cill flashing to extend past jamb flashing
9. Jamb liner and internal lining

NOTE: It is not advisable to rely on sealants in lieu of jamb flashings. We recommend the use of flashing at all times so as not to rely solely on the performance of sealants.



6.1 ETERPAN[fi] -MD Backing Board for Solid Plastering *continued from opposite page*

ANNOTATION DETAILS THIS PAGE

1. ETERPAN[fi] -MD 4.5mm thick
2. Timber window joinery
3. Building paper
4. Solid plaster
5. Mesh reinforcing spaced off ETERPAN[fi] -MD ar approx. 10mm
6. Head flashing behind ETERPAN[fi] -MD
7. Jamb flashing behind ETERPAN[fi] -MD
8. Cill flashing to extend past jamb flashing
9. Jamb liner and internal lining

NOTE: It is not advisable to solely rely on sealants in lieu of jamb flashings. We recommend the use of flashing at all times so as not to rely on the performance of sealants.

FIGURE 68 ***Solid plastering - Timber window head***

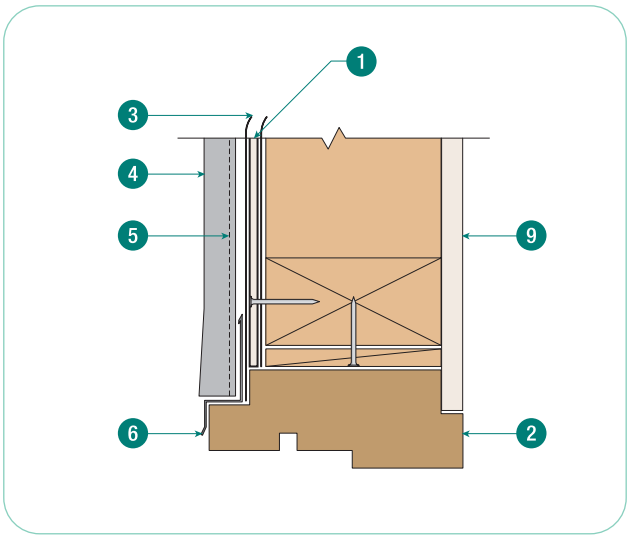


FIGURE 69 ***Solid plastering - Timber window jamb***

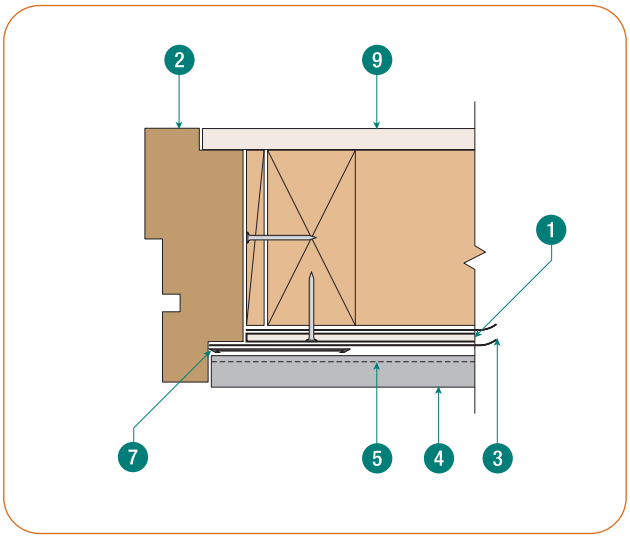
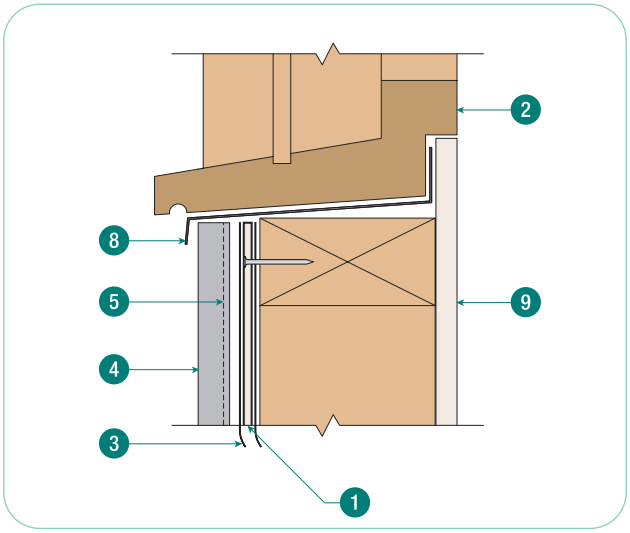


FIGURE 70 ***Solid plastering - Timber window sill***



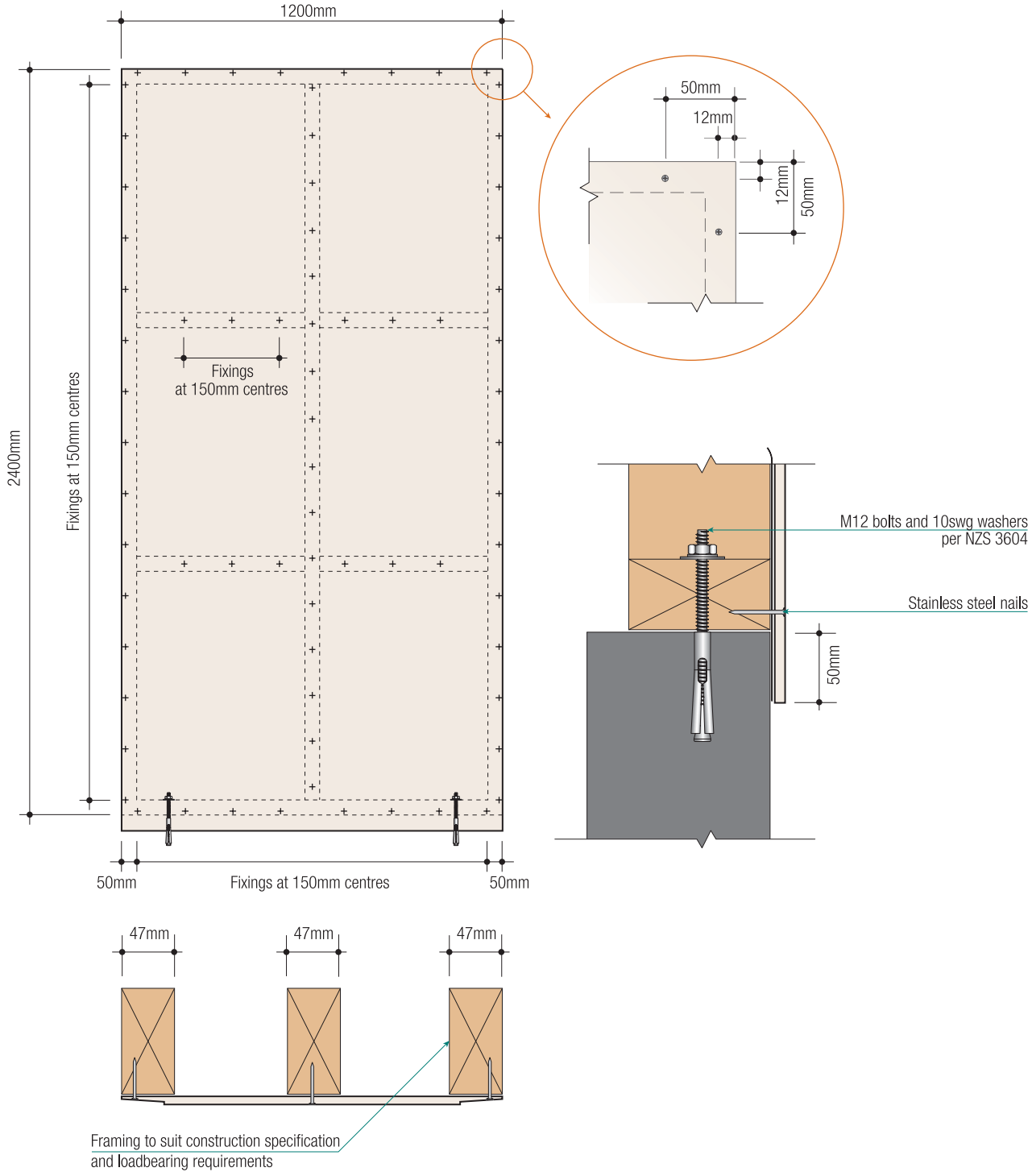
6.1 ETERPAN[fi]-MD Backing Board for Solid Plastering *continued from page 35*

For wind and earthquake resistant constructions, 4.5mm thick ETERPAN[fi]-MD has been subject to tests and shown to provide the following performance, which are dependent on the nail fixing configurations.

Substrate	Fixing for board	Wind	Earthquake	Remarks
Concrete slab	40 x 2.8mm	85 units/metre	70 units/metre	General structural bracing: **FIGURE 71(A)**
Timber	40 x 2.8mm	85 units/metre	70 units/metre	General structural bracing: **FIGURE 71(B)**
Timber	40 x 2.8mm	110 units/metre	85 units/metre	General structural bracing with hold downs: **FIGURE 72**

FIGURE 71(A) ***Solid plastering general structural bracing - Board to slab***

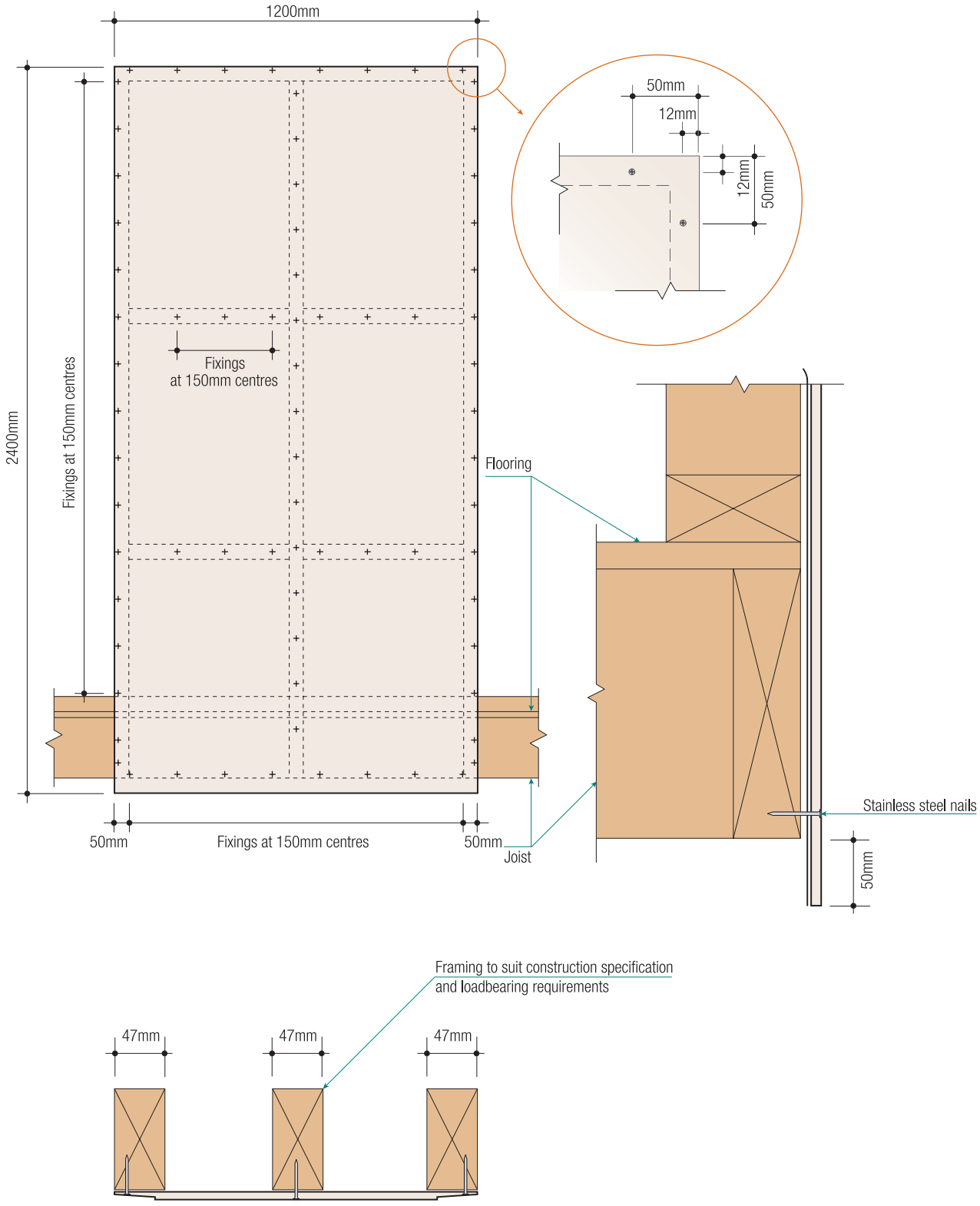
Fixings to be stainless steel nails 40mm x 2.8mm.



6.1 ETERPAN[fi]-MD Backing Board for Solid Plastering *continued from opposite page*

FIGURE 71(B) ***Solid plastering general structural bracing - Board to timber***

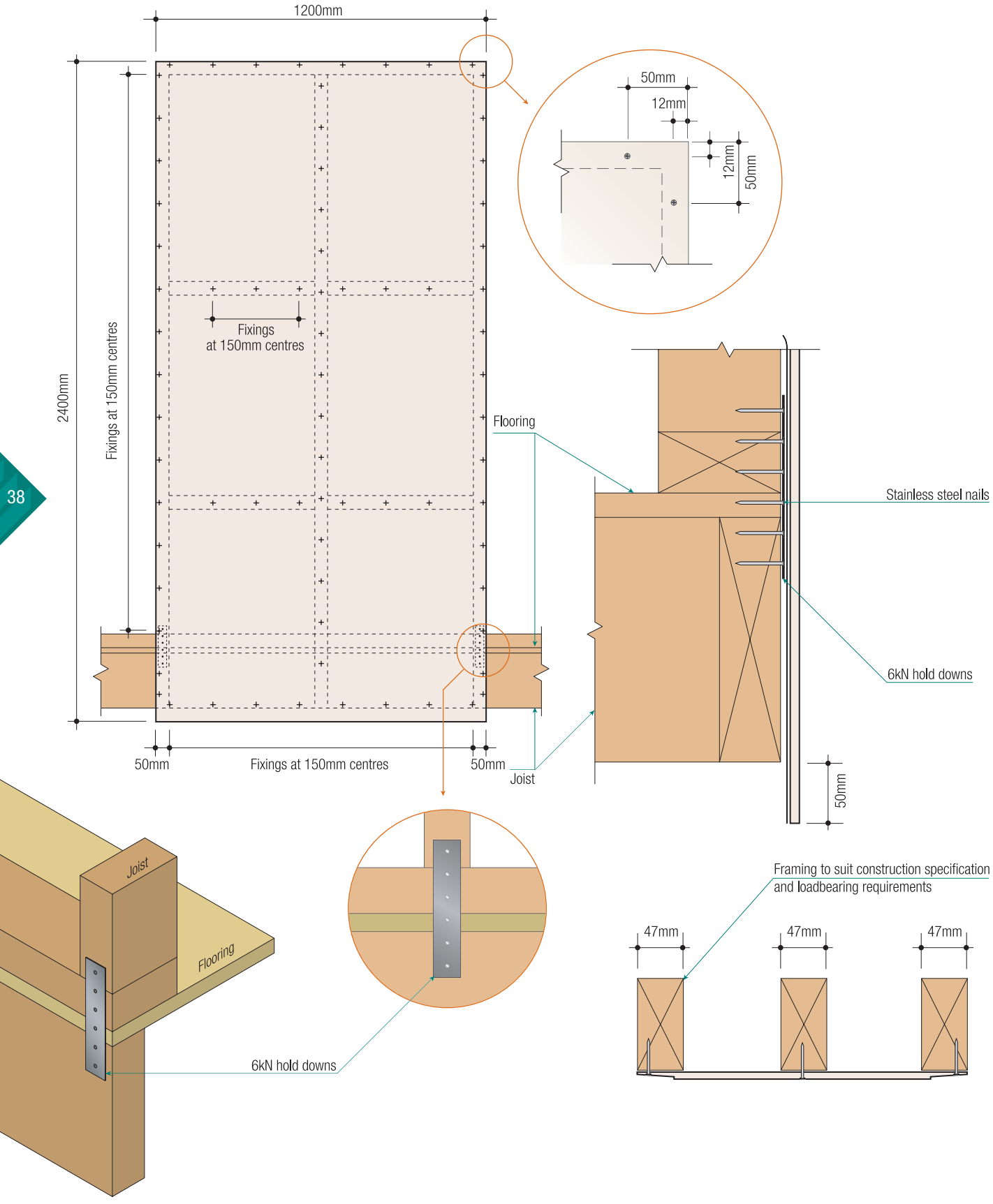
Fixings to be stainless steel nails 40mm x 2.8mm.



6.1 ETERPAN[fi]-MD Backing Board for Solid Plastering *continued from page 37*

FIGURE 72 ***Solid plastering general structural bracing with hold downs on edges***

Fixings to be stainless steel nails 40mm x 2.8mm.

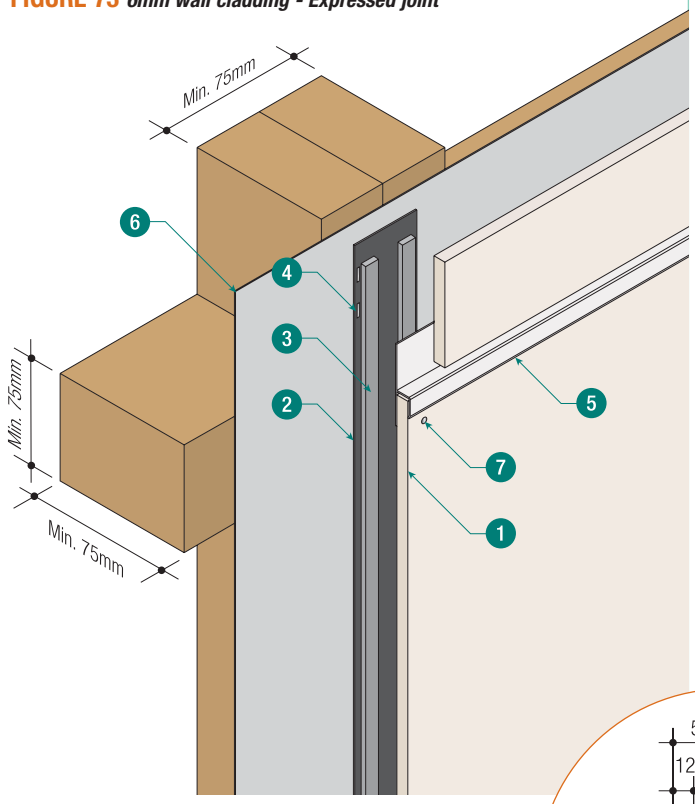


6.2 ETERPAN[fi]-MD for Wall Cladding

When a thin weatherproof coating is used, the minimum board thickness to be used should be at least 6mm, where it will provide to a degree of impact resistant as well as protection against weather. A proper sealing system must be considered between board joints in order to prevent rain water from penetrating through the structure.

6.2.1 6mm ETERPAN[fi]-MD Wall System

FIGURE 73 ***6mm wall cladding - Expressed joint***



ANNOTATION DETAILS THIS PAGE

1. ETERPAN[fi]-MD 6mm thick
2. Butyl strip 50mm x 1mm
3. Foam tape 10mm x 6mm
4. Corrosion resistant staples at 400mm centres
5. PVC jointer
6. Building paper
7. Stainless steel nails 40mm x 2.5mm
   Distance from edge 12mm
   Maximum centres 200mm
   Distance from corner 50mm
   See note (5) in Section 4.1, **page 15**

FIGURE 74 ***6mm wall cladding - Framing layout***

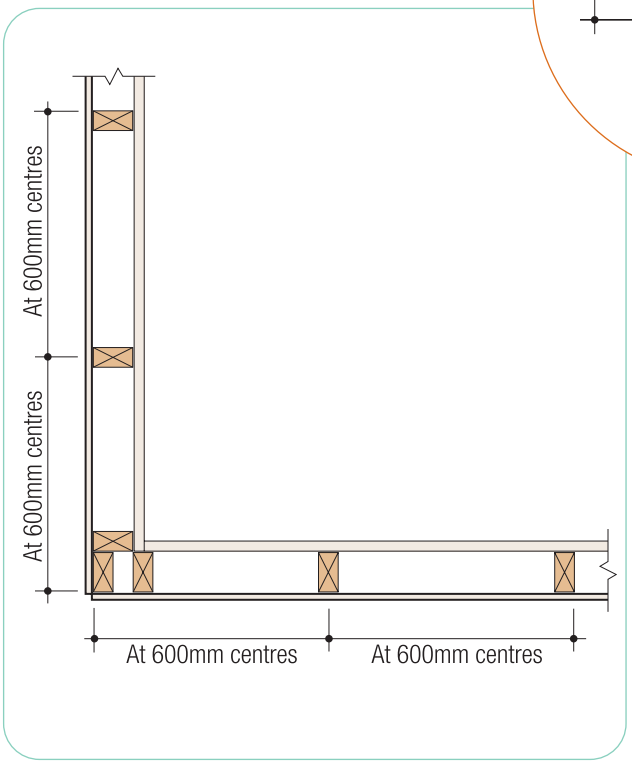
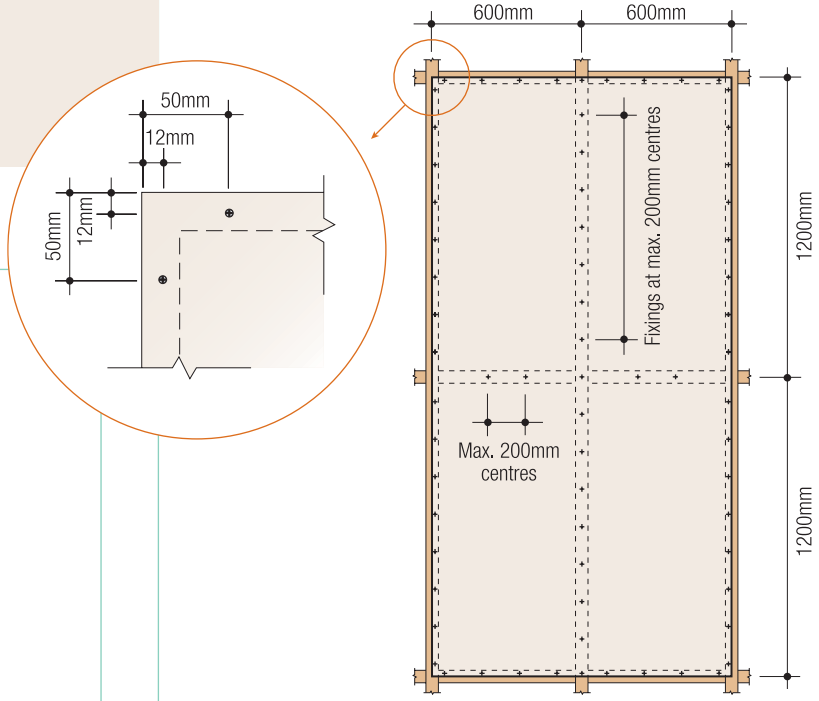


FIGURE 75 ***6mm wall cladding - Framing and fixing layout***



6.2 ETERPAN[fi]-MD for Wall Cladding *continued from page 39*

FIGURE 76 ***6mm wall cladding - Close joint***

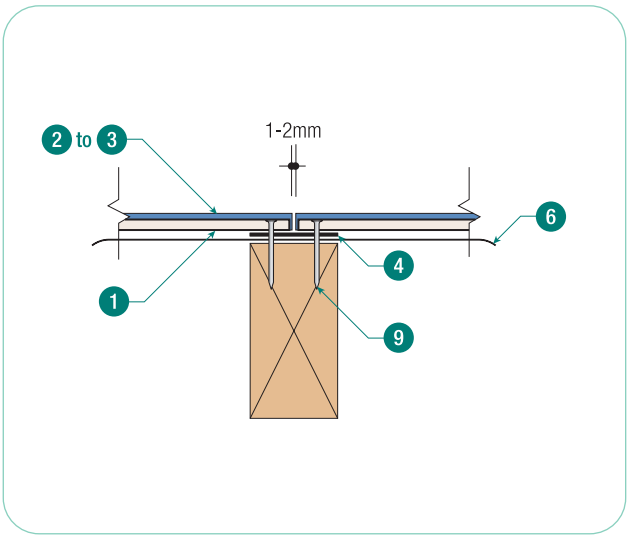


FIGURE 77 ***6mm wall cladding - Sealed joint***

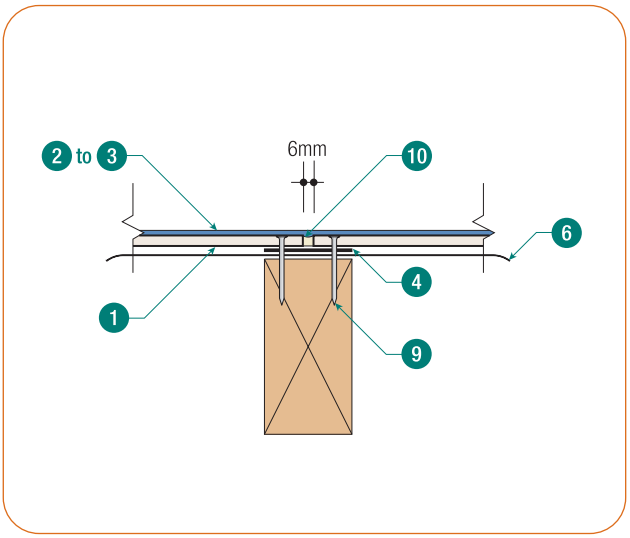
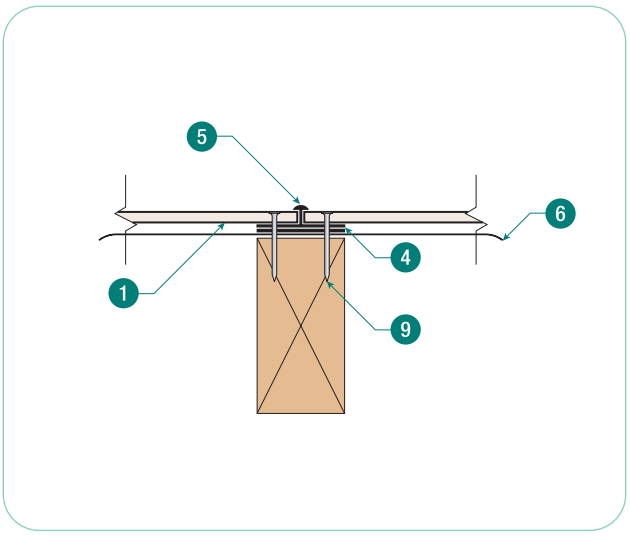


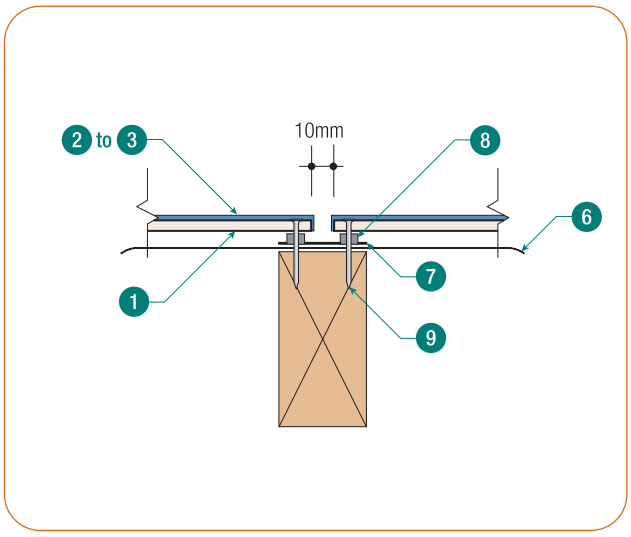
FIGURE 78 ***6mm wall cladding - PVC joint***



ANNOTATION DETAILS THIS PAGE

1. ETERPAN[fi]-MD 6mm thick
2. Proprietary sealer
3. Proprietary acrylic high build coating
4. Foam tape 50mm x 1.5mm
5. PVC jointer
6. Building paper
7. Butyl strip 50mm x 1mm
8. Foam tape 10mm x 6mm
9. Stainless steel nails 40mm x 2.5mm
   Distance from edge 12mm
   Maximum centres 200mm
   Distance from corner 50mm
   See note (5) in Section 4.1, **page 15**
10. Polyurethane flexible sealant

FIGURE 79 ***6mm wall cladding - Expressed joint***



6.2 ETERPAN[fi] -MD for Wall Cladding *continued from opposite page*

Two types of joint finishing can be used to provide watertight joints, as illustrated below. For other jointing methods, please consult your local supplier or Eternit Asia Panels Technical Department.

ANNOTATION DETAILS THIS PAGE

1. ETERPAN[fi] -MD 6mm thick
2. Proprietary sealer
3. Proprietary mesh
4. Proprietary mesh bedding compound
5. Proprietary finishing compound
6. Proprietary levelling coat
7. Proprietary sealer coat
8. Proprietary acrylic high build coating
9. Building paper
10. Galvanised steel nails 40mm x 2.5mm
    Distance from edge 12mm
    Maximum centres 200mm
    Distance from corner 50mm
    See note (5) in Section 4.1, **page 15**
11. Aluminium strip 0.7mm x 100mm
12. Polyurethane flexible sealant
13. Foam tape 10mm x 6mm
14. Polystyrene moulding 20mm thick
15. PVC jointer

NOTE: Polyurethane flexible sealant first applied to aluminium strip (item 11) as adhesive for lower sheet. Then fill joint once second sheet in place.

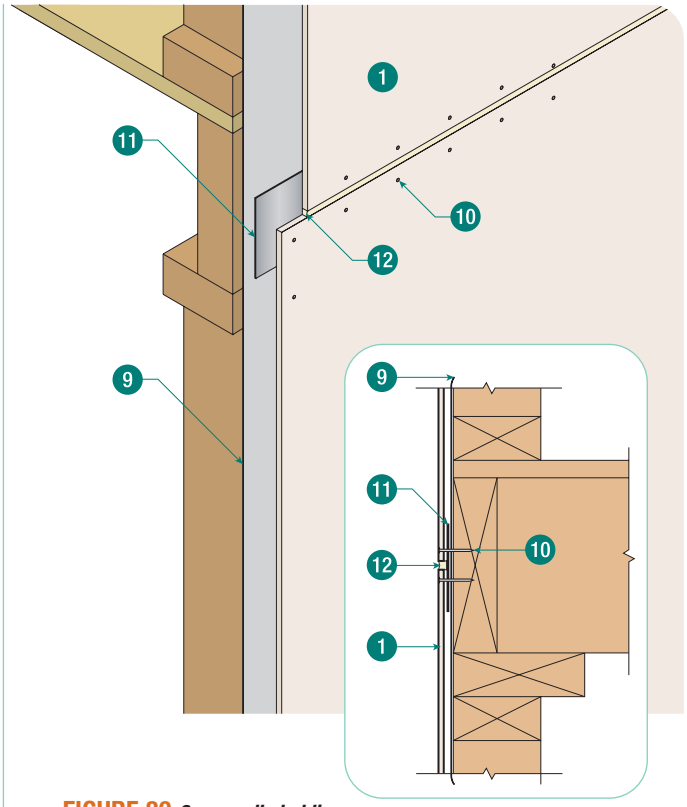


FIGURE 80 ***6mm wall cladding - General expressed joint***

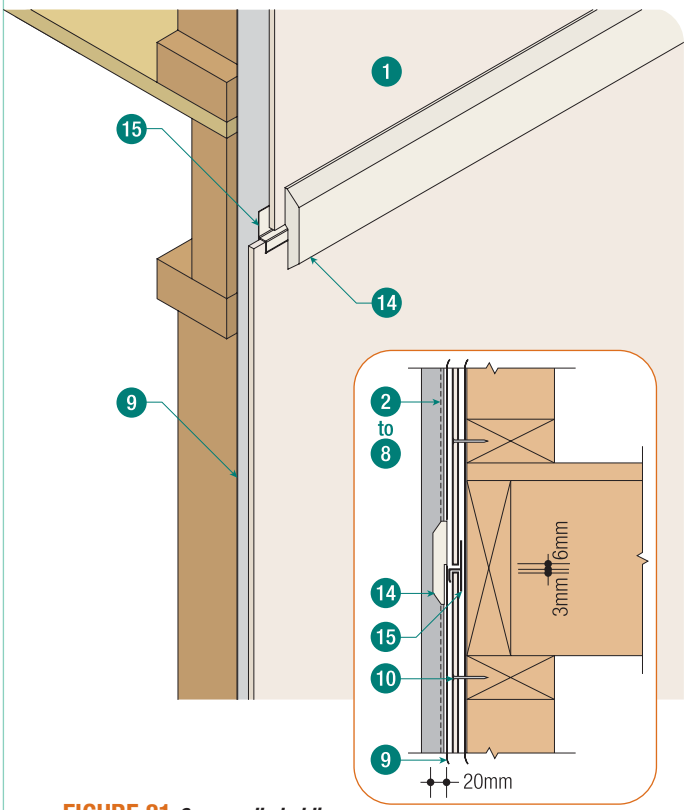


FIGURE 81 ***6mm wall cladding - General concealed joint***

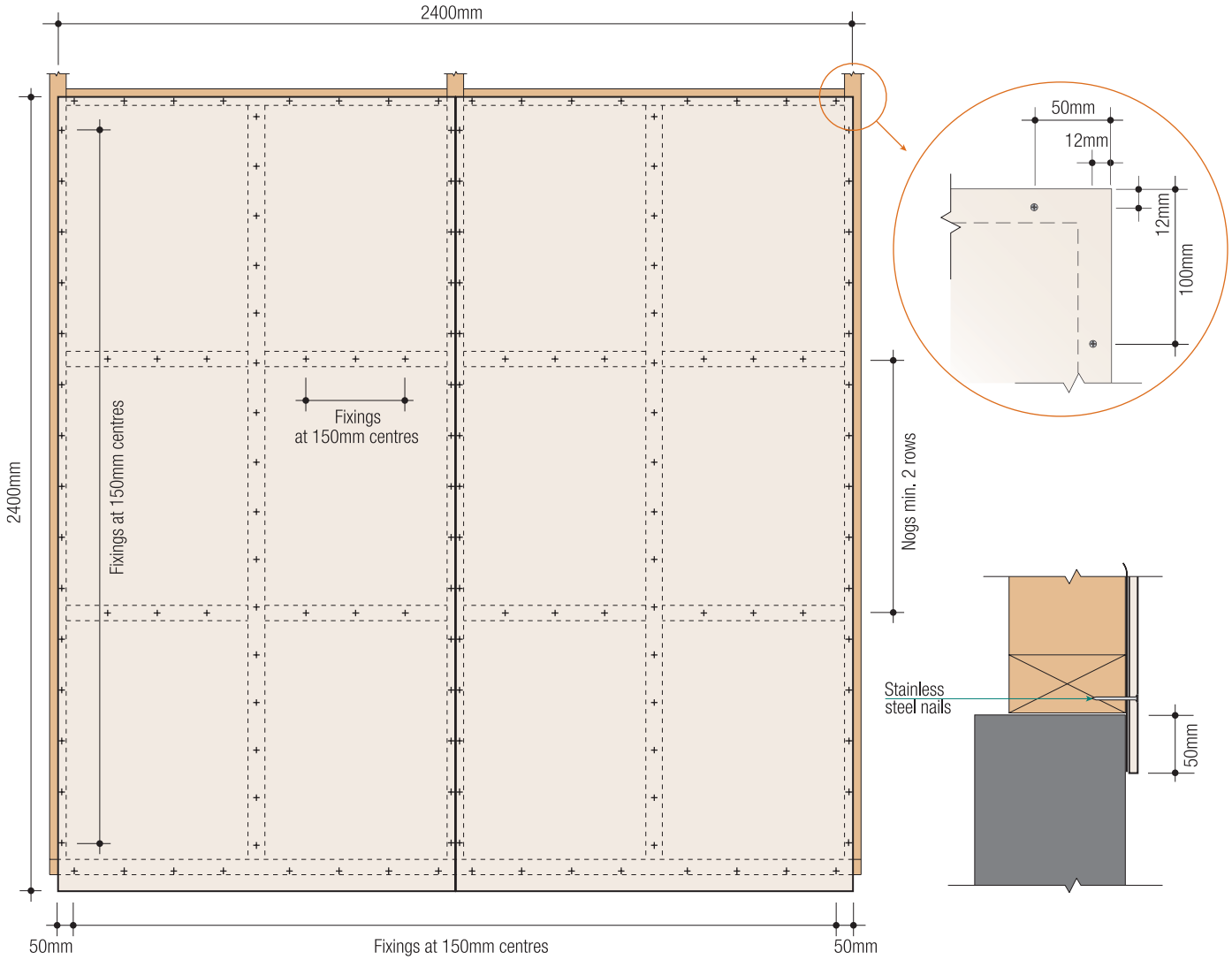
6.2 ETERPAN[fi]-MD for Wall Cladding *continued from page 41*

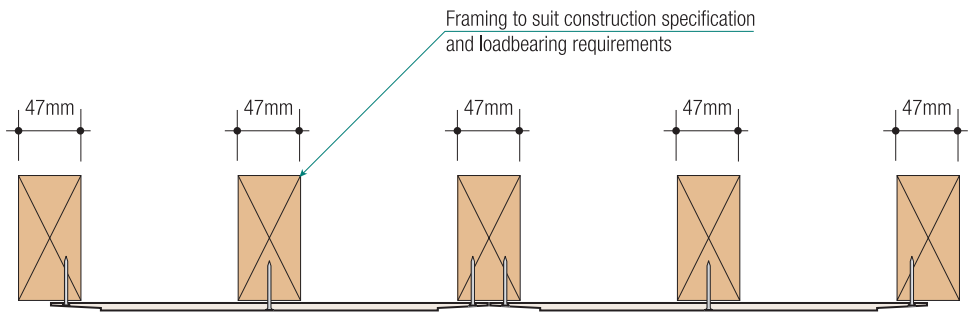
For wind and earthquake resistant constructions, 6mm thick ETERPAN[fi]-MD wall system has been subject to tests and shown to provide the following performances, which are dependent on the nail fixing configurations.

Substrate	Fixing for board	Wind	Earthquake	Remarks
Concrete slab	40 x 2.8mm	106 units/metre	102 units/metre	General structural bracing: **FIGURE 82**
Concrete slab	40 x 2.8mm	100 units/metre	100 units/metre	General structural bracing: **FIGURE 83**

FIGURE 82 ***General structural bracing for 6mm wall system (106 and 102 wind units/earthquake metre)***

Fixings to be stainless steel nails 40mm x 2.8mm.

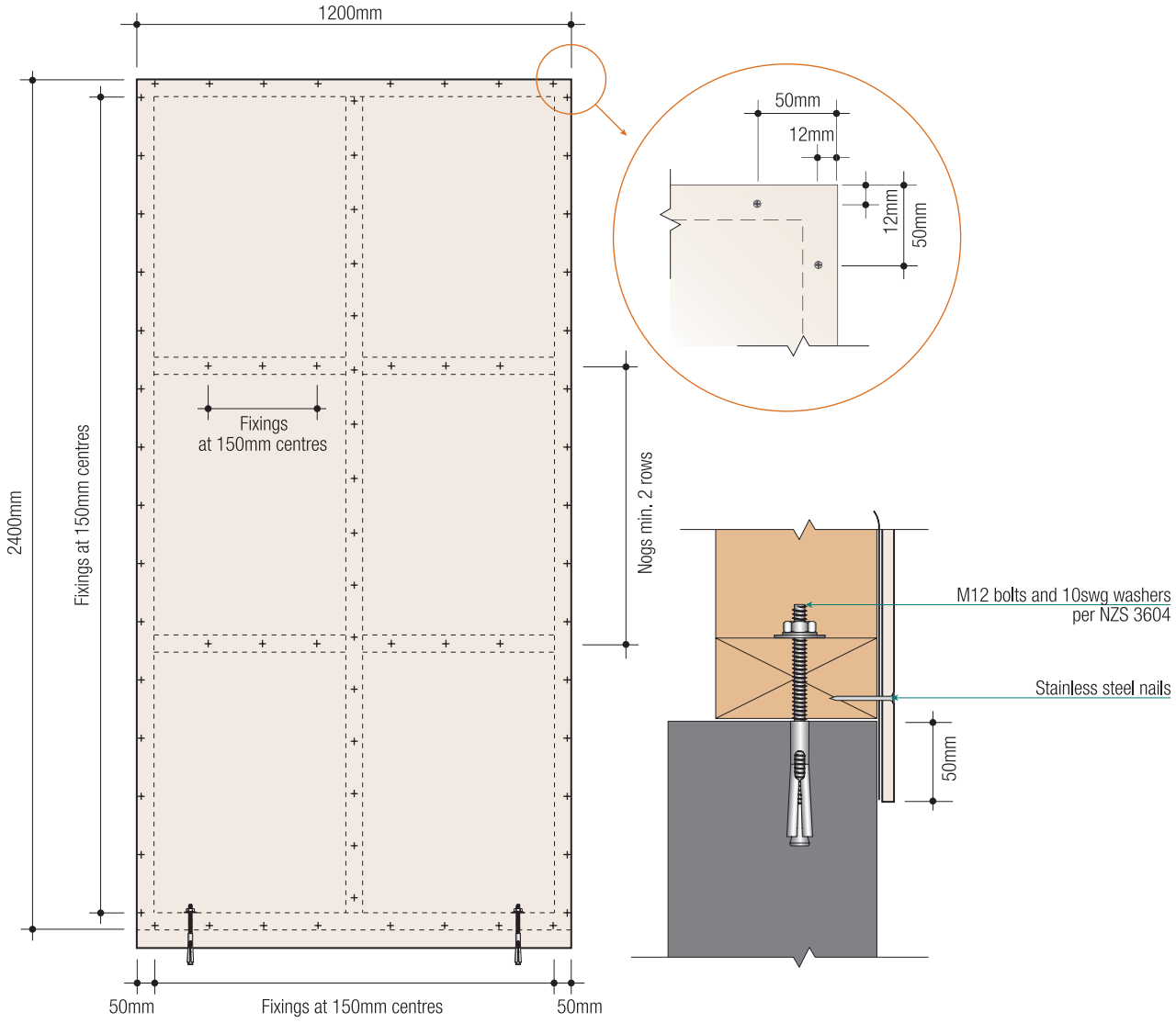


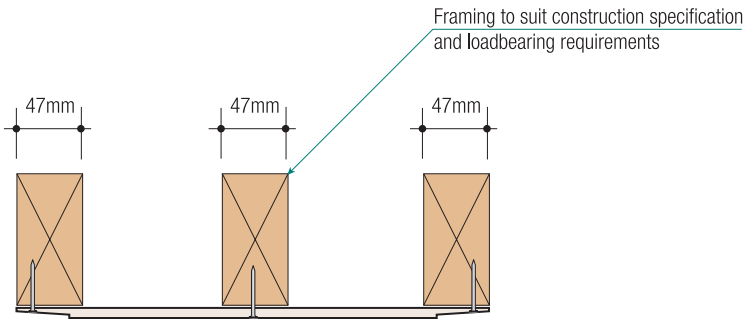


6.2 ETERPAN[fi]-MD for Wall Cladding *continued from opposite page*

FIGURE 83 ***General structural bracing for 6mm wall system (100 wind units/earthquake metre)***

Fixings to be stainless steel nails 40mm x 2.8mm.





6.2 ETERPAN[fi]-MD for Wall Cladding *continued from page 43*

6.2.2 7.5mm ETERPAN[fi]-MD Wall System

This is the most commonly used method for external wall application due to its excellent performance in terms of durability and strength of racking resistance. The ETERPAN[fi]-MD fibre cement boards must be supported directly by well constructed framing, or be it made timber or steel framing.

a) Type E1
Timber is a common material used to construct framing in some countries e.g. New Zealand and Australia.

FIGURE 84 ***7.5mm wall cladding general arrangement for Type E1 system***

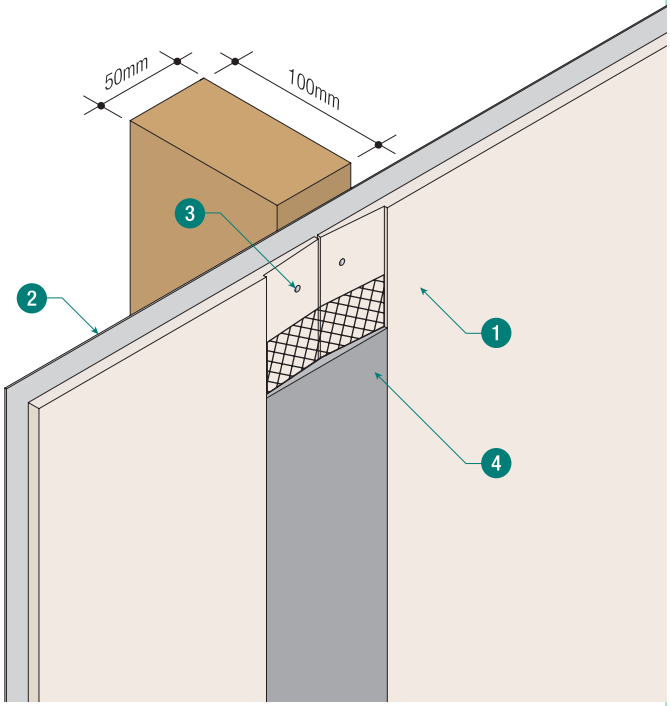
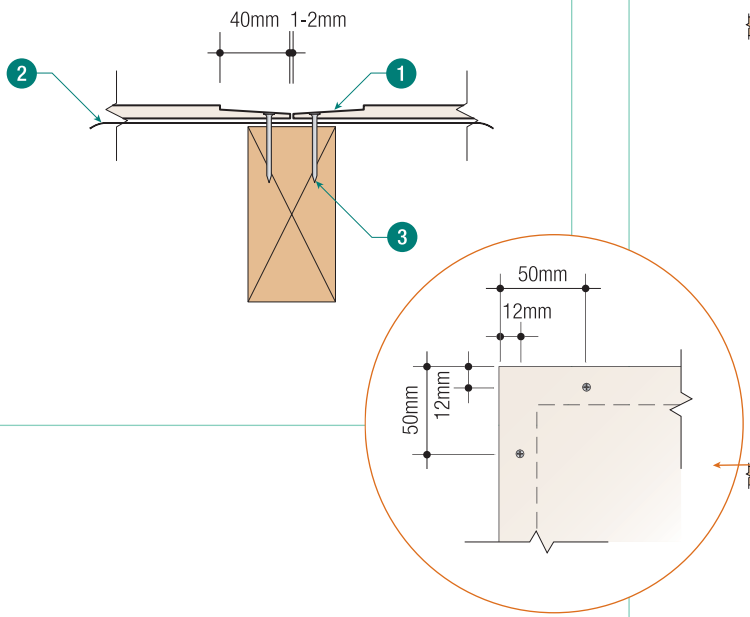


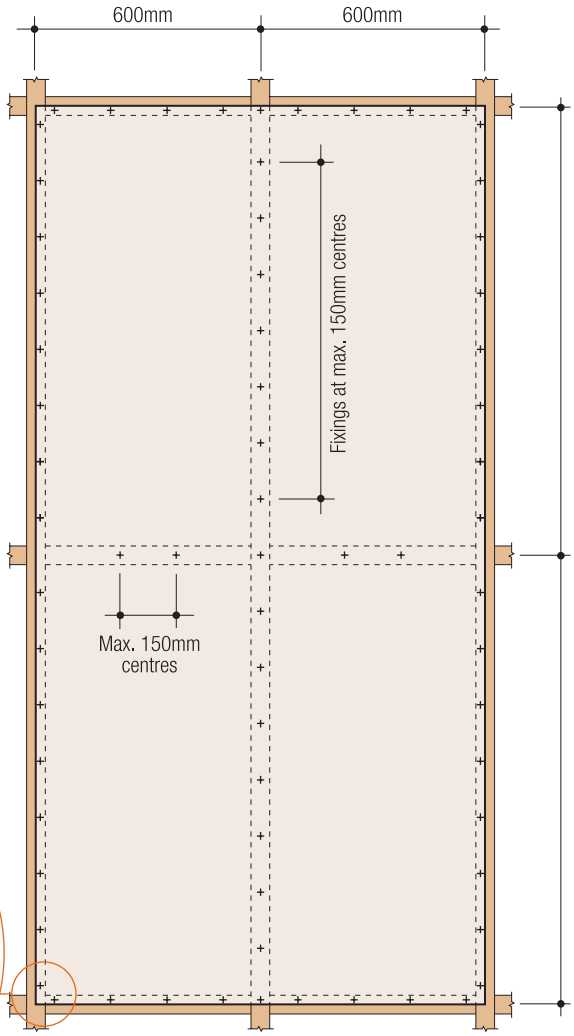
FIGURE 85 ***7.5mm wall cladding - Joint detail (Type E1)***



ANNOTATION DETAILS THIS PAGE

1. ETERPAN[fi]-MD 7.5mm thick
2. Building paper
3. Galvanised steel nails
   Distance from edge 12mm
   Maximum centres 200mm
   Distance from corner 50mm
   See note (5) in Section 4.1, **page 15**
4. Joint flushing compound
   (contact your local supplier or Eternit Asia Panels for a full list of approved joint stopping systems)

FIGURE 86 ***7.5mm wall cladding - Framing and fixing layout (Type E1)***



6.2 ETERPAN[fi]-MD for Wall Cladding *continued from opposite page*

ANNOTATION DETAILS THIS PAGE

1. ETERPAN[fi]-MD 7.5mm thick
2. Proprietary sealer
3. Proprietary mesh
4. Proprietary mesh bedding compound
5. Proprietary finishing compound
6. Proprietary levelling coat
7. Proprietary sealer coat
8. Proprietary acrylic high build coating
9. Building paper
10. Galvanised steel nails 40mm x 2.5mm
    Distance from edge 12mm
    Maximum centres 200mm
    Distance from corner 50mm
    See note (5) in Section 4.1, **page 15**
11. Foam tape 80mm x 1.5mm
12. PVC angle
13. Flexible sealant
14. Damp proof course
15. Tesa foam tape 10mm x 6mm

NOTE: Refer to NZBC E1, 150mm to paved ground and 225mm to cleared ground.

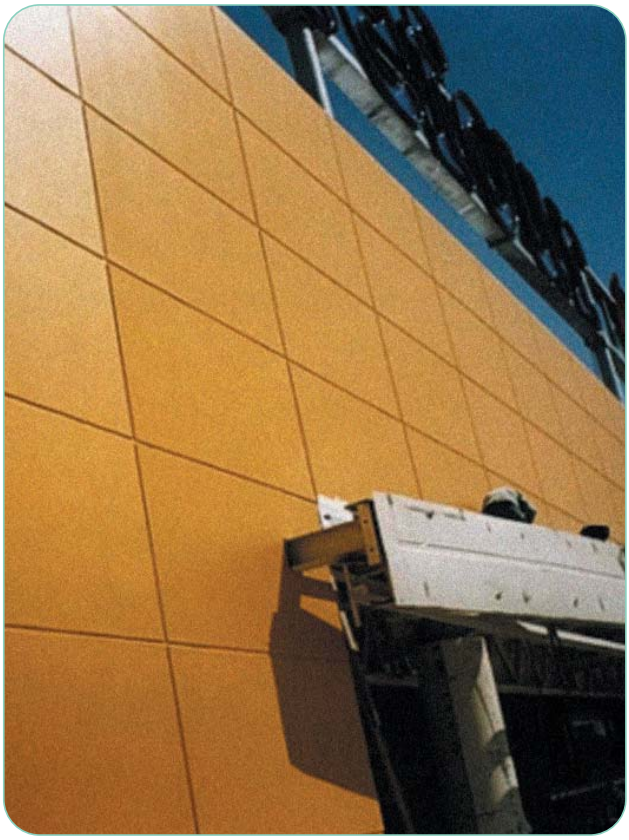


FIGURE 87 ***7.5mm wall cladding - Internal corner detail (Type E1)***

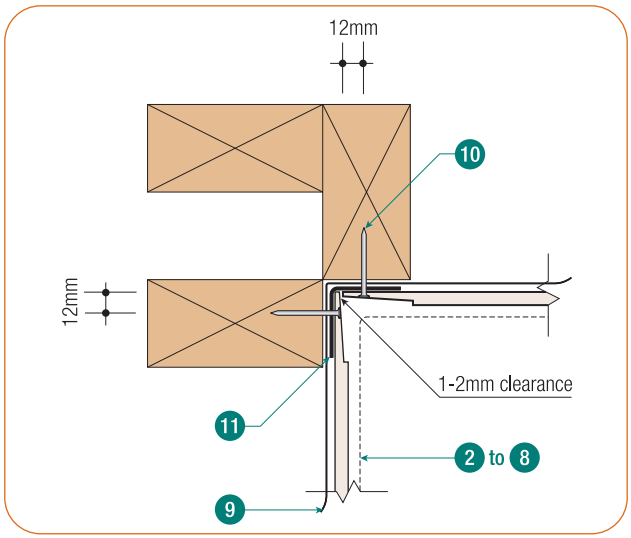


FIGURE 88 ***7.5mm wall cladding - External corner detail (Type E1)***

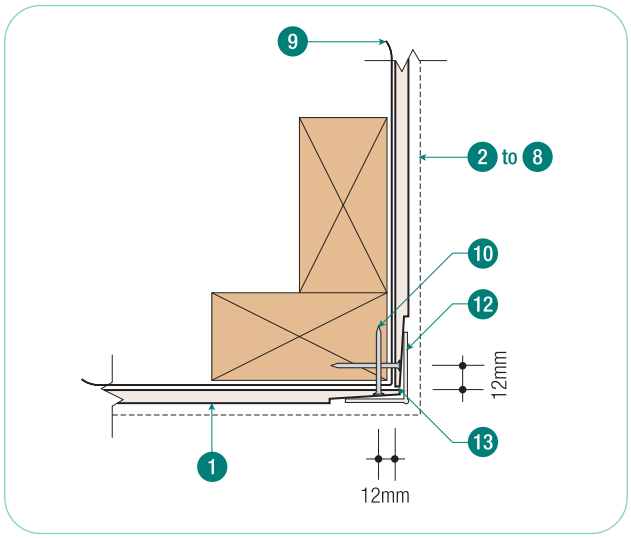
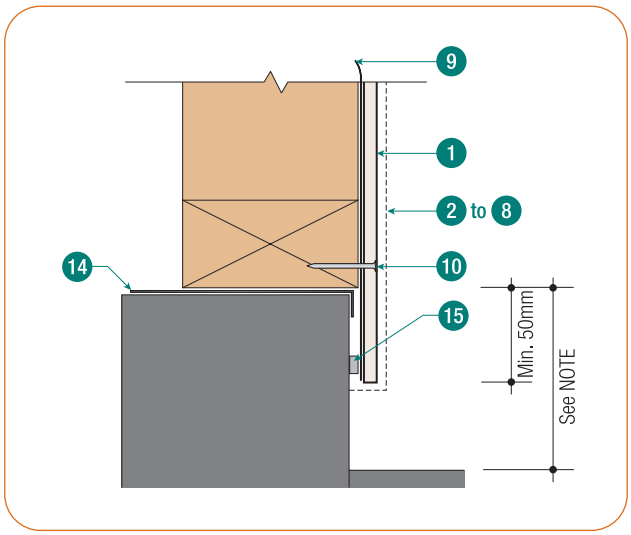
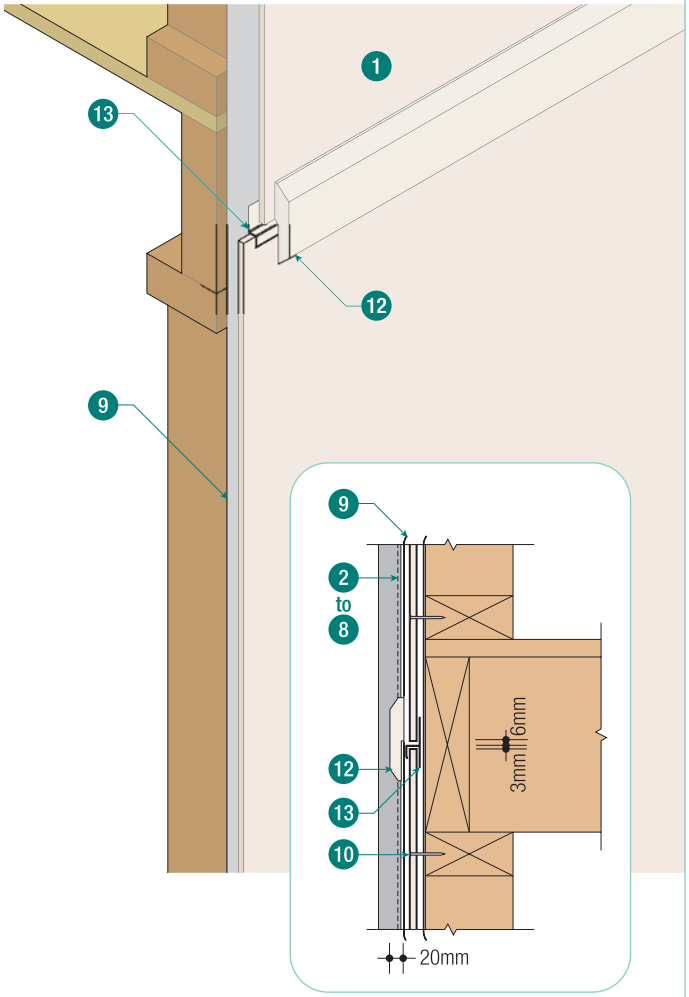


FIGURE 89 ***7.5mm wall cladding - Bottom plate detail (Type E1)***



6.2 ETERPAN[fi]-MD for Wall Cladding *continued from page 45*

FIGURE 90 *7.5mm wall cladding - Horizontal relief joint (Type E1)*



ANNOTATION DETAILS THIS PAGE

1. ETERPAN[fi]-MD 7.5mm thick
2. Proprietary sealer
3. Proprietary mesh
4. Proprietary mesh bedding compound
5. Proprietary finishing compound
6. Proprietary levelling coat
7. Proprietary sealer coat
8. Proprietary acrylic high build coating
9. Building paper
10. Galvanised steel nails 40mm x 2.5mm
    Distance from edge 12mm
    Maximum centres 200mm
    Distance from corner 50mm
    See note (5) in Section 4.1, **page 15**
11. Polyurethane flexible sealant
12. Polystyrene moulding 20mm thick
13. PVC jointer
14. Foam tape 50mm x 1.5mm

FIGURE 91 *7.5mm wall cladding - Vertical control joint (Type E1)*

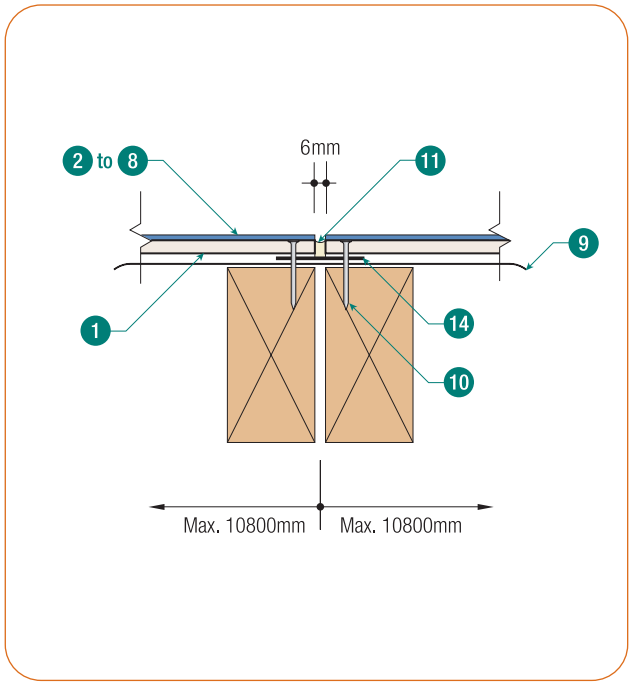
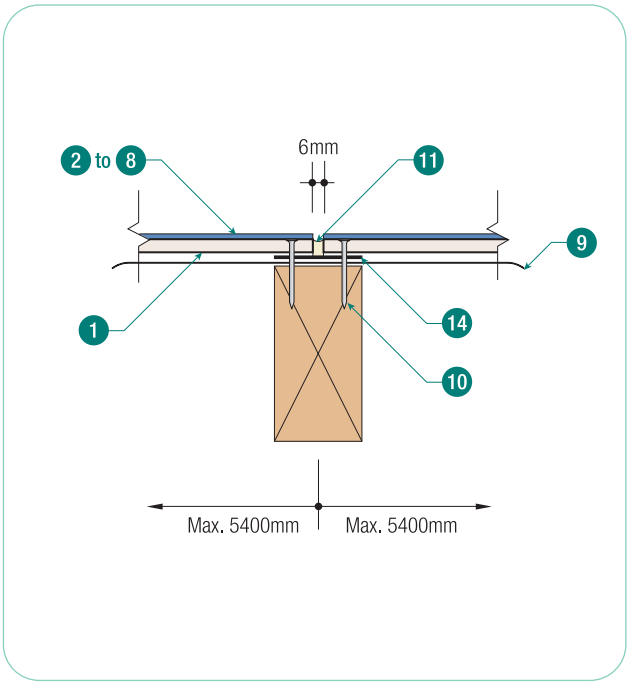


FIGURE 92 *7.5mm wall cladding - Vertical relief joint (Type E1)*



6.2 ETERPAN[fi]-MD for Wall Cladding *continued from opposite page*

For wind and earthquake resistant structure, Type E1, as detailed on the previous pages, has been subjected to structural bracing tests, which confirmed a performance of 106 units/metre and 102 units/metre respectively. Please consult your local supplier for details.

b) Type E2

ANNOTATION DETAILS THIS PAGE

1. ETERPAN[fi]-MD 7.5mm thick
2. Paint system
3. Aluminium socket 80mm x 1mm
4. Polyurethane flexible sealant
5. Butyl strip 50mm x 1mm
6. Foam tape 10mm x 6mm
7. Corrosion resistant staples at 400mm centres
8. Stainless steel screws 40mm x 10swg or Stainless steel nails 40mm x 2.8mm
9. Noggings min. 75mm x 50mm at max. 1200mm centres
10. Studs min. 75mm x 50mm at max. 600mm centres
11. Building paper
12. Mineral wool

NOTE: Refer to structural engineer for sizing of studs and noggings according to wind loading requirements.

FIGURE 93 *7.5mm wall cladding general arrangement for Type E2 system*

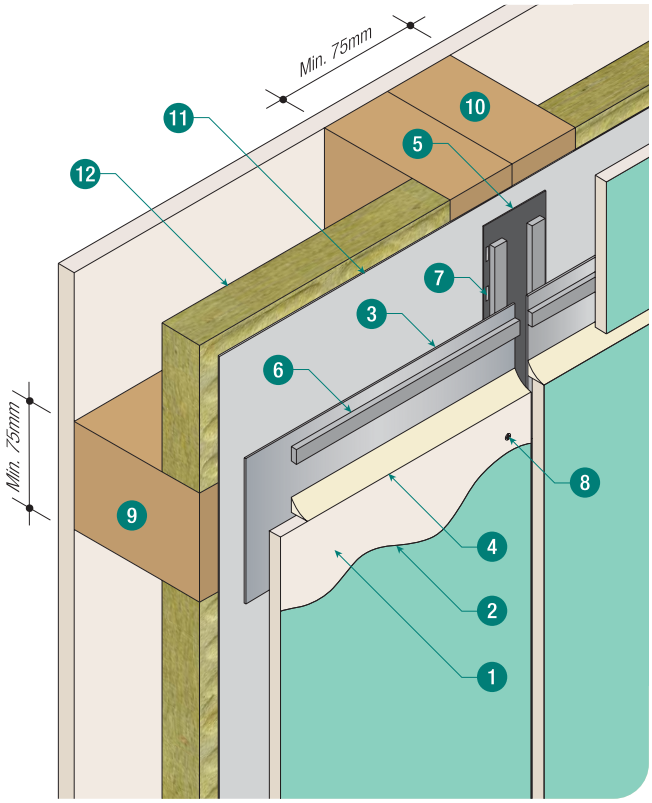


FIGURE 94 *7.5mm wall cladding - Framing layout (Type E2)*

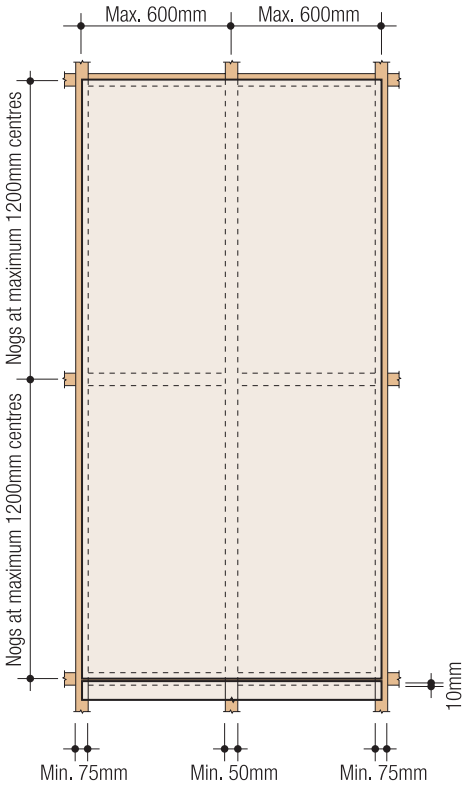
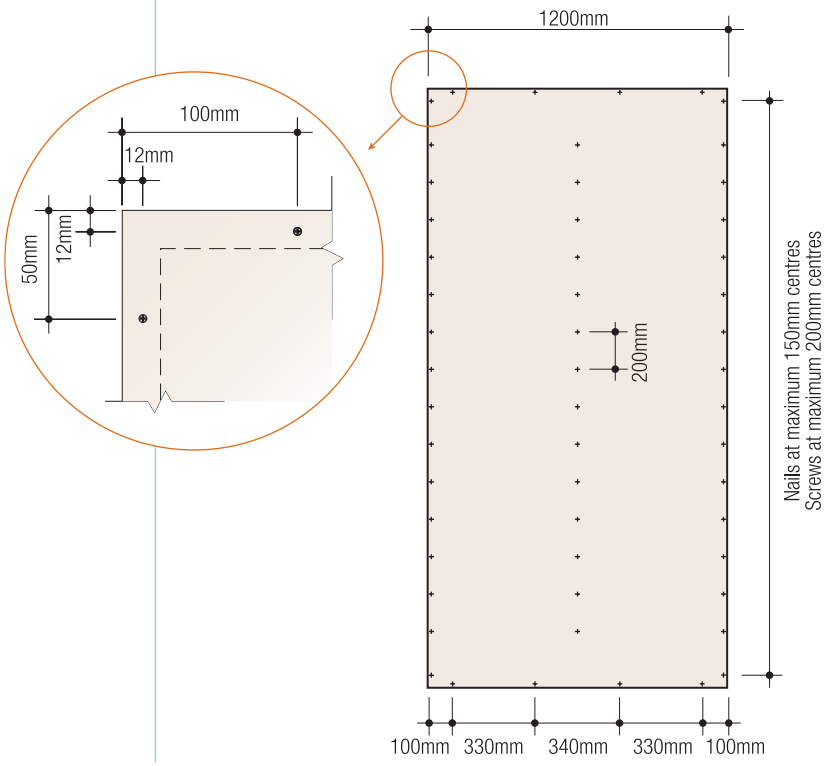


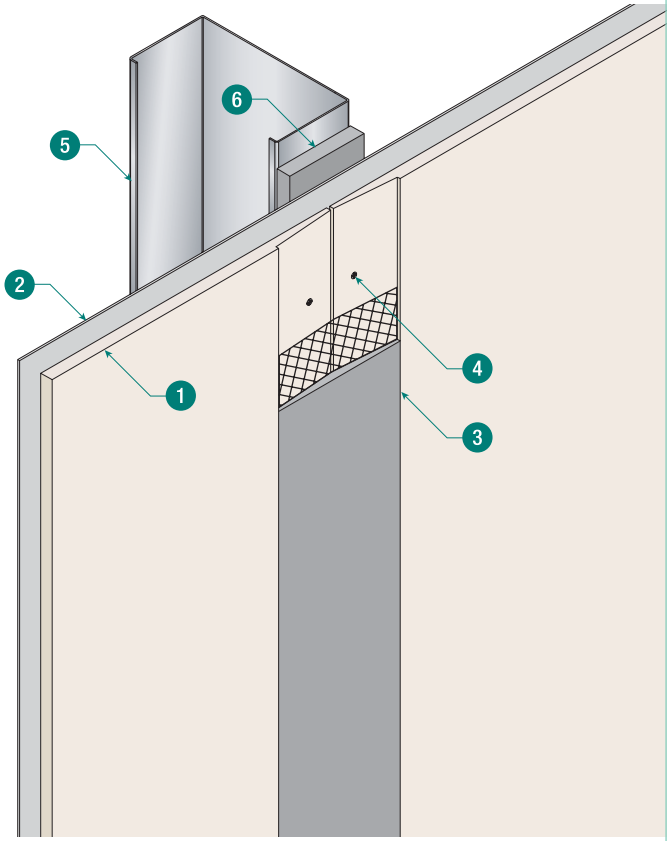
FIGURE 95 *7.5mm wall cladding - Typical fixing layout for 2400mm x 1200mm sheet (Type E2)*



6.2 ETERPAN[fi]-MD for Wall Cladding *continued from page 47*

c) Type E3
In this construction, steel channels are utilised as the supporting elements.

FIGURE 96 ***7.5mm wall cladding general arrangement for Type E3 system***



ANNOTATION DETAILS THIS PAGE

1. ETERPAN[fi]-MD 7.5mm thick
2. Building paper
3. Joint flushing compound
4. Stainless steel screws 40mm x 2.8mm
   Distance from edge 12mm
   Maximum centres 200mm
   Distance from corner 50mm
   See note (5) in Section 4.1, **page 15**
5. Steel framing according to structural calculation
6. Thermal break strips 50mm wide x 9mm thick

FIGURE 97 ***7.5mm wall cladding - Framing joint (Type E3)***

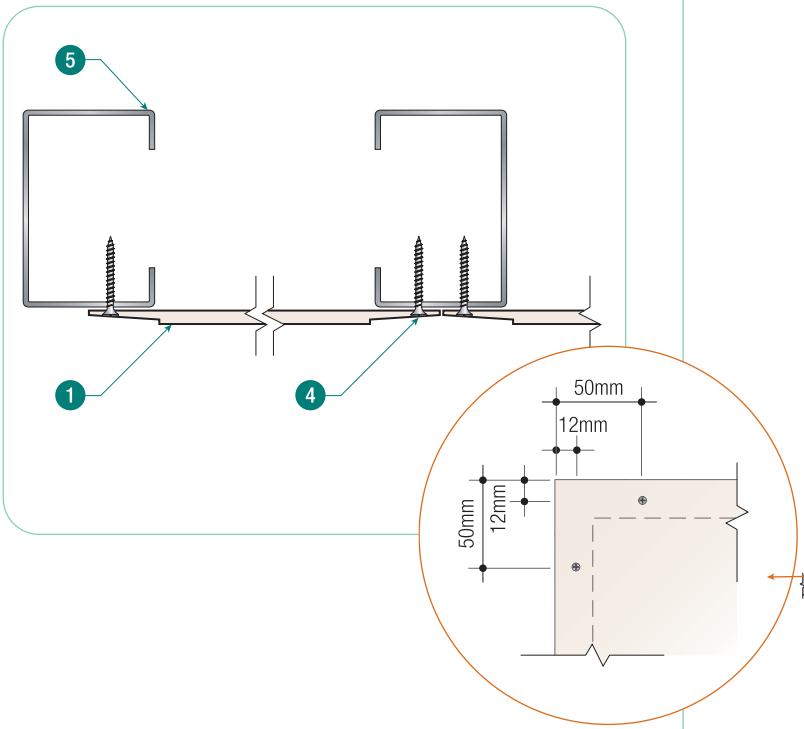
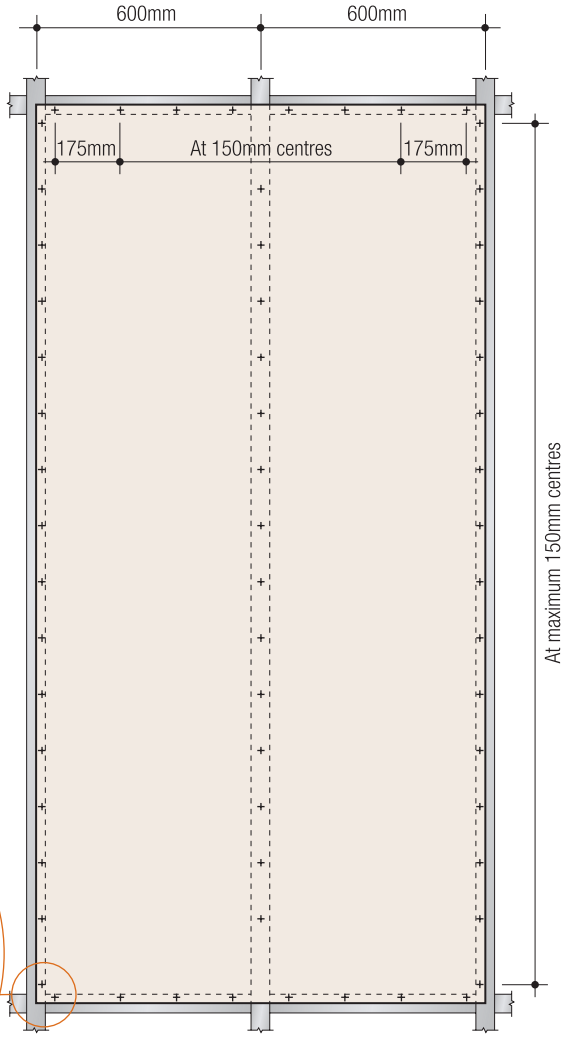


FIGURE 98 ***7.5mm wall cladding - Framing layout (Type E3)***



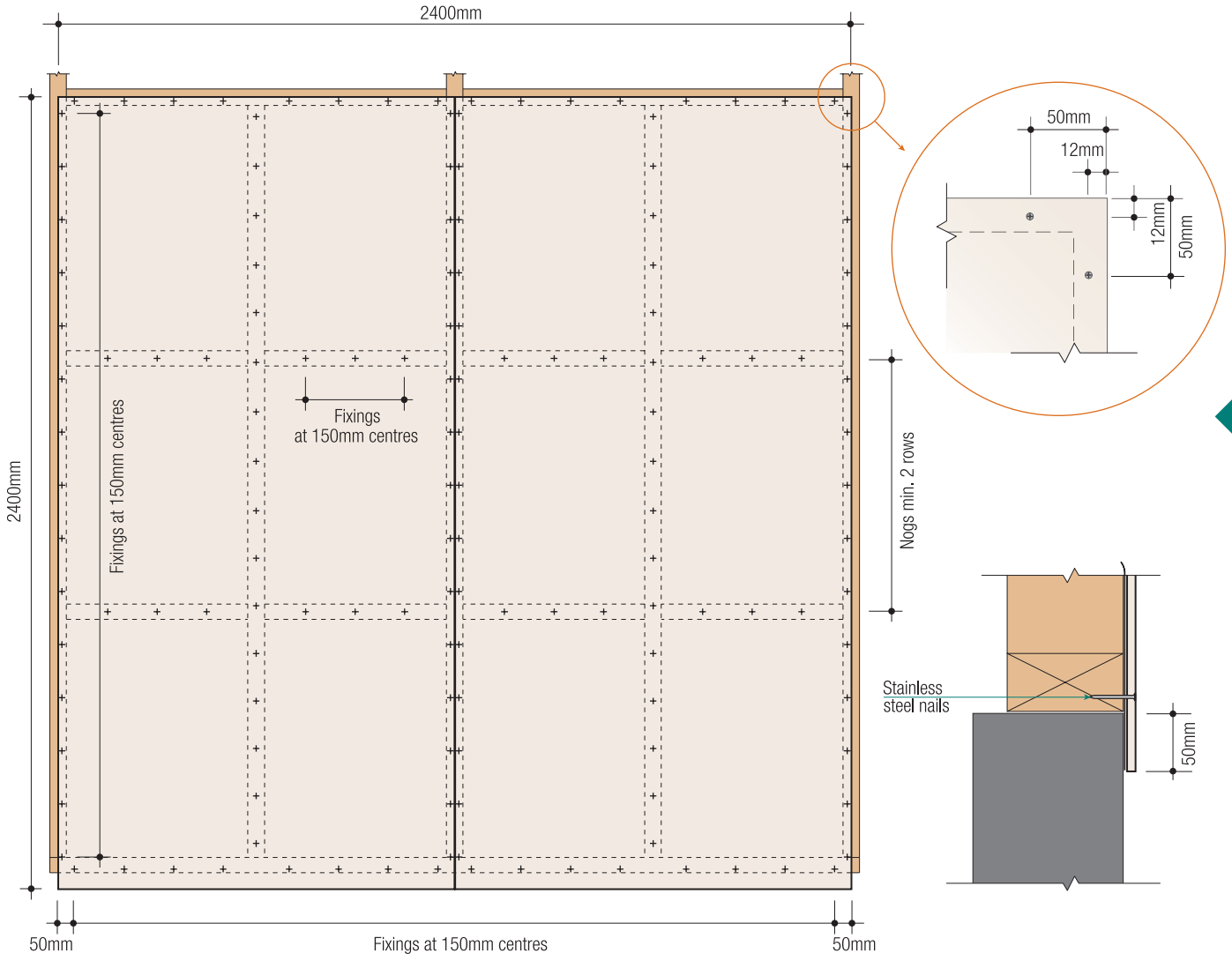
6.2 ETERPAN[fi]-MD for Wall Cladding *continued from opposite page*

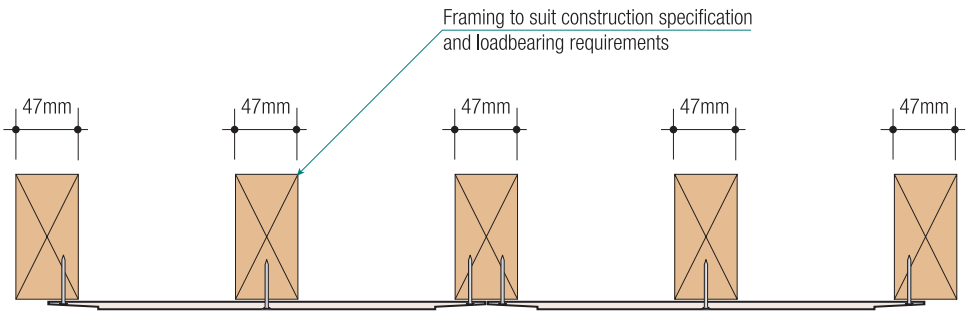
For wind and earthquake resistant structures, several systems using 7.5mm thick board have been subjected to structural bracing tests, which confirmed the following results. Please consult your local supplier for details.

Substrate	Fixing for board	Wind	Earthquake	Remarks
Timber floor	40 x 2.8mm	100 units/metre	100 units/metre	General structural bracing: Similar to **FIGURE 83** except using 7.5mm board
Timber floor	40 x 2.8mm	106 units/metre	102 units/metre	General structural bracing: **FIGURE 99**

FIGURE 99 ***Construction of 7.5mm structural bracing test***

Fixings to be stainless steel nails 40mm x 2.8mm.





6.2 ETERPAN[fi]-MD for Wall Cladding *continued from page 49*

Substrate	Bracing length	Wind	Earthquake	Remarks
Concrete slab	0.6-1.2m	112 units/metre	73 units/metre	General structural bracing: **FIGURE 100**
Timber floor	0.6-1.2m	125 units/metre	120 units/metre	General structural bracing: **FIGURE 101**
Timber floor	0.9-1.8m	158 units/metre	163 units/metre	General structural bracing: **FIGURE 102**
Timber floor	1.2-2.4m	158 units/metre	151 units/metre	General structural bracing: **FIGURE 103**

FIGURE 100 ***Frame layout and nailing pattern for bracing element to concrete floor slab***

Bracing length: 0.6-1.2m

For wind and earthequake resistant structure.
Wind: 112 units/m; Earthquake: 73 units/m

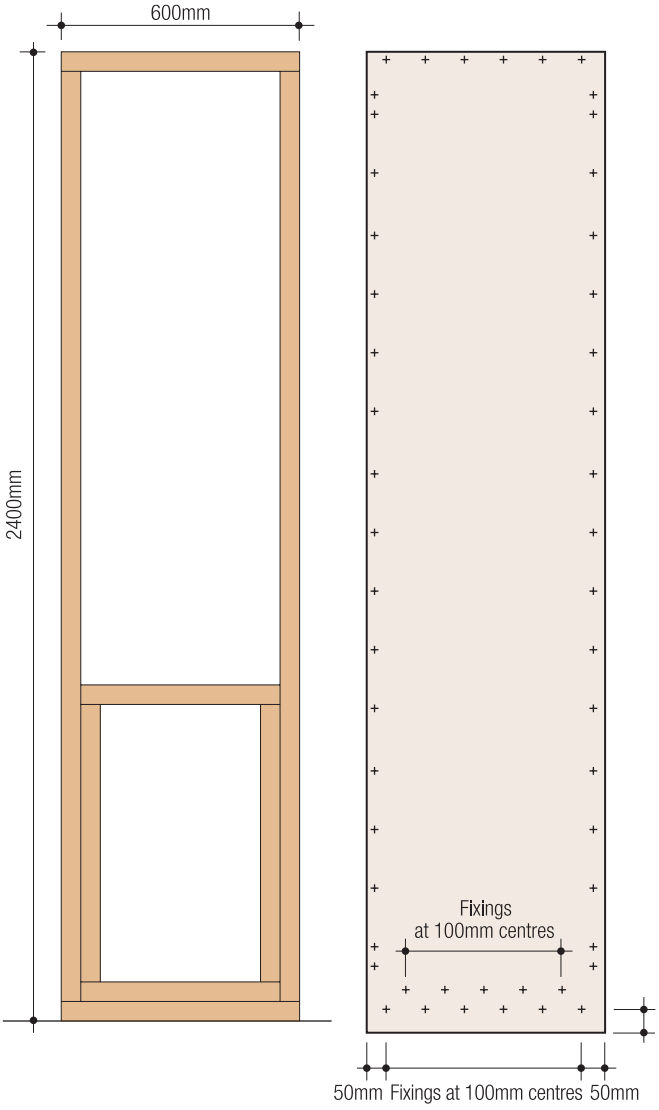
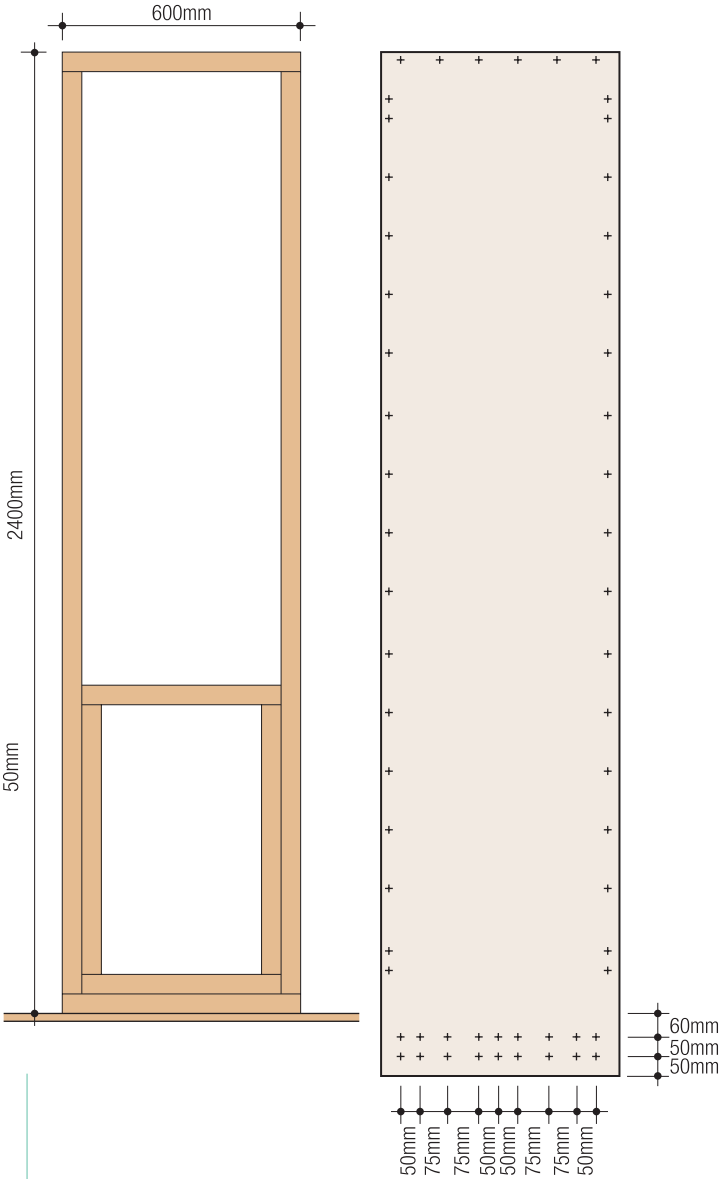


FIGURE 101 ***Frame layout and nailing pattern for bracing element to timber floor joists***

Bracing length: 0.6-1.2m

For wind and earthequake resistant structure.
Wind: 125 units/m; Earthquake: 120 units/m



6.2 ETERPAN[fi]-MD for Wall Cladding *continued from opposite page*

FIGURE 102 ***Nailing pattern for gib braceline to timber floor joists***

Bracing length: 0.9-1.8m

For wind and earthequake resistant structure.
Wind: 158 units/m; Earthquake: 163 units/m

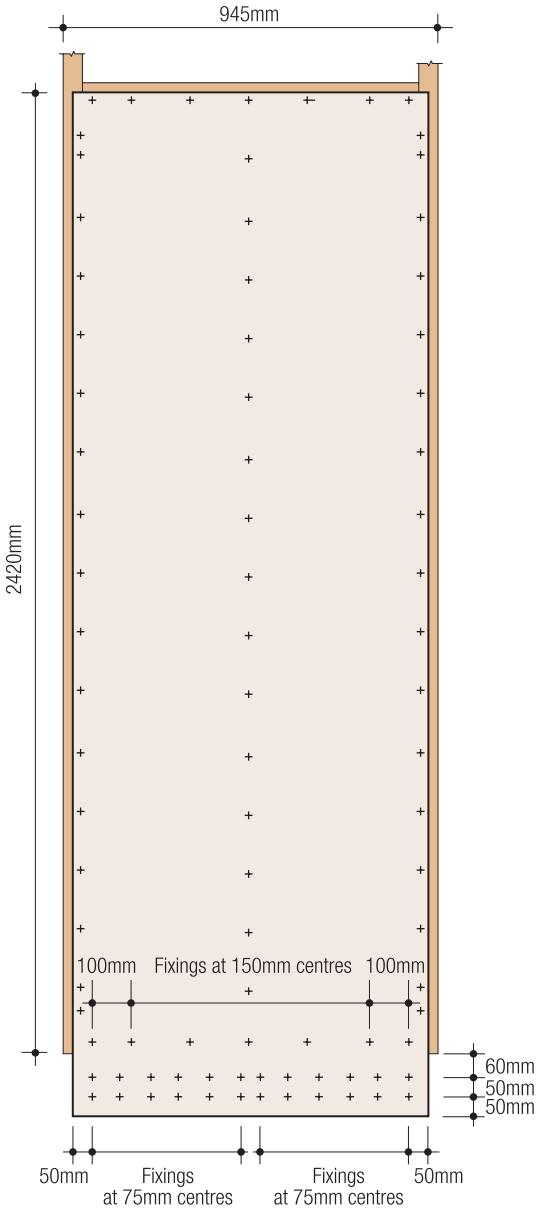
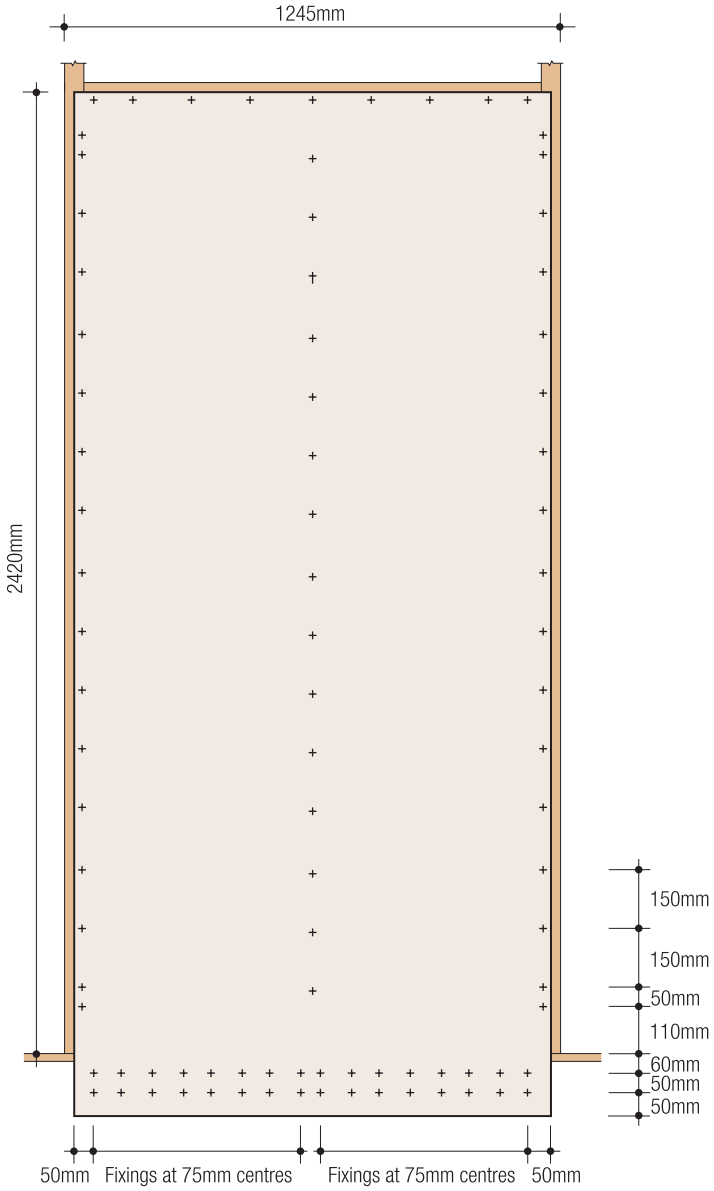


FIGURE 103 ***Nailing pattern for bracing element to timber floor joists***

Bracing length: 1.2-2.4m

For wind and earthequake resistant structure.
Wind: 158 units/m; Earthquake: 151 units/m



6.2 ETERPAN[fi]-MD for Wall Cladding *continued from page 51*

6.2.3 9mm ETERPAN[fi]-MD Wall System

The construction of this wall system is essentially similar to Type E2 system as described on page 47. The board thickness of 7.5mm is in fact interchangeable with 9mm thick ETERPAN[fi]-MD board. For details, please refer to Type E2 system on page 47. Do take note of the following recommendations to be followed in order to produce a well constructed and watertight structure.

FIGURE 104 ***9mm wall cladding - Screw fixing detail***

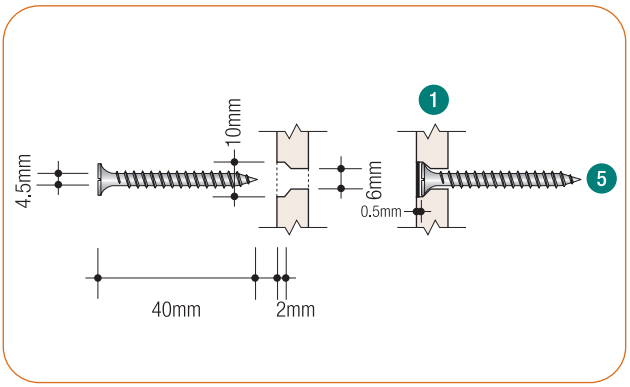


FIGURE 105 ***9mm wall cladding - Internal corner***

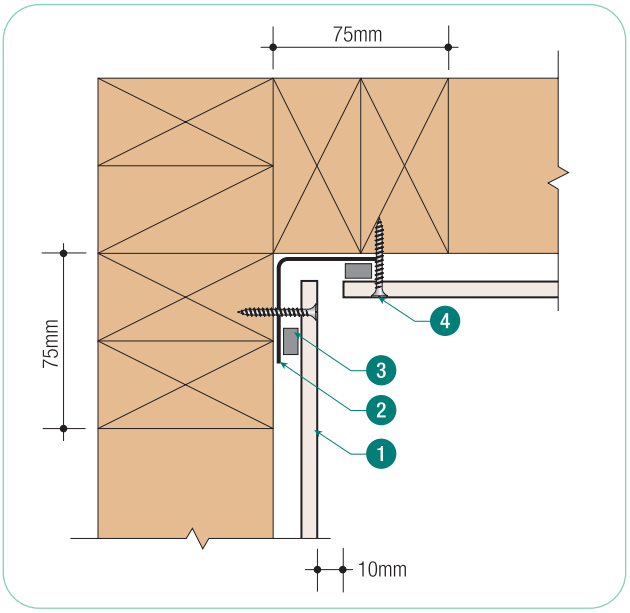
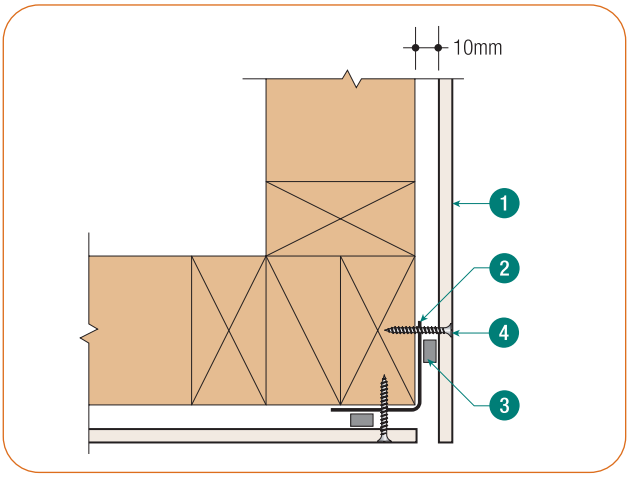


FIGURE 106 ***9mm wall cladding - External corner***



ANNOTATION DETAILS THIS PAGE

1. ETERPAN[fi]-MD 9mm thick
2. Butyl strip 80mm x 1mm
3. Foam tape 10mm x 6mm
4. Stainless steel screws 40mm x 10 swg
5. Epoxy filler

NOTE 1: Refer to NZBC E1, 150mm to paved ground and 225mm to cleared ground.

NOTE 2: Peel back foam tape and cut Butyl strip.

NOTE 3: Peel back and cut foam tape.

FIGURE 107 ***9mm wall cladding - Bottom plate detail***

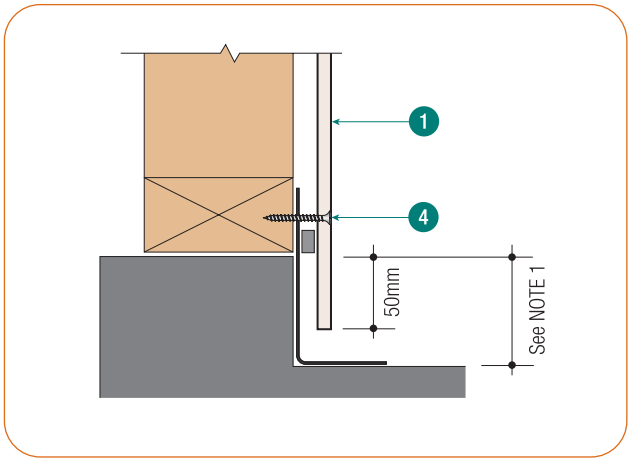
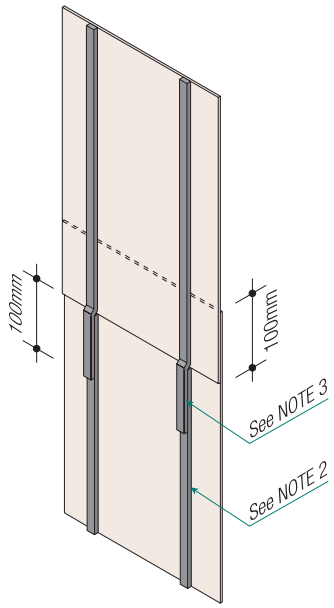


FIGURE 108 ***9mm wall cladding - Overlap joint for butyl strip***



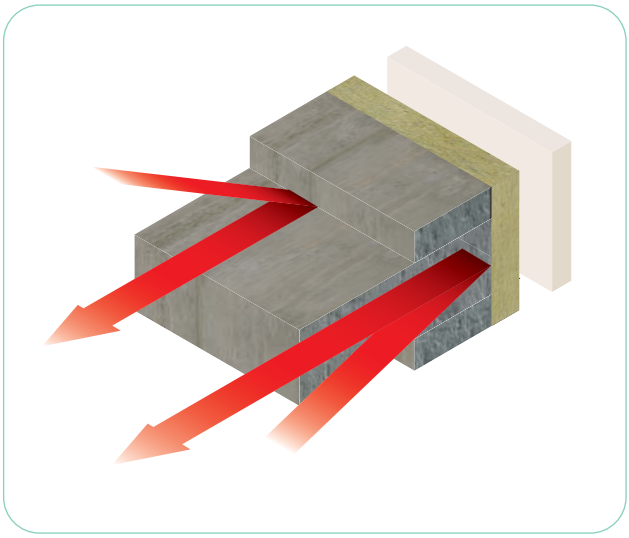
6.2 ETERPAN[fi] -MD for Wall Cladding *continued from opposite page*

6.2.4 ETERPAN[fi] -MD Rainscreen Cladding System

Along with the improvement in today s building technology, a rainscreen cladding system utilising ETERPAN[fi] board has been developed for external use. It is applicable to either new buildings or the refurbishment of old structures. The type of ETERPAN[fi] board used is of medium density (ETERPAN[fi] -MD) with a thickness of at least 9mm or 12mm, dependent on the wind loading requirements.

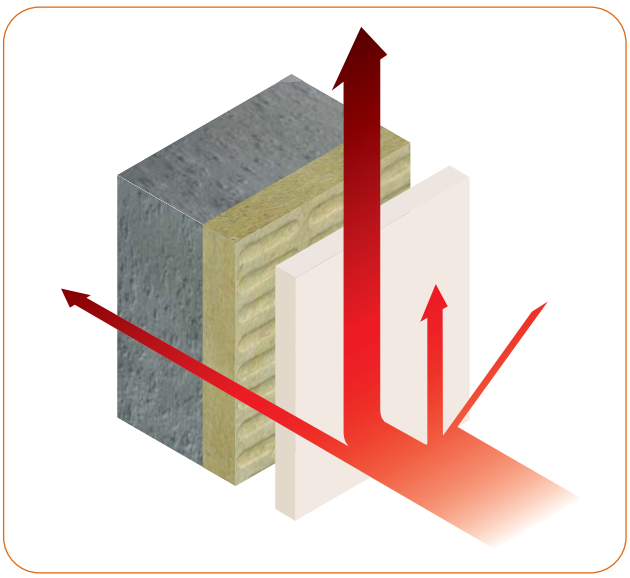
Some of the major advantages provided by rainscreen cladding systems are shown on this page.

FIGURE 109 ***Preventing thermal bridges***



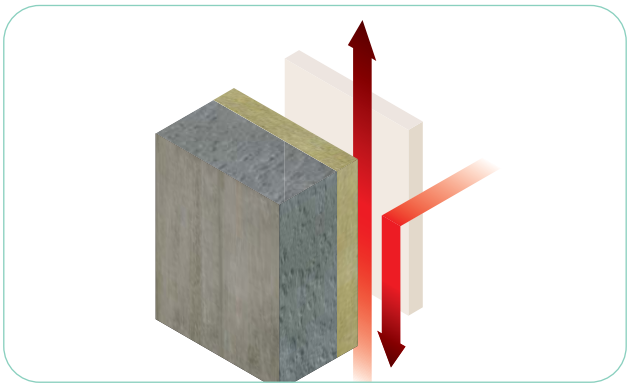
The insulating material should be mounted on the outside of the structural wall without interruptions caused by the floor slabs. Thus thermal bridges that occur at each floor slab can be avoided.

FIGURE 110 ***Dissipating heat from the sun***



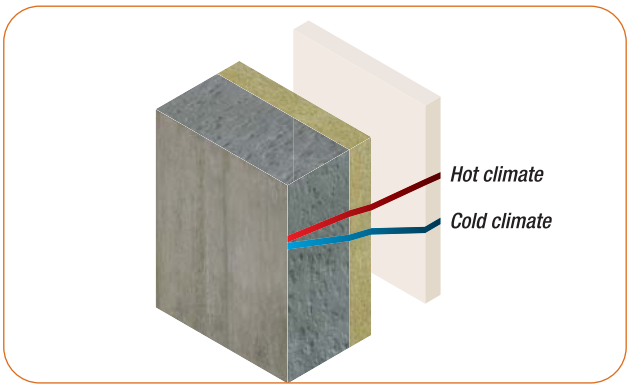
Heat passing through the exterior wall board is partially dissipated by the ventilating effect of the air space between the exterior cladding board and the structural wall.

FIGURE 111 ***Rainscreen profile***



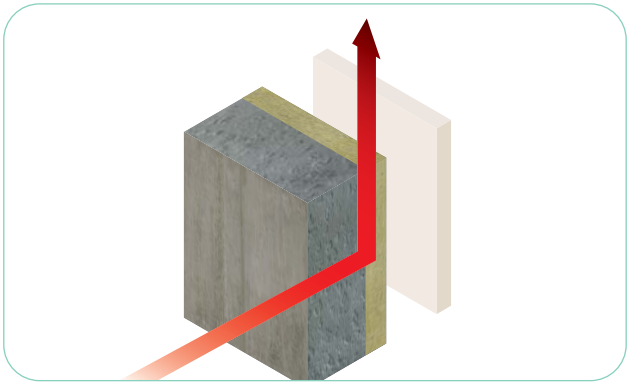
The air current flowing within the cavity evaporates water and humidity that might have penetrated behind the cladding panels via the panel joints. This water should not then reach the loadbearing wall structure and/or the insulation layer.

FIGURE 112 ***Protecting the basic structure and load bearing wall against temperature variations***



Due to the insulation material being applied to the outside of the building, changes in temperature are very minor compared with those found in conventional constructions where insulation is applied on the interior. This principles works in both hot and cold climatic conditions.

FIGURE 113 ***Prevention of internal condensation***



Insulation material can be applied to the outside of the wall structure without risk of it remaining wet due to the effects of condensation, as it is being effectively protected by the architectural cladding boards and ventilated air space.

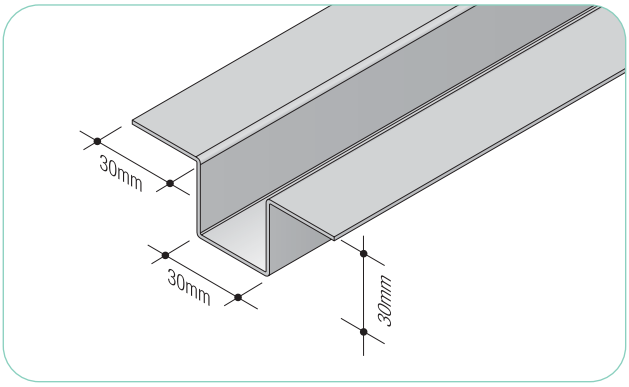
6.2 ETERPAN[fi]-MD for Wall Cladding *continued from page 53*

6.2.4 ETERPAN[fi]-MD Rainscreen Cladding System

Component of System

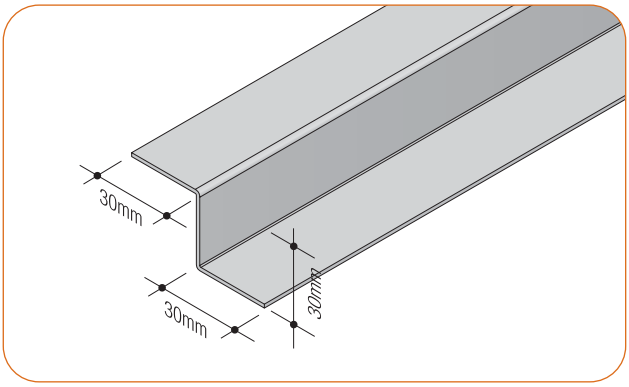
The type of framing used should be at a minimum fabricated from high quality galvanised steel profiles, as detailed below.

FIGURE 114 ***Ω profile rainscreen***



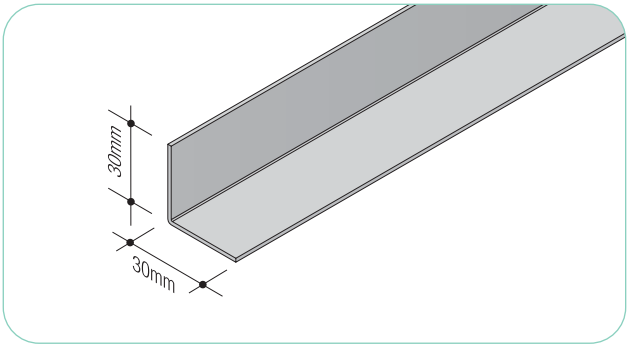
For use as support at board joints.

FIGURE 115 ***Z profile rainscreen***



For use as support at mid width of board.

FIGURE 116 ***L profile rainscreen***



For use as support at corners.

The framing is supported by high quality adjustable galvanised steel brackets, fixed directly to the substrate by means of anchor bolts. This adjustable bracket offers a ventilated cavity range from 65mm to 125mm, in order to accommodate insulation material (optional) as well as allowing natural ventilation of air behind the cladding boards.

Depending on requirements, this is achieved by selecting an appropriate size of L bracket, as detailed below.

Size	Minimum distance	Maximum distance
30mm	40mm	55mm
50mm	55mm	60mm
65mm	70mm	85mm

FIGURE 117 ***Supporting bracket rainscreen system***

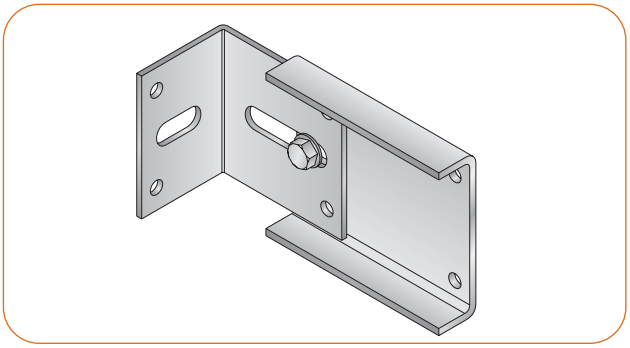


FIGURE 118 ***Adjustable bracket rainscreen system***

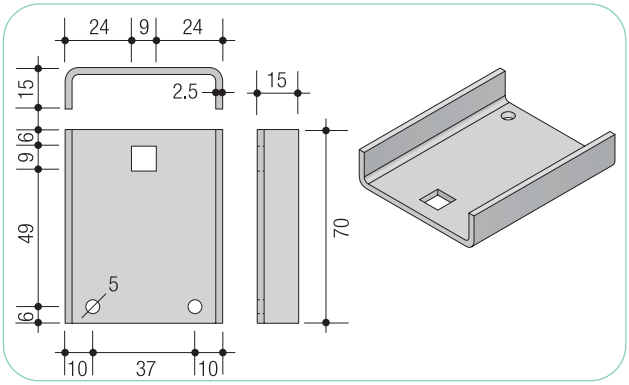
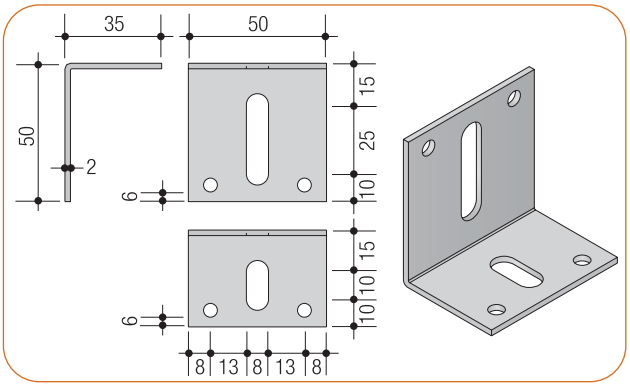


FIGURE 119 ***L bracket rainscreen system***



In those instances where insulation material is required, it can be fixed to the existing substrate using rosette pins. However, one should ensure that the cavity between the surface of insulation material and back of ETERPAN[fi]-MD should be not less than 40mm, in order to maintain free and smooth air flow through the cavity.

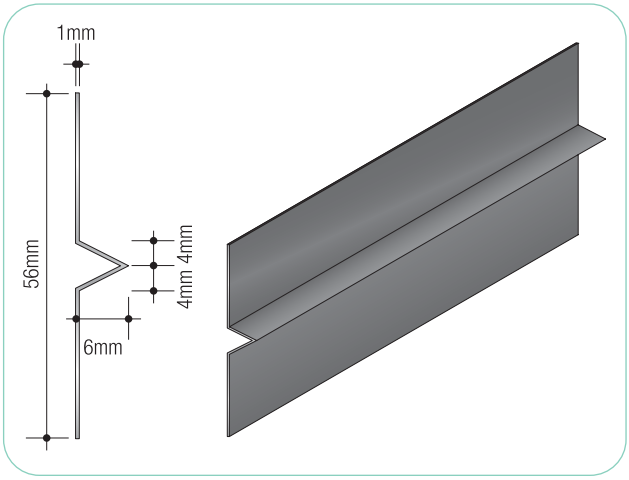
6.2 ETERPAN[fi] -MD for Wall Cladding *continued from opposite page*

Joint Treatments

HORIZONTAL JOINT

Where necessary, a horizontal V-profile, as illustrated below, with a thickness of at least 1mm, can be used to cover the horizontal board joints to prevent water from penetrating through the joints.

FIGURE 120 ***Horizontal joint rainscreen profile***



TOP & BOTTOM COVERING

In order to allow adequate ventilation within the cavity whilst keeping vermin out, a non-perforated (top, weatherproof) and a perforated (bottom, allows air movement) cavity closure can be used at top and bottom respectively.

WINDOW CILLS

Window cills, made of PVC, aluminium etc, should be incorporated in both vertical and horizontal orientations within window openings, with an extended distance of at least 20mm from the board surface to prevent back splash of rain water, and subsequent discolouration.

FIXING & SURFACE FINISHING OF ETERPAN[fi] -MD

The fixing of ETERPAN[fi] -MD to the supporting framework can be carried out by means of self-tapping screw of at least M3.5 x 25mm, of appropriate material. It is recommended that ETERPAN[fi] -MD board should be pre-drilled before the fixings are applied. The fixing points can then be finished using an appropriate sealing compound that is suitable for external use as well as compatible with the paint material.

One of the advantages of using ETERPAN[fi] -MD rainscreen cladding system is that there is no restriction on either colour selection or decoration, thus providing the architects freedom of design and innovation. For this application, water-based paint is recommended and should be carried out strictly in accordance to instructions from paint manufacturer.

It should be noted that in some types of application and under certain climatic conditions, it may be preferable to prime the rear surface of the ETERPAN[fi] -MD prior to installation, to ensure the boards remain flat and no bowing occurs. Please consult Eternit Asia Panels for details.

6.2 ETERPAN[fi]-MD for Wall Cladding *continued from page 55*

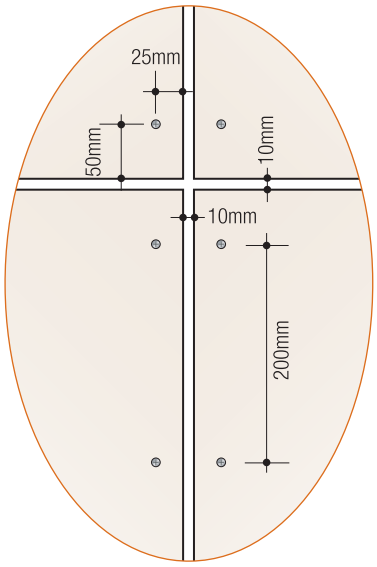
System Installation

General requirements for profile installation:

- The vertical support profiles can be fixed to the substrate either directly or by using supporting brackets. The type of anchorage used can be either self-drilling screws or anchor bolts, depending on material of the substrate.
- The maximum horizontal distance between vertical supporting profiles should not be more than 615mm.
- The maximum vertical distance between supporting brackets for a profile should not be more than 1500mm.
- Each vertical supporting profile should have at least 3 points of support. Otherwise, the maximum vertical distance between supporting brackets should be reduced to 1000mm.

NOTE: The recommended distance clearances are subject to change in accordance with wind loading requirements.

FIGURE 121 ***Installation of rainscreen system***



Corner detail

General requirements for board installation:

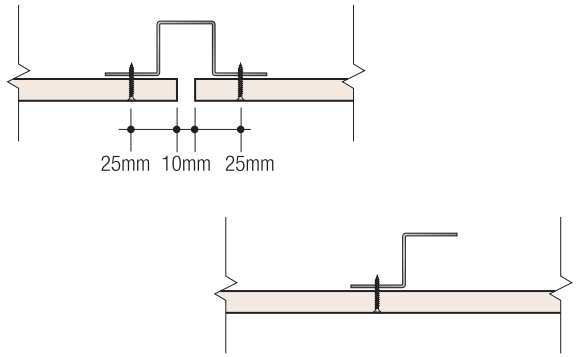
- Subjected to conditions, ETERPAN[fi]-MD can be fixed in both horizontal and vertical orientations. The clear distance for fixing points in various location should comply to the following requirements.

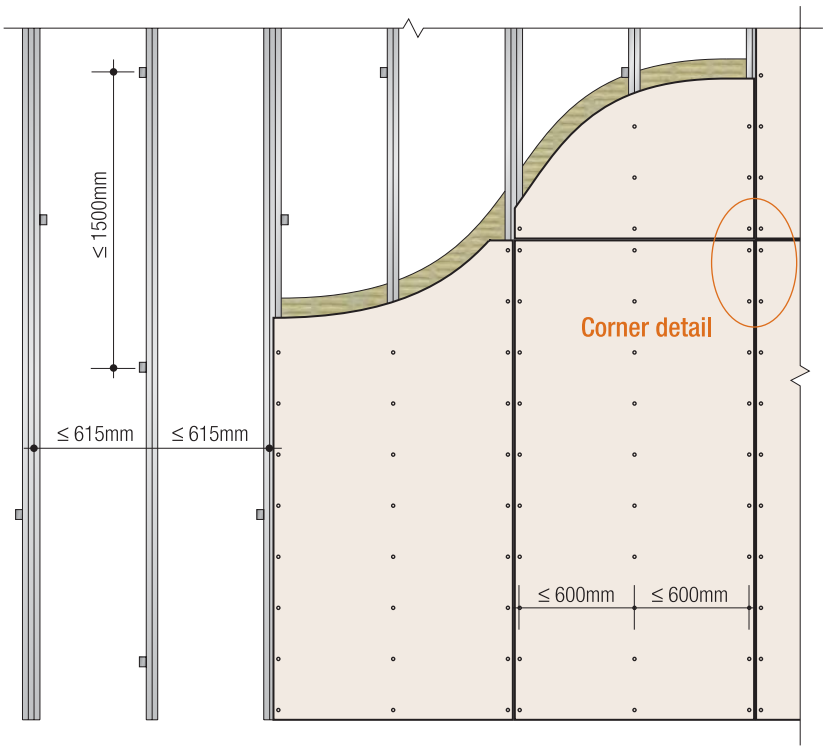
Condition	Maximum distance
Horizontal clearance between fixing points	≤ 600mm
Vertical clearance between fixing points	≤ 250mm
Horizontal clearance from edge of board	25mm
Vertical clearance from edge of board	50mm

Note: If exposure of fixing head is preferred for architectural reasons, then fixing head of size ≥ 12mm is recommended.

- From an aesthetic point of view, it is recommended that a 10mm gap between board joints, be it horizontal or vertical, is incorporated.

FIGURE 122 ***Vertical joint detail***





6.2 ETERPAN[fi] -MD for Wall Cladding *continued from opposite page*

Typical Drawing Details

FIGURE 123 *Internal corner*

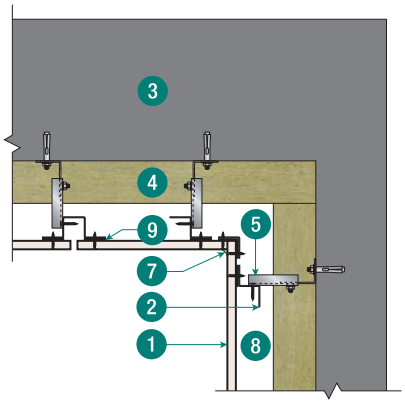


FIGURE 124 *External corner*

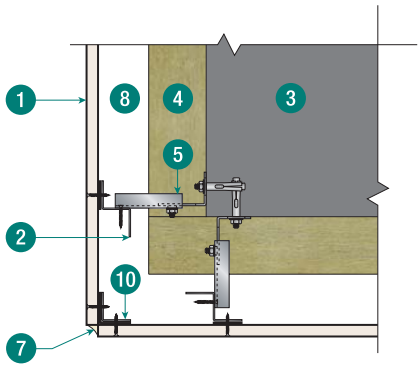
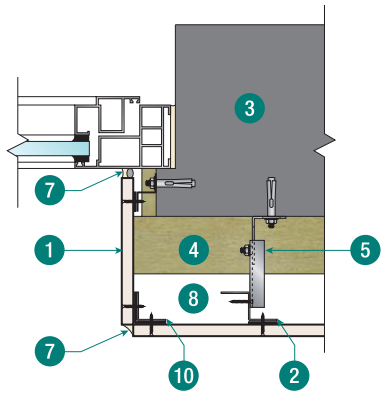


FIGURE 125 *Horizontal connection to window profile*



ANNOTATION DETAILS THIS PAGE

1. ETERPAN[fi] -MD
2. Profile
3. Existing substrate
4. Insulation
5. Adjustable bracket
6. Perforated closure
7. Sealant
8. Air cavity
9. Stainless or galvanised steel omega profile
10. L profile
11. Fixing element

FIGURE 126 *Vertical connection to window profile*

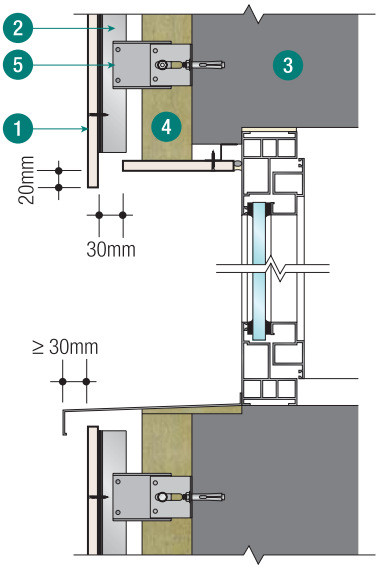


FIGURE 127 *Horizontal cross section*

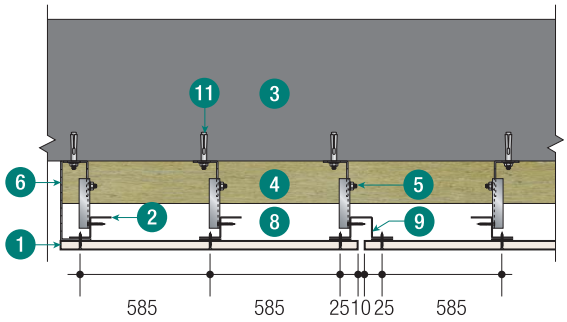
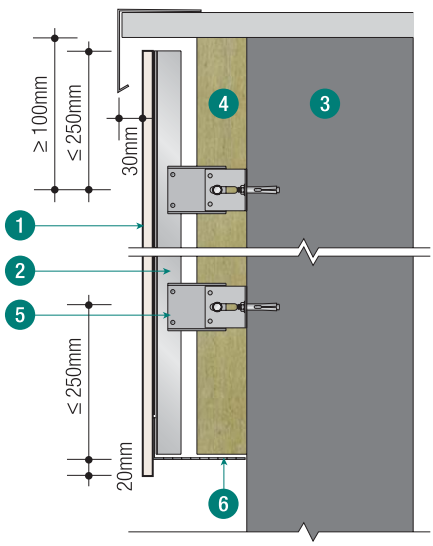


FIGURE 128 *Vertical cross section*



6.2 ETERPAN[fi]-MD for Wall Cladding *continued from page 57*

Material Consumption

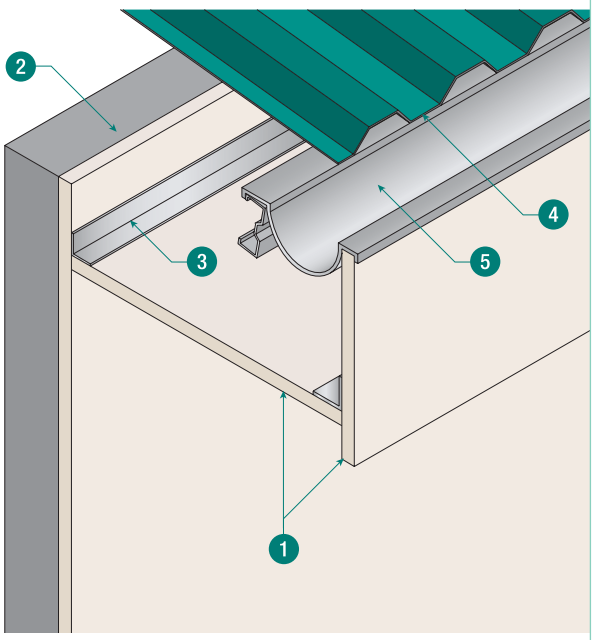
Based on experience and estimation, the consumption of materials per m^2 of an endless wall, using standard board size of 2440mm x 1220mm, vertically orientated and without openings, is tabulated below.

NOTE: these are minimal amounts and should be used for reference only. In instances where door or window opening is required, consumption of material may increase or decrease.

Material	Quantity per m^2
ETERPAN[fi] -MD	1m^2
Ω profile	1.63m
Z profile	1.63m
Support bracket	1.08 set
Anchorage for bracket	1.08 pieces
Fixing for profiles	2.16 pieces
Fixing for boards	10.95 pieces
Fixing for insulation material	9 pieces
Insulation material	1m^2

6.3 Soffit & Eaves

FIGURE 129 ***Soffit and eaves***



ANNOTATION DETAILS ABOVE

1. ETERPAN[fi] -MD
2. Existing wall
3. Alumimium angle
4. Roof decking
5. Gutter

Other than cladding applications, ETERPAN[fi] -MD is often used to construct soffit and eaves boards. ETERPAN[fi] -MD is rot proof and tolerates wet and damp conditions. Normally ETERPAN[fi] -MD of minimum 4.5mm thick is used for this application but could be up to 9mm depending on construction requirements.

ANNOTATION DETAILS: FIGURES 130-132

1. ETERPAN[fi] -MD 4.5mm thick
2. PVC jointer
3. Galvanised steel nails 40mm x 2.5mm
   Distance from edge 12mm
   Maximum centres 200mm
   Distance from corner 50mm
   See note (5) in Section 4.1, **page 15**
4. PVC corner moulding
5. Ribbon plate ex. 40mm
6. Soffit outriggers ex. 50mm
7. Polythene backer 50mm

FIGURE 130 ***PVC jointer for soffits*** *(see layout on page 60)*

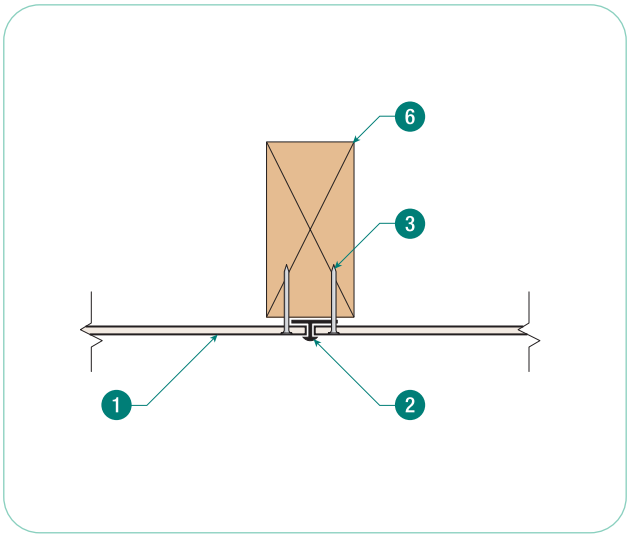


FIGURE 131 ***Expressed joint for soffits*** *(see layout on page 60)*

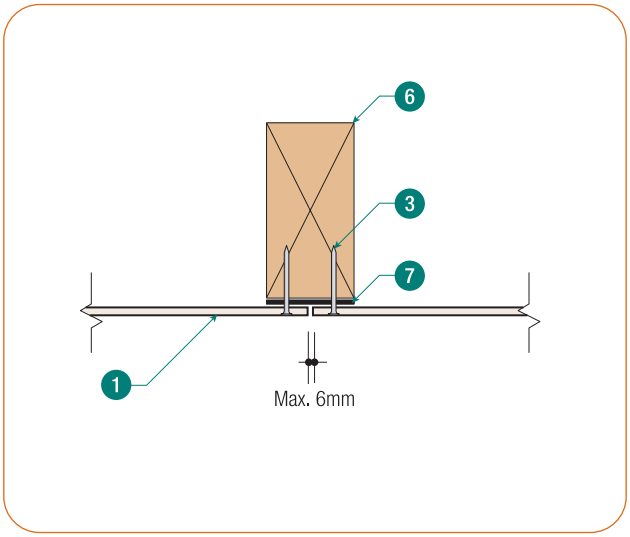
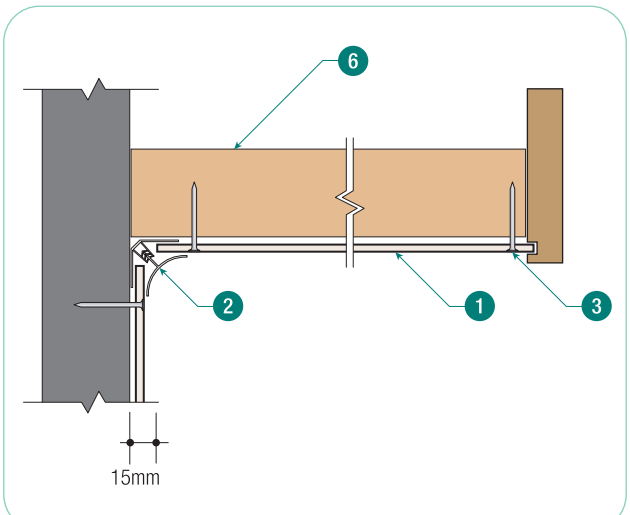
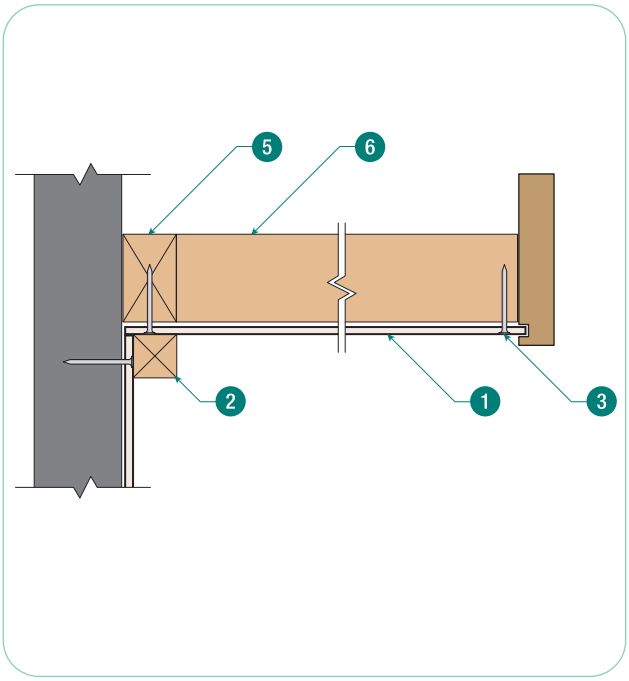


FIGURE 132 ***Corner moulding for soffits*** *(see layout on page 60)*



6.3 Soffit & Eaves *continued from page 59*

FIGURE 133 ***General arrangement for soffits***



ANNOTATION DETAILS THIS PAGE

1. ETERPAN[fi] -MD 4.5mm thick
2. Timber batten
3. Galvanised steel nails 40mm x 2.5mm
   Distance from edge 12mm
   Maximum centres 200mm
   Distance from corner 50mm
   See note (5) in Section 4.1, **page 15**
4. Rebated fascia board
5. Ribbon plate ex. 40mm
6. Soffit outriggers ex. 50mm

FIGURE 134 ***Framing layout for 450/600/700mm wide soffits***

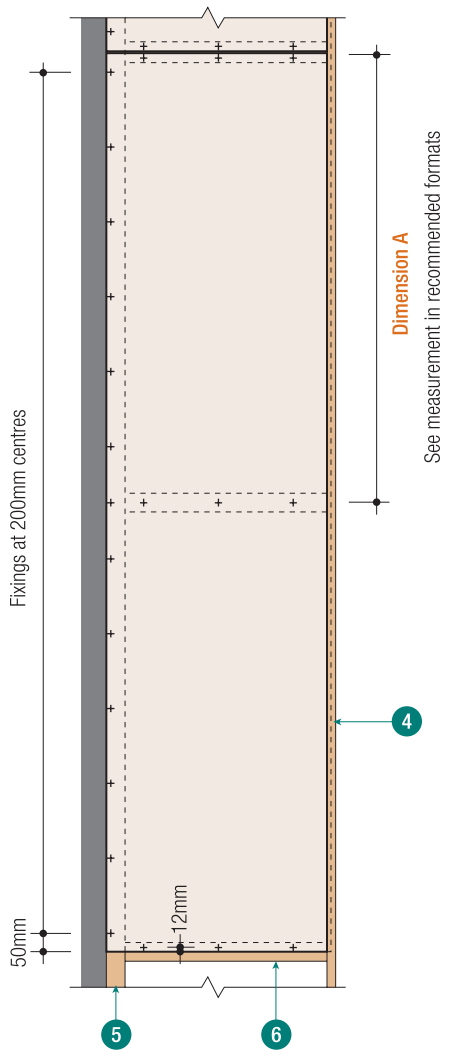
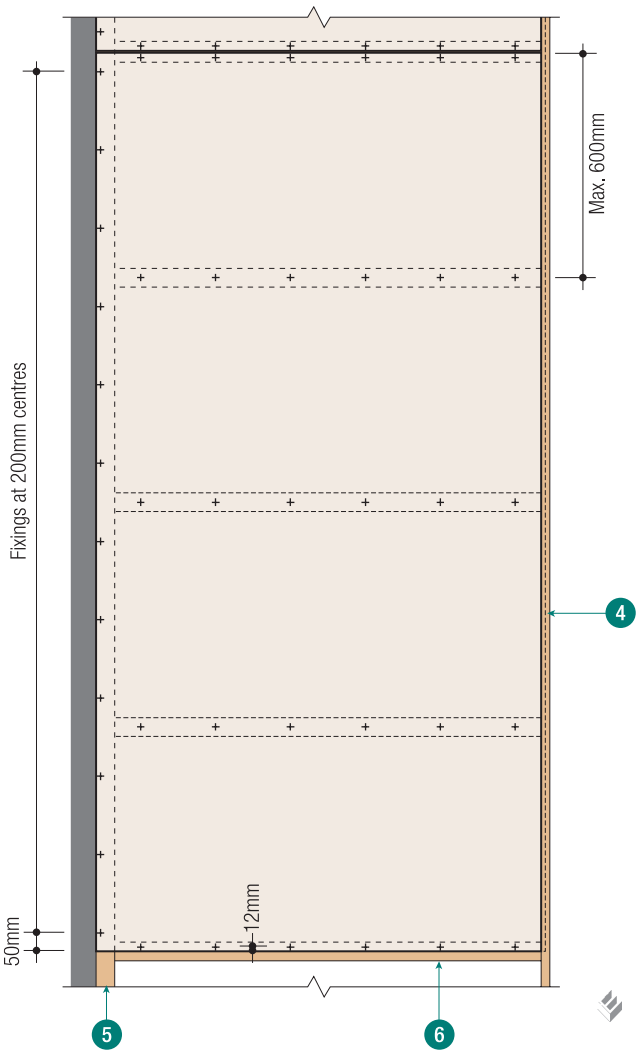


FIGURE 135 ***Framing layout for 1200mm wide soffits***



Combining ETERPAN[fi] board with light metal studs to construct non-loadbearing partitions is a dry work technique which is used world-wide. Without doubt this versatile construction system is so popular because of its simplicity and therefore requires only short installation time. Nevertheless, its characteristics are unbeaten and can meet the highest requirements. The system is flexible so that it can overcome most difficulties of installation.

7.1 Advantages of ETERPAN[fi] Partition Systems

The general advantages provided by these partition systems are as below:

- Fire resistance
  ETERPAN[fi] board itself is a non-combustible material in accordance with BS 476: Part 4. ETERPAN[fi] drywall partitions therefore will not contribute to fire by burning and will offer a degree of protection for the evacuation of personnel from the building safely.
- Compact system
  The overall thickness of ETERPAN[fi] partition is generally 50% of a half brick wall, thus giving additional space, important in these times of high floor space rental costs.
- Lightweight
  The overall weight of ETERPAN[fi] -MD drywall partition is approximately 20kg/m^2. This is only 8~10% of $^1/_2$ brick wall; and approximately 16kg/m^2 if ETERPAN[fi] -LD is used. Thus the total weight of the building is greatly reduced. This results in the loadbearing structure and the foundation being much lighter. This also means the total cost of construction will be reduced effectively.
- Thermal insulation
  Having a cavity with a drywall partition, the system provides very good thermal insulation. In addition, the thermal conductivity coefficient of ETERPAN[fi] board is only $^1/_3$ of that of bricks and therefore can also be used as an energy efficient partition system. In order to increase thermal efficiency, mineral wool panels can be inserted in the cavity.
- Sound insulation
  Although lighter than masonry, ETERPAN[fi] drywall partitions provide good sound insulation when tested according to ISO 140 series or equivalent standards. Due to the high flexibility of light metal studs and elasticity of the fibre cement board, the partition system provides good sound absorption as well. Inclusion of mineral wool batts into the wall cavity will improve the level of sound insulation.

- Fast installation
  The installation of metal studs and ETERPAN[fi] board is easy and requires only simple and portable tools. The installation time required for a dry wall system is estimated to be $^1/_3$ of masonry wall.
- Easy decoration
  The surface of partition can be decorated after completion of the construction. Decorative finishes such as paint, wall paper, laminates and tiles can be applied without any special treatment requirements.
- Easy installation of electrical wiring and sanitary ducts
  The problems caused by wiring or pipe installation within masonry walls is easily overcome within ETERPAN[fi] drywall partitions. The cavity within the partition system is an ideal and practical space for the installation of all kind of conduits, wiring and pipe services.
- Durable
  Due to the main component of ETERPAN[fi] board being cement and quartz (sand), the durability of the partitions are comparable to masonry walls.

7.2 Specifications of ETERPAN[fi] Partition Systems

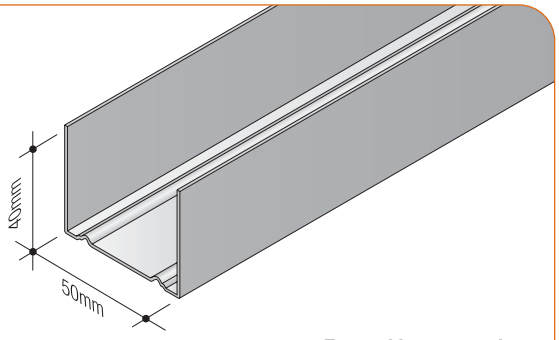
Details described in the following are based on conventional methods of construction, and should be used as a guideline only. If there are special requirements to be considered during construction, please consult Eternit Asia Panels Technical Department.

7.2.1 Specifications of ETERPAN[fi] Boards & Profiles

In general, ETERPAN[fi] -MD and ETERPAN[fi] -LD with thicknesses of 6mm, 9mm or 12mm respectively are recommended for partition constructions.

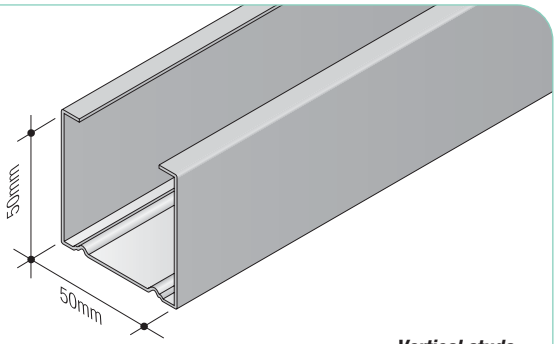
For guidance purposes, the framing of the partition comprises of horizontal U-profiles and vertical C-studs made of galvanised steel, with a standard length of 3m or 6m. Other lengths may be used depending on local market availability.

FIGURE 136 ***Selections of U-profiles and C-profiles (for guide only)***



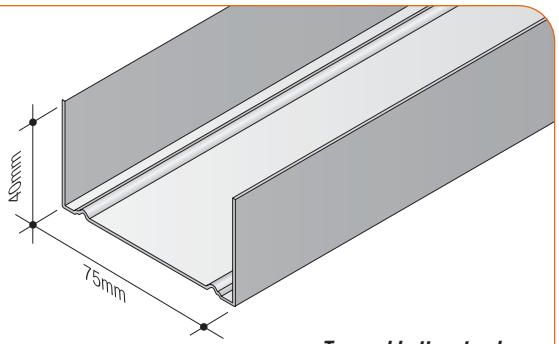
Top and bottom tracks

Code	Thickness	Dimension	Weight
U50	0.63mm	50mm x 40mm	0.63kg/m



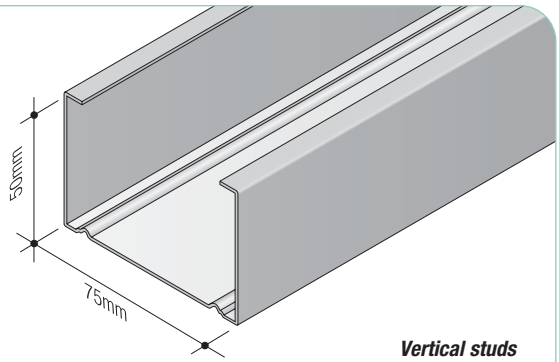
Vertical studs

Code	Thickness	Dimension	Weight
C50	0.63mm	50mm x 50mm	0.81kg/m



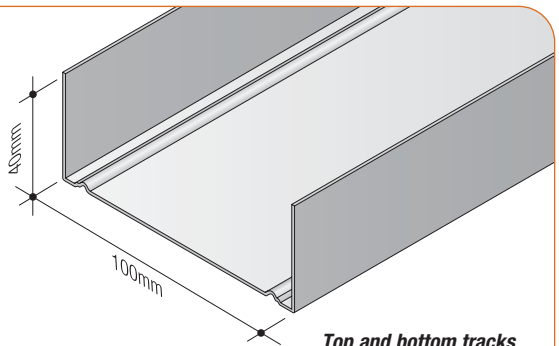
Top and bottom tracks

Code	Thickness	Dimension	Weight
U75	0.63mm	75mm x 40mm	0.75kg/m



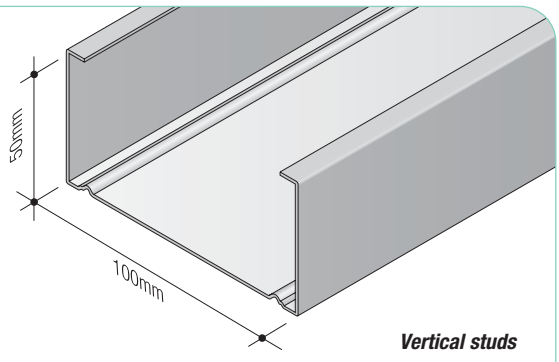
Vertical studs

Code	Thickness	Dimension	Weight
C75	0.63mm	75mm x 50mm	0.93kg/m



Top and bottom tracks

Code	Thickness	Dimension	Weight
U100	0.63mm	100mm x 40mm	0.86kg/m



Vertical studs

Code	Thickness	Dimension	Weight
C100	0.63mm	100mm x 50mm	1.05kg/m

7.2 Specifications of ETERPAN[fi] -MD Partition Systems *continued from opposite page*

7.2.2 Fixing Elements

Fixing to Surrounding Structure

The use of fixing elements for U- and C- profiles on the perimeter of the partition to a substrate depends on the nature of the surrounding structure.

SELECTION OF FIXING ELEMENTS

Substrate	Fixing elements
Concrete, brick	Expansion bolts, bullet nails, screws and plugs
Wood	Nails, screws

Fixing of Profiles

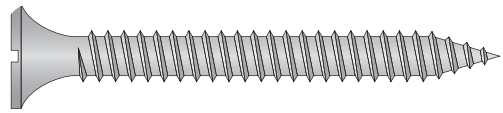
When fixing profiles to each other, rivets of minimum size 4mm diameter x 8mm can be used. Alternatively, a crimping tool can be used. See figure below.

FIGURE 137 ***Crimping tool***

Fixing of Flat Sheets

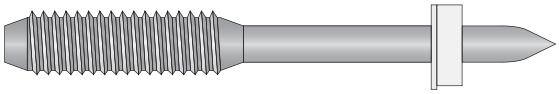
The sheets are normally fixed to profiles using self-tapping screws of an appropriate size (recommend at least M4 x 25mm).

FIGURE 138 ***Fixing elements***

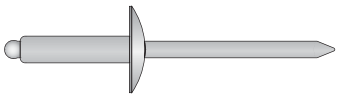


Drywall screw

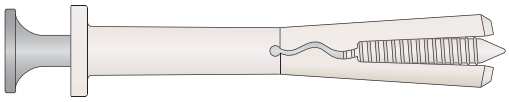
Clout nail



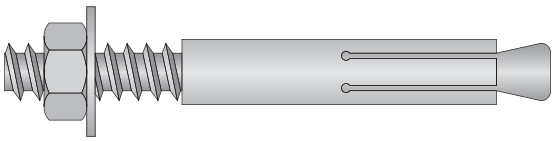
Bullet nail



Rivet



Screw and expanding plug



Expansion bolt

7.3 Partition Construction

7.3.1 Considerations & General Assembly

During the design stage, choose the right profile taking into account the height of the wall, the type of room and the dimension of any conduit that must be incorporated within the cavity of the partition.

If the wall is higher than 2.44m, the horizontal joint between the panels is supported by cross studs, cut out from U-profiles. However, 3m long ETERPAN[fi] -MD can be supplied upon request.

The recommended maximum height of the wall is as below.

MAXIMUM HEIGHT OF WALL

Stud type	High traffic areas (1)	Low traffic areas (2)
C50	3,000mm	3,600mm
C75	3,200mm	4,200mm
C100	4,000mm	5,000mm

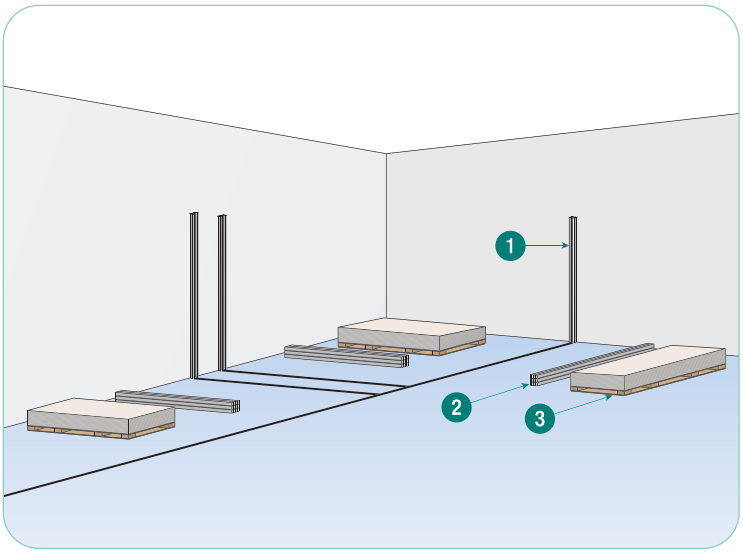
NOTES:
1) Places such as meeting rooms, classrooms, exhibition rooms, department stores and other public areas of high usage.
2) Places such as residential apartments, offices etc.
3) For high partitions please consult Eternit Asia Panels Technical Department.

The installation sequences are as detailed below:

a) Before beginning the installation, trace the position onto the floor and ceiling profiles and mark clearly to indicate door and window openings, sanitary equipment and the penetration points of conduit pipes. This does not only facilitate the installation of services after completion, but gives the opportunity to distribute materials such as boards, profiles, doorframes etc. adequately over the workplace while the total area is still free.

b) Start with the installation of U-profiles on floor and ceiling. At junctions where two partitions meet, leave a space between the U-profiles which are equal to the thickness of the ETERPAN[fi] board to be used, to accommodate potential movements.

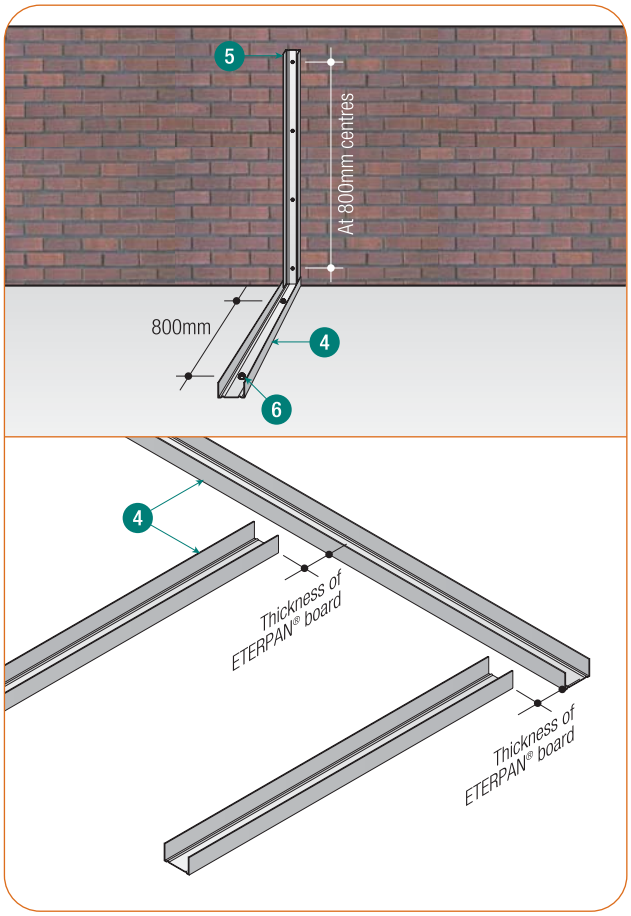
FIGURE 139 ***Making and material distribution***



ANNOTATION DETAILS THIS PAGE

1. Traced lay out
2. Bundle of profiles
3. Sheets
4. Horizontal profiles
5. Vertical profiles
6. Bullet nail or expansion bolt or screw and plug

FIGURE 140 ***Installation of U-profiles and tolerance for movements***

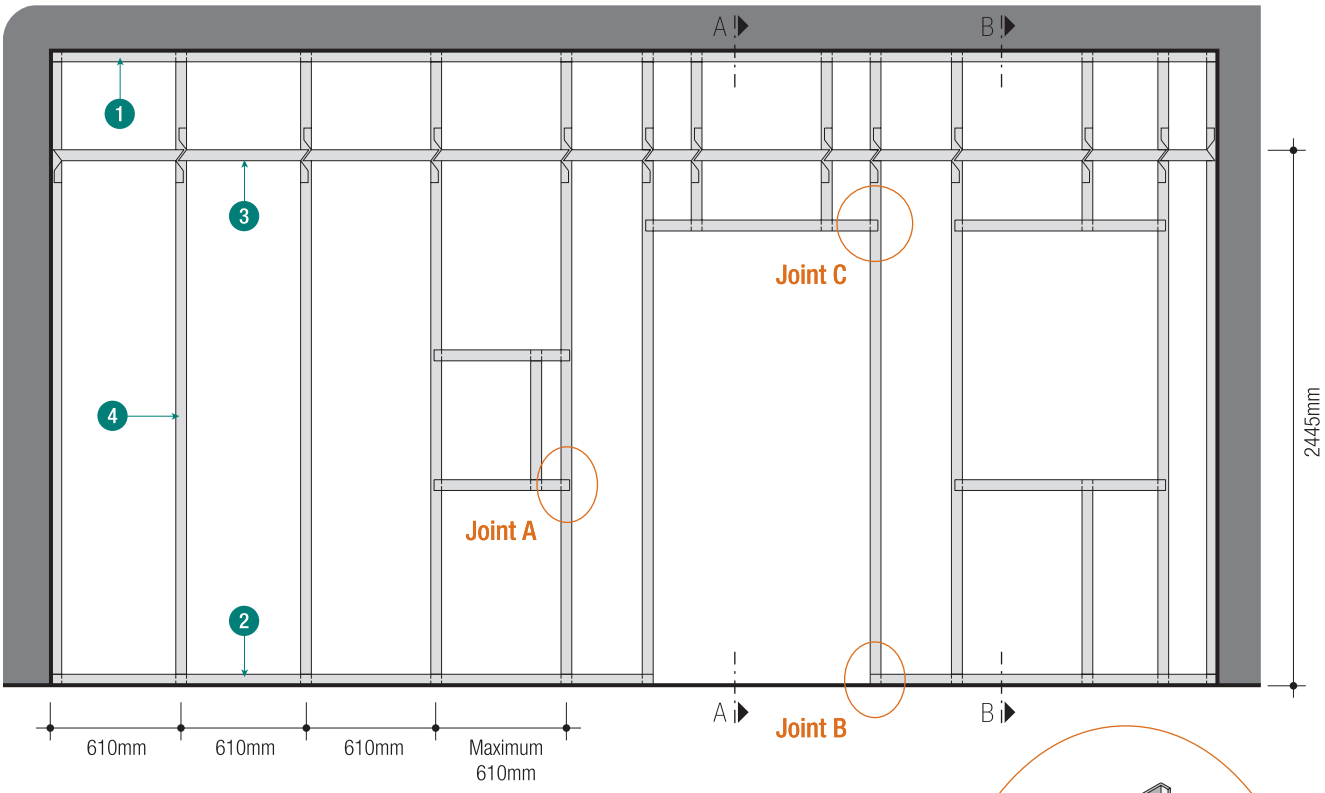


c) Fix the C-profiles against the adjacent walls. The maximum distance between fixing points is a nominal 800mm. The studs are then inserted into the U-profiles at nominal 610mm centres. Note that the length of these studs should be 10mm less than the floor-to-ceiling distance, in order to accommodate expansion movements.

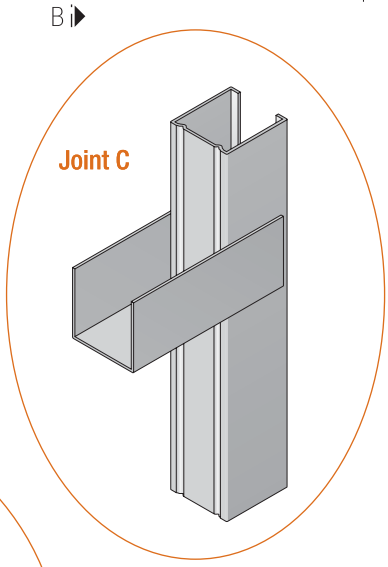
7.3 Partition Construction *continued from opposite page*

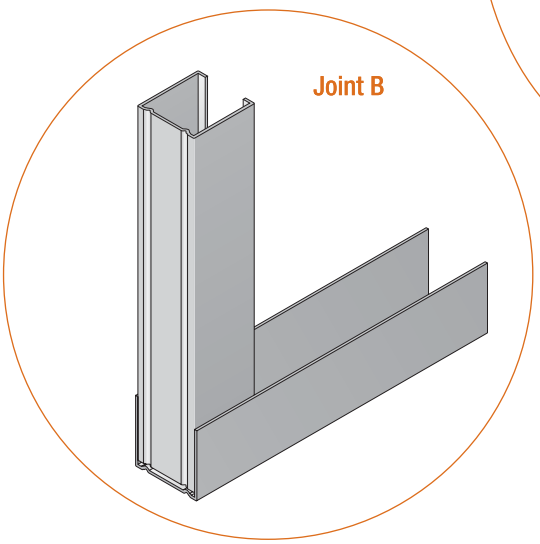
d) Extra studs are placed at a wall end, junction and at both sides of large openings. When the wall is higher than the length of a sheet, noggings made up of U-profile can be used to back the horizontal joint between panels.

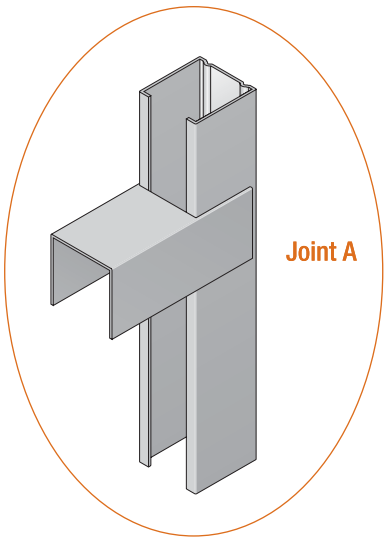
FIGURE 141 ***Installation of studs and openings*** *(see page 67 for vertical sections A-A and B-B)*



1. U-ceiling profile
2. U-floor profile
3. Horizontal cross profile
4. Vertical C-profile



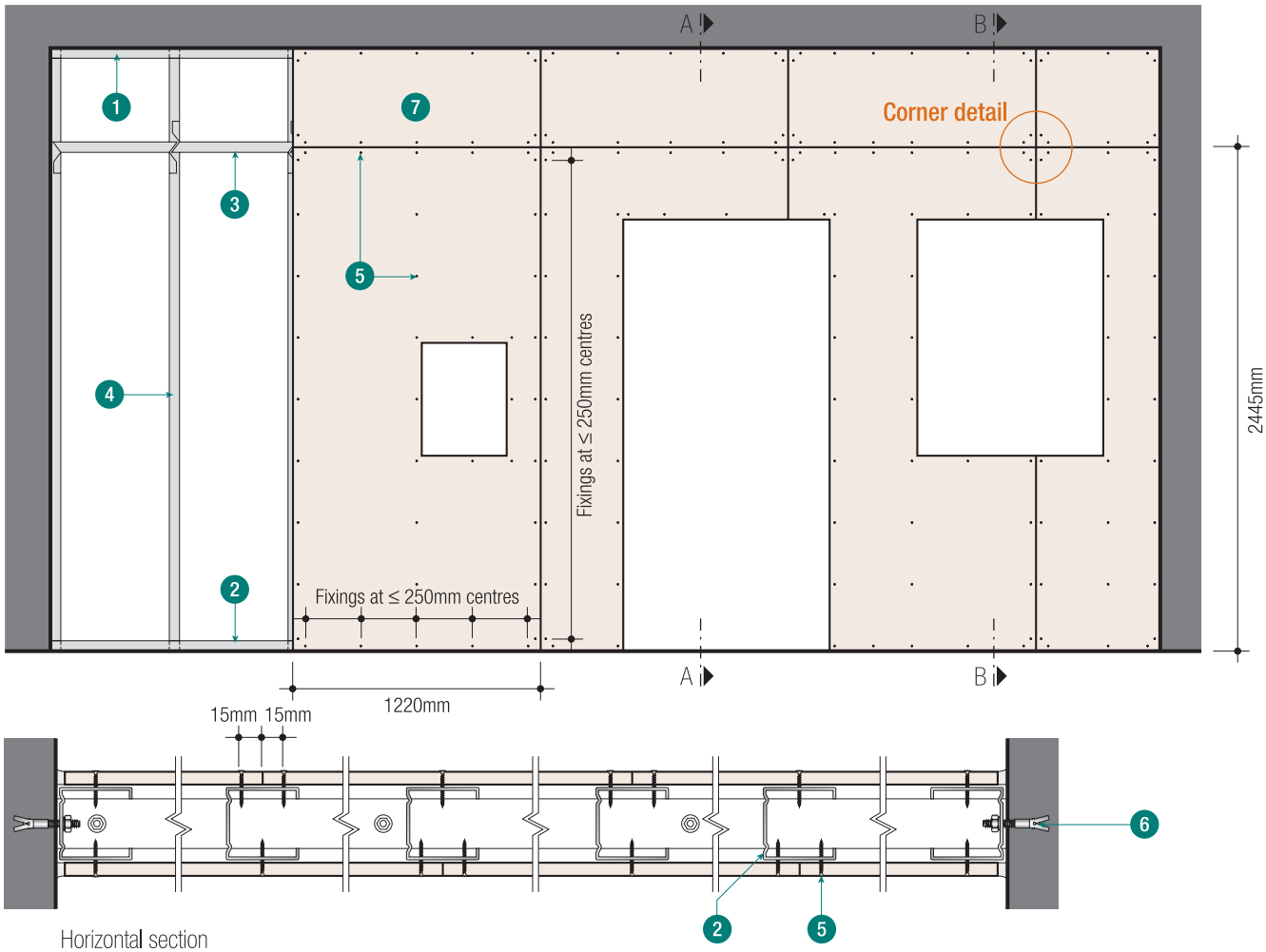




7.3 Partition Construction *continued from page 65*

e) The ETERPAN[fi] sheets are cut to size 10mm shorter than the height of wall. After adjusting the studs the sheets can be screwed to the profiles in such as way that the joints at both sides of the partition are staggered. Leave a joint of 5mm between the panel and the floor. Screws are fixed at nominal 250mm centres, at 15mm from the edges and 50mm from the corner of the sheets.

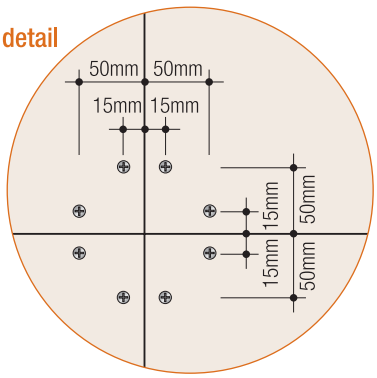
FIGURE 142 ***Board installation*** *(see opposite page for vertical sections A-A and B-B)*



Horizontal section
(profile fixing measurement and 6 similar in vertical section)

1. Ceiling profile
2. Floor profile
3. Horizontal profile
4. Vertical profile
5. Self-tapping screw
6. Bullet nail, expansion bolt or screw and plug
7. ETERPAN[fi] -LD

Corner detail

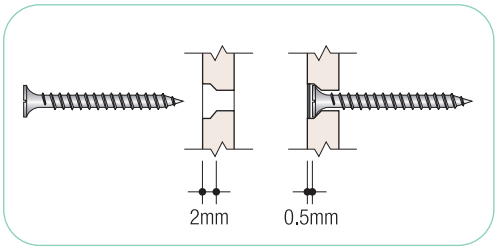


f) ETERPAN[fi] board can be supplied bevelled on 1, 2, 3 or 4 edges.

g) When partitions are of a height above the length of a single sheet or when a panel is cut to size, the board must be bevelled on site to facilitate the application of a jointing compound. For small amounts a plane with a hardened steel blade can be used. Otherwise an angle grinder with a carborandum blade can be utilised for large quantities. For larger volumes tools with diamond tipped blades are recommended.

h) When fixing the board, the head of the screw must be inserted 0.5mm below the surface of sheet to obtain flush finishing during the application of jointing compound.

FIGURE 143 ***Depth of screw***



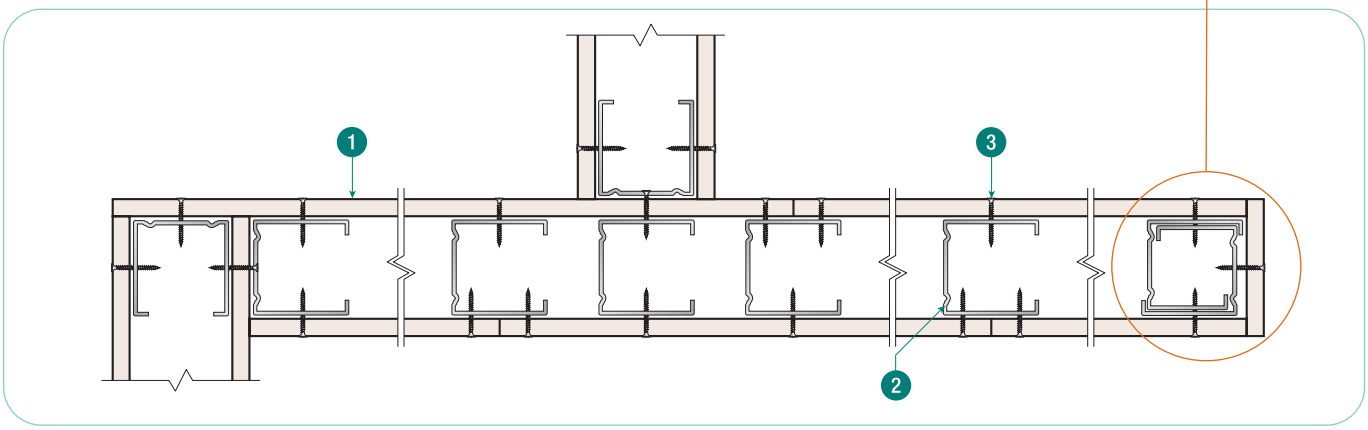
7.3 Partition Construction

7.3.2 General Details

Typical L-Junctions, T-Junctions & Partition Ending

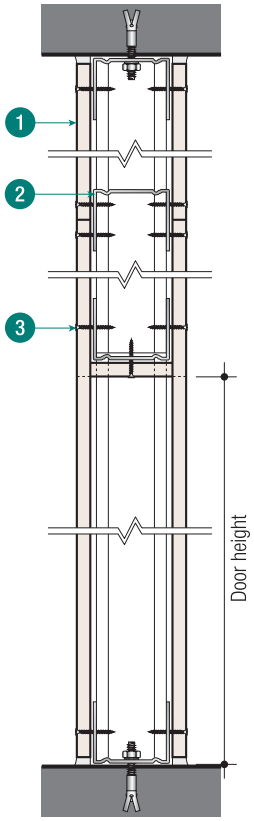
Care should be taken that where the partition wall is to end floating, e.g., is not fixed to a substrate, the last stud should be boxed to ensure the partition has additional stiffness and strength.

FIGURE 144 ***L-junctions, T-junctions and partition ending***



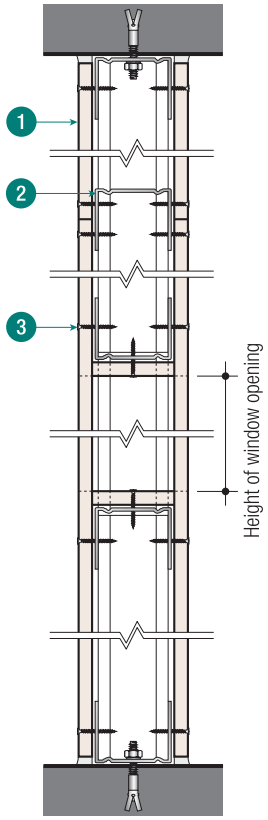
Door (vertical section A-A)

At either side of an opening for doors an extra stud must be fixed by means of rivets or equivalent to ensure the partition has additional stiffness at this point to withstand the stress imposed by the door. The studs should continue at 610mm centres over the door. The U-profile above the door is fixed to the extra studs by means of rivets or equivalent. See **FIGURES 141 or 142** for details and below for door cross section. The sheets that cover the area beside and above the door should not be cut in two pieces.



Window (vertical section B-B)

At both sides of the window one extra stud must be fixed.. Under and above the window additional U-profiles are also fixed after being cut to size. See **FIGURES 141 or 142** for details and below for window cross section.



ANNOTATION DETAILS THIS PAGE

1. ETERPAN® board
2. Profiles
3. Screw fixings

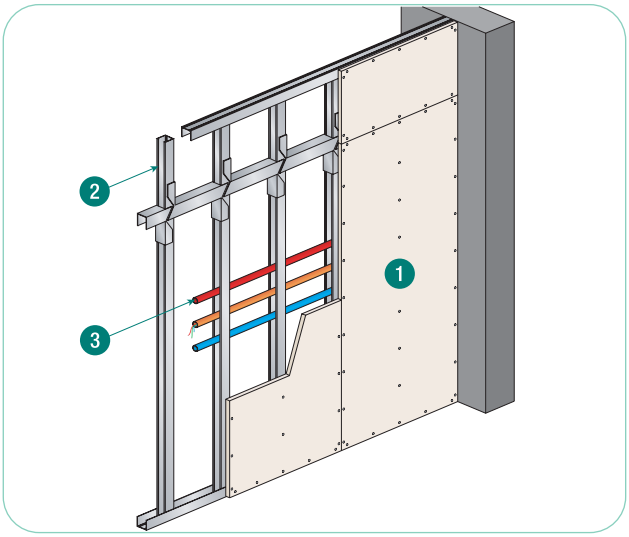
7.3 Partition Construction *continued from page 67*

Small Openings Not Coinciding with Stud

Around the opening a bridging construction of U- and C-profiles is fixed with rivets. See **FIGURE 141** for details.

Incorporation of Conduit Piping

FIGURE 145 ***Installation of conduit pipes***



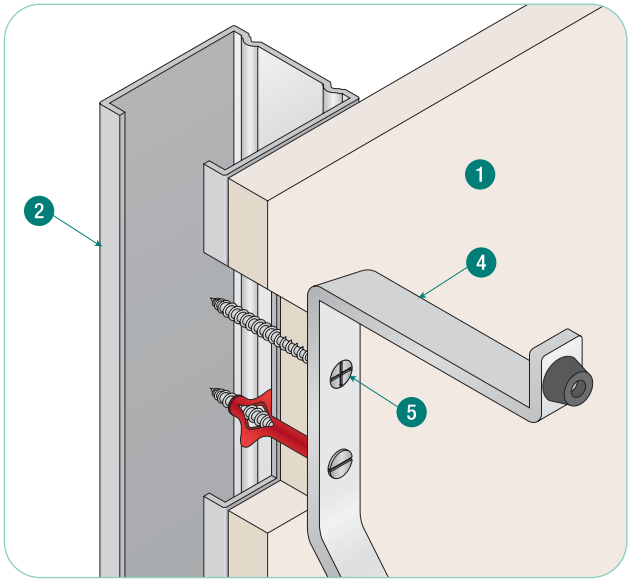
Fixing of Heavy Elements

When heavy elements such as wardrobe, shelves, wash basin, etc. must be fixed, inclusion of wood, plywood or heavy stud are required to transfer the load to the framing and thus avoid damaging the sheets.

Fixing of Light Elements

To fix light elements to the partition, one can use screws, hooks or screws with special cavity wall plugs.

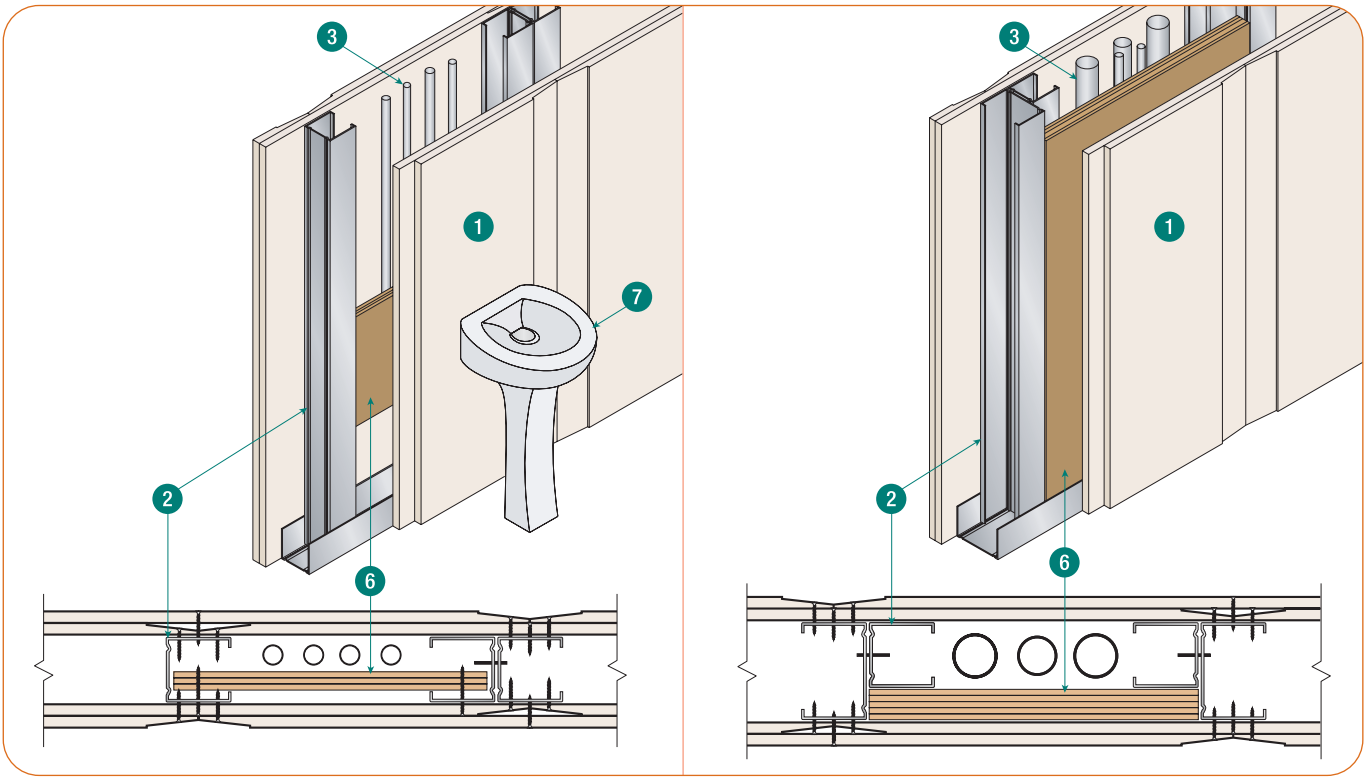
FIGURE 146 ***Fixing of light elements***



ANNOTATION DETAILS THIS PAGE

1. ETERPAN[fi] board
2. Galvanised profile
3. Services
4. Hanger
5. Screw fixing
6. Plywood as backing board
7. Basin

FIGURE 147 ***Fixing of heavy elements***



7.3 Partition Construction

7.3.3 Joint Finishing

Level of Surface Finish

Before any jointing work is started the surface of the joint must be coated with a primer over a width of 300mm, symmetrical divided over both panels.

Apart from the applications where no finishing of the joints and stopping of the screw holes is required or where no aesthetic requirements are given one can distinguish three grades of finish, as below:

GRADE A
To be chosen if the surface is finished with non-textured coatings or with a high build finish. It is strongly recommended in all cases where critical lighting conditions occur. All joints must be finished as described in page 14. The total surface must then be finished with a thin layer of skim coat. This last layer must be finished in an absolutely smooth manner.

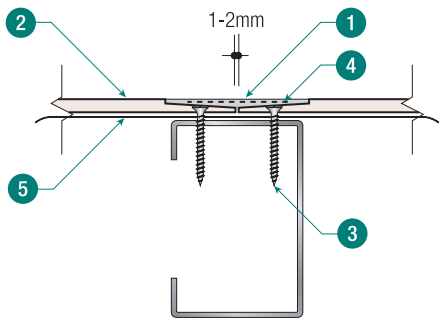
GRADE B
To be chosen if the surface is finished with textured coatings or wallpaper in situations with non-critical lighting. All joints must be finished as described in page 14. Furthermore, a third layer with a special joint finishing product must be applied. The screw heads must also be finished in a similar manner.

GRADE C
To be chosen if the surface is finished with tiles, vinyl or heavy textured finishes. The surface of the construction must be treated in a way that any possible uneven part will not reflect through the finished layer.

Flush Joint

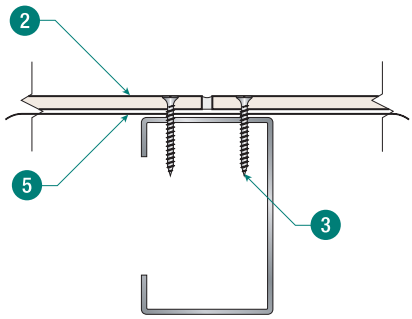
When panels with bevelled edges are used and if the wall is higher than the length of the sheets, the panels must be bevelled along the width on site. The jointing system comprises of plaster-based joint filler and reinforcing paper tape, as described in page 14.

FIGURE 148 ***Flush jointing on board with bevelled edges***



When panels with straight edges are used, one should leave a 4mm opening between boards and further fill with the same joint filler to obtain a semi-flush joint.

FIGURE 149 ***Flush jointing on board with straight edges***



Decorative Joint

This method leads to a much quicker mounting of the construction. Profiles that are covering the joint can be used to fix the panels in the same time. In that case, if a panel width of 610mm is used, no other fixings are needed which provides the opportunity to finish the panels once mounted.

When Ω-profiles are used, the distance between the studs must be adapted to enlarge the joint between the panels. When demountable walls (see page 72) are required in areas such as offices, etc., these type of profiles give the possibility to do so at minimal cost.

Expansion Joint

In areas subjected to very high moisture variations, reduce the distance between the vertical profiles to 407mm and an expansion joint of 4mm every 3 panels should be allowed for.

ANNOTATION DETAILS THIS PAGE

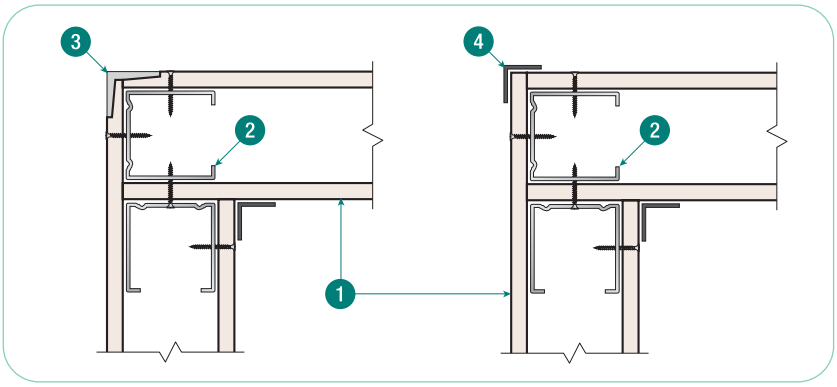
1. Joint filler
2. ETERPAN® board
3. Self-tapping screw
4. Paper tape strip
5. Building paper

7.3 Partition Construction

7.3.4 Other Finishing Details

External & Internal Corners

FIGURE 150 *External and internal corners*



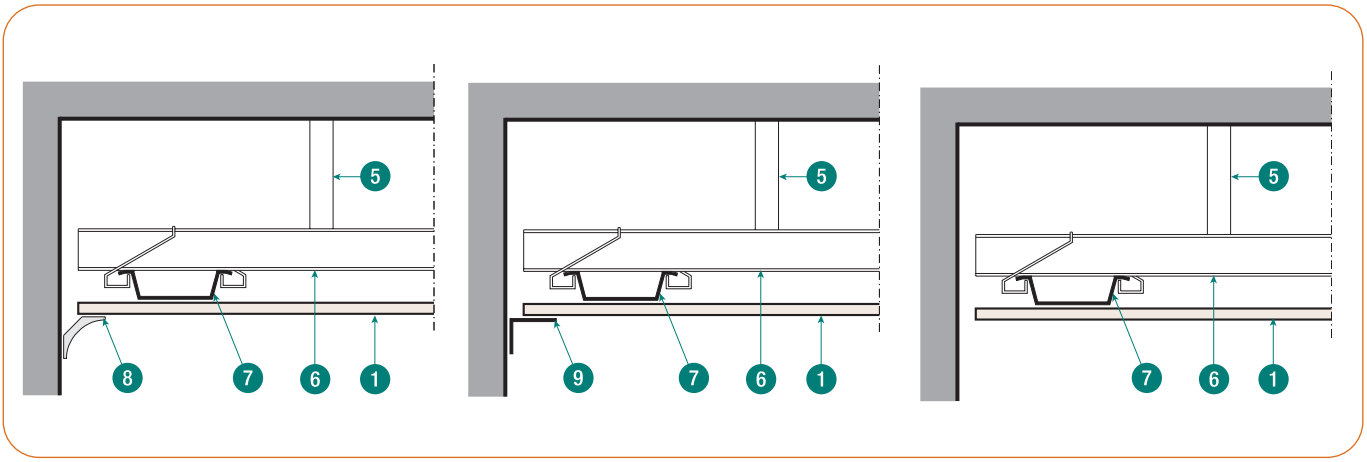
ANNOTATION DETAILS THIS PAGE

1. ETERPAN[fi] board
2. Galvanised profile
3. Flush finished at corner
4. Corner profile for edge protection
5. Suspended element
6. Primary framings
7. Secondary framings
8. Plinth cornice
9. Covering profile

Wall-Ceiling Junction

Several options can be used for this detail.

FIGURE 151 *Wall-ceiling connections*



7.3.5 Decoration

Before applying any decoration; at all times strictly follow the paint manufacturers recommendations.

Paint

All kinds of paints suitable for fibre cement products are acceptable. They can be applied by spray, brush or roller on the surface of the sheet. The instructions of the paint manufacturer must be strictly followed at all time. For a water-based acrylic paint, it is advisable to first apply primer before applying two layers of acrylic paint.

Wall Paper, Textile Laminates

All manner of flexible wall covering materials can be adhered onto ETERPAN[fi] board, provided accumulated dust on board surface is first removed. The instructions of these adhesive supplier must be strictly followed at all times.

Tiles

When ETERPAN[fi] partitions are to be tiled in wet rooms, the distance between the studs must be reduced to 407mm. the partition must have an expansion joint every 3 panels. This expansion joint must coincide with a joint between the tiles which is filled with elastic caulking material such as silicones, polyurethanes, etc. The tiles must be fixed with a flexible synthetic adhesive formulated for tiles and use on fibre cement boards. Use only compressive grouts for tiling. In wet room applications special precautions must be taken: before tiling a waterproof membrane must be applied and all pipe penetrations must be sealed with a flexible sealant.

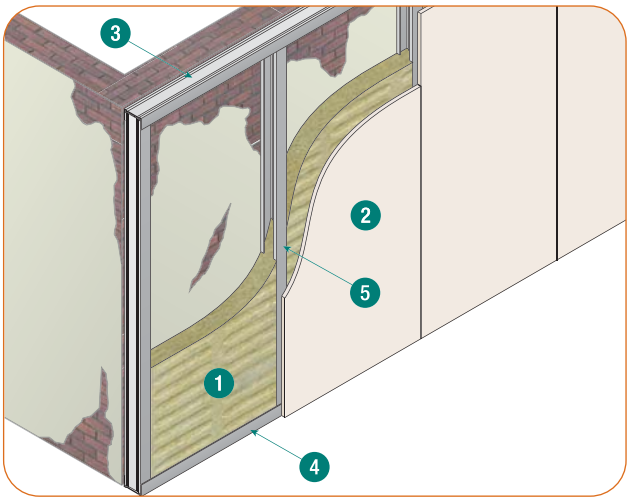
For more details regarding the use of ETERPAN[fi] board in wet areas, please refer to page 85.

7.4 Special Applications

7.4.1 Wall Lining

For the refurbishment of brick or concrete walls, an ETERPAN[fi] board facing can be used. To increase the rigidity of the construction, one may put an intermediate fixing point by means of a 20mm wide ETERPAN[fi] strip. If required additional insulation materials can be positioned between the wall and the ETERPAN[fi] board.

FIGURE 152 ***Wall refurbishing***



1. Mineral wool
2. ETERPAN[fi] board
3. Top track
4. Bottom track
5. Vertical profile

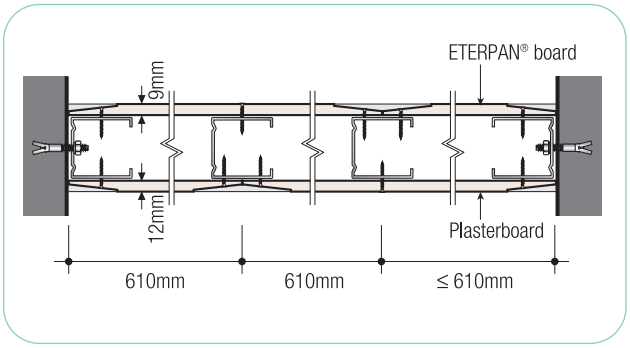
7.4.2 Sound Insulating Partition

When high sound insulation performance is required special constructions can be made. In this case, attention must be given to providing an airtight connection between the partition and the surrounding structure, in order to avoid passage of sound through any gaps.

Asymmetrical Construction

A special sound insulating effect is obtained when two different thickness (i.e. 9mm and 12mm) or products of two varying densities (i.e. plasterboard and ETERPAN[fi]) are used at both sides of the stud.

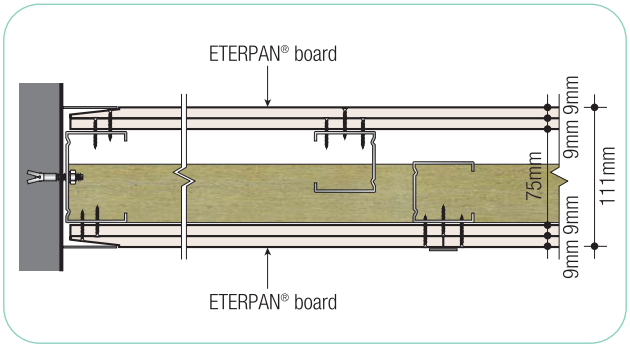
FIGURE 153 ***Asymmetrical construction***



Independent Stud

Contact between the ETERPAN[fi] board at both sides of the partition can be avoided by using a double stud grid that is not linked. This will reduce sound transmission through the construction.

FIGURE 154 ***Double studs system***



For reference, tabulated below are STC levels obtained from various partition configurations, constructed using ETERPAN[fi] -MD boards.

Sound Insulation Performance of ETERPAN[fi] -MD Partitions

Board thickness (mm)	Type of studs	Board placed to studs	Insulation	STC rating
12	C-channel metal studs	One side	Nil	36
		Both sides	Nil	47
			Yes	53
9	Timber studs	Both sides	Nil	45
			Yes	52

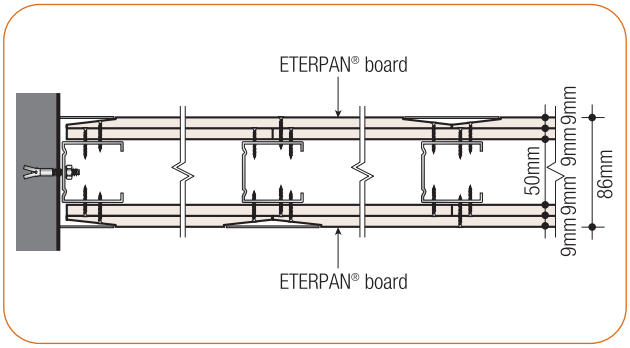
Should further information be required concerning acoustic performance of ETERPAN[fi] board, please consult Eternit Asia Panels Technical Department.

7.4.3 Impact Resistant Wall

When a high impact resistance partition is required, fix two layers of ETERPAN[fi] -MD on both sides of the stud. However, note should be taken that the second sheet must be fixed with longer screws (minimum M4 x 35mm).

This method will also increase the sound and thermal insulation performance of the partition.

FIGURE 155 ***Impact resistant wall construction***



7.4 Special Applications

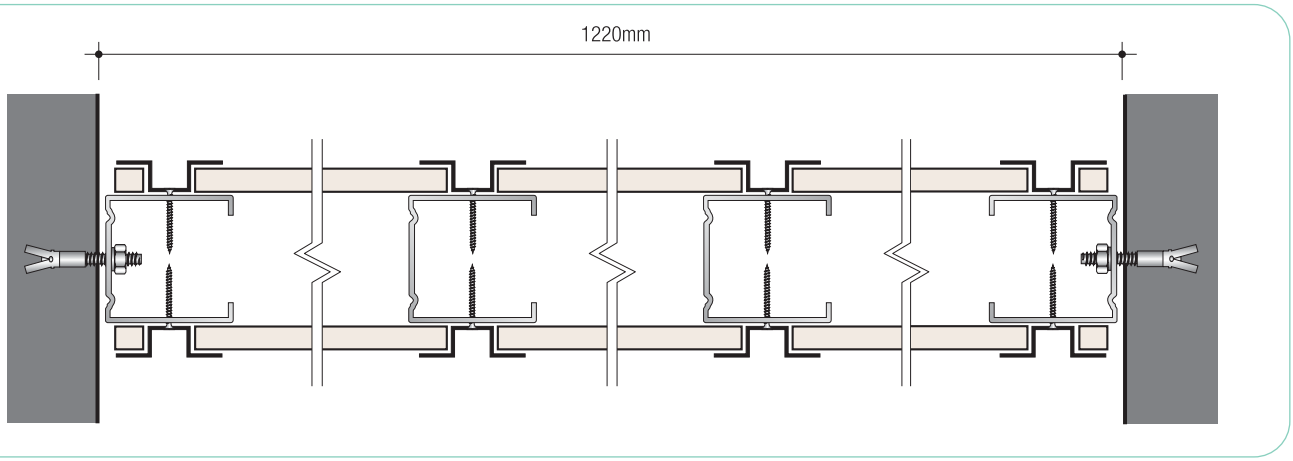
7.4.4 Demountable Partition

Using ETERPAN[fi] -MD, a demountable partition is possible to construct in several ways, two such example is as follows.

Demountable Partition Using Ω-Profiles

Pre-decorated panels of nominal 610mm wide can be fixed with Ω-profiles to the studs. The partition can be dissembled and reassembled simply by removing and relocating the fixing screws of the omega s.

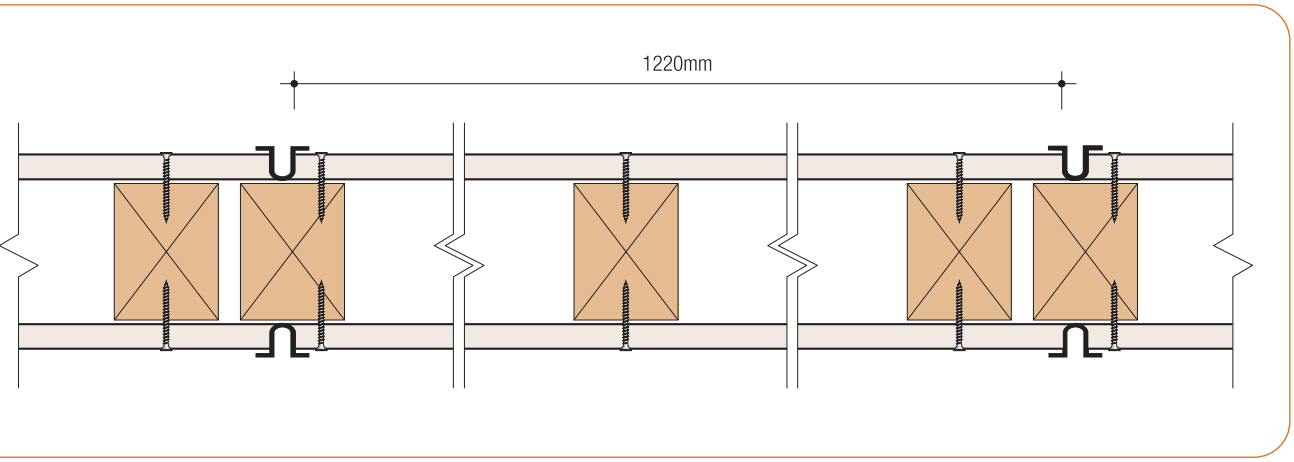
FIGURE 156 ***Demountable partition using Ω-profiles***



Pre-fabricated Demountable Partition

Pre-fabricated composite panels are fixed at floor and ceiling level onto L-profiles. The partition is finished by means of a skirting and a coving at the junction with the ceiling. Joints between panels can be left open or can be finished with a cover profile. For more information, please consult Eternit Asia Panels Technical Department.

FIGURE 157 ***Pre-fabricated demountable partition***



7.4.5 Material Consumption

Based on experience and estimation, the consumption of materials per m^2 of an endless wall, with height of 3000mm using standard sheet size of 2440mm x 1220mm, without openings, is as tabulated on the right.

Note these are minimal amounts and should be used as a guide only. The exact quantity of material required must be calculated for an individual project.

MATERIAL CONSUMPTION

Material	Quantity/m^2
U-profiles	0.67m
C-studs	1.63m
U-cross studs	0.33m
Fixing to surrounding structure	0.83pcs
ETERPAN[fi] board	$2m^2$
Screws	30pcs
Joint filler	0.5kg
Paper tape	2.3m

ETERPAN[fi] board can be combined with several types of profile systems to construct a variety of suspended ceilings. Due to their simplicity and short installation time, ETERPAN[fi] ceiling systems have gained popularity in building construction. Moreover, their aesthetic and technical characteristics can meet most requirements and are so flexible that all difficulties in detailing can be overcome.

Note that the STANDARD THICKNESS OF ETERPAN[fi] BOARD RECOMMENDED FOR CEILING SYSTEMS IS 6MM THICK. System with thicker boards are heavier and would need additional safety precautions, meaning additional framing could be needed to support the extra weight.

8.1 Advantages of ETERPAN[fi] Ceiling Systems

Some of the advantages presented by these ceiling systems are as below:

- Fire resistance
  ETERPAN[fi] board itself is a non-combustible material in accordance with BS 476: Part 4. Thus in the event of fire, the ceiling system could give a degree of resistance to allow the occupants to evacuate safely from the building.
- Humidity resistance
  When in contact with constant humidity, ETERPAN[fi] board remains stable and does not disintegrate.

- Fast installation
  The installation of profiles and ETERPAN[fi] boards are simple and require only simple and conventional installation tools.
- Good thermal and sound insulation
  When a layer of mineral wool is lay on top of the panel, it enhances the sound and thermal insulation of the ceiling system, which is also energy saving. When perforated ETERPAN[fi] boards are used along with mineral wool, the whole then forms a perfect sound absorption barrier.

- Lightweight
  The light weight property of ETERPAN[fi] board allows easy handling and fixing.
- Easy installation of E&M services
  The cavity above ETERPAN[fi] ceiling system is an ideal and practical space for installation of E&M services such as air-conditioning ducts, electric wiring etc.

- Harmless to humans and animals
  Various tests confirmed that there is no dispersion of harmful fibres in places where ETERPAN[fi] board is used in the event of fire. The ETERPAN[fi] sheet does not release toxic gases or smoke.
- Long life circle
  ETERPAN[fi] board is made from mixture of cement and quartz. Therefore the durability of the ceilings can be expected to exceed 25 years.

8.2 Specifications of ETERPAN[fi] Ceiling Systems

8.2.1 Sheet Size

Generally ETERPAN[fi]-MD of thickness 4.5mm and 6mm are normally preferred for exposed Tee-grid ceiling construction, in dimensions of either 595mm x 595mm, 595mm x 1195mm, 605mm x 605mm or 605mm x 1195mm.

If ETERPAN[fi]-LD is used, the preferred thickness then ranges from 6mm to 9mm or even 12mm, depending on requirements. In addition, ETERPAN[fi]-LD can be perforated in various patterns for use as a sound insulation ceiling barrier, which will provide a result ranging from 30dB to 35dB. For more information on low density sound insulation ceiling board, please consult Eternit Asia Panels Technical Department.

For a concealed ceiling system, ETERPAN[fi]-MD with a thickness of 9mm or 12mm is preferred.

8.2.2 Profiles & Accessories for ETERPAN[fi]-MD Ceiling Systems

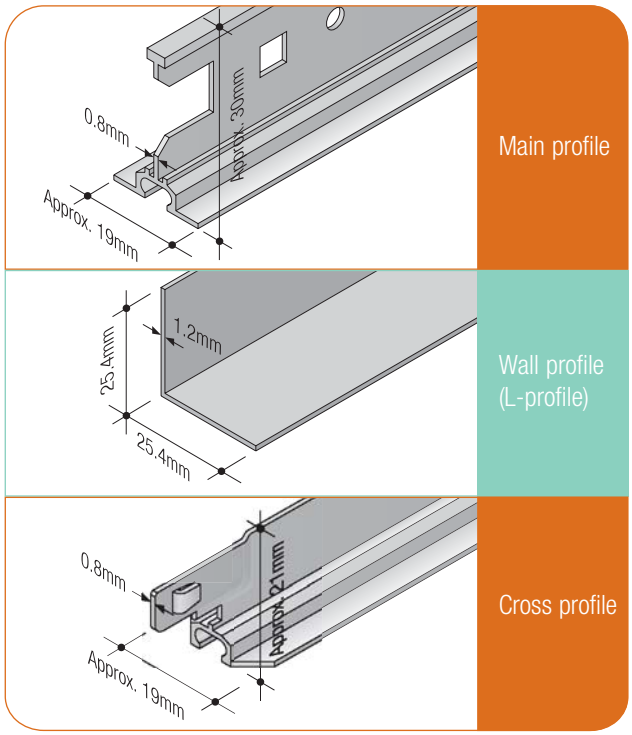
In order to maintain the integrity and durability of ETERPAN[fi] ceiling systems, the type of profile used for framing is important, especially if it is designed as a load-bearing structure.

The following are some profiles that are commonly used and thus easily available. The size of profiles can be amended at any time as long as they possess comparable performances as the following, which should be treated as the minimum requirements for constructing the ceiling system.

Exposed Tee-Grid Ceiling System

This visible grid system comprises of Tee-main profiles fixed to the ceiling with metal rods and Tee-cross profiles. Additionally, L-profiles are used along the perimeter of the wall. These accessories are made of either natural anodised aluminium, galvanised or powder-coated metals.

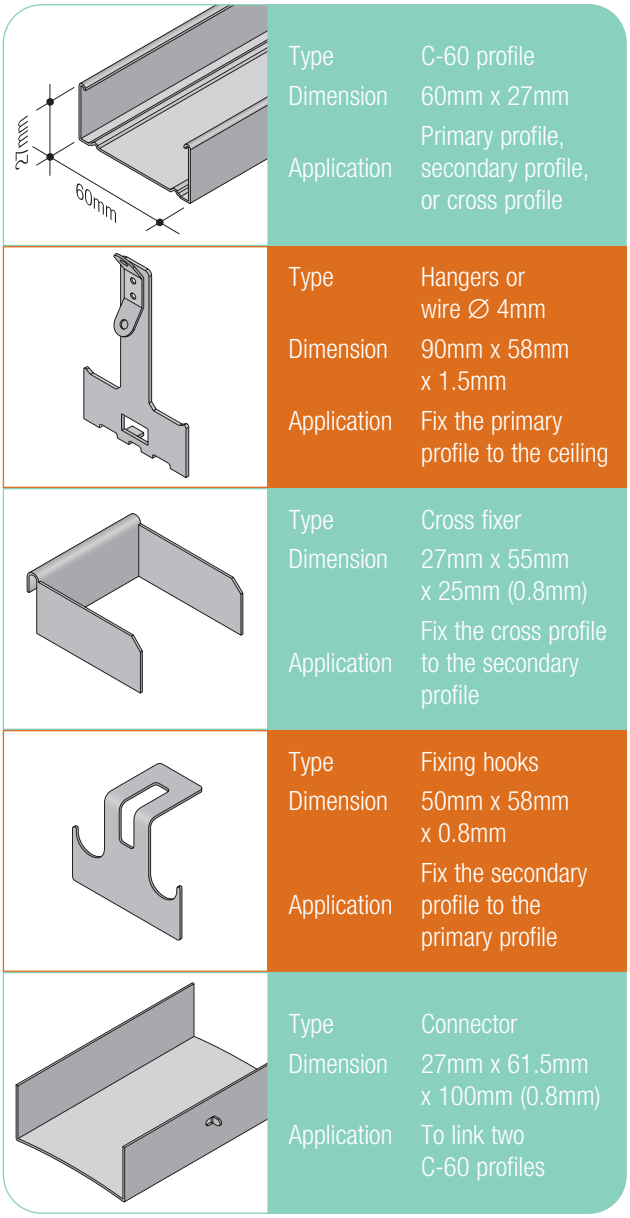
FIGURE 158 *Essential elements for Tee-grid ceiling system*



Concealed Ceiling System

The metal structure of the suspended ceiling is composed of a double grid of C-profiles and accessories, made of 0.63mm thick galvanised steel. The standard length of the C-profile is either 3m or 6m.

FIGURE 159 *Typical profiles for ceiling construction*



Self-Supporting Ceiling System

This system utilises the same profiles as for partitions, which is illustrated on page 62.

8.2 Specifications of ETERPAN[fi] Ceiling Systems

8.2.3 Fixing Elements

Fixing of the Profiles

The fixing elements used to fix the suspended wire to the ceiling or the L and U-profiles to the walls depend on the nature of the ceiling or wall material, are as tabulated below.

Fixing for Substrates

Substrate	Fixing elements
Concrete, brick	Expansion bolts, bullet nails, screws and plugs
Wood	Screws

Fixation of Fibre Cement Sheets

Self-drilling screws at least of M4 x 25mm are used to fix the ETERPAN[fi] board to the profiles. Note that the screws must be countersunk below the surface of board with a depth of approximately 0.5mm if a smooth finished surface is required. The fixing of the sheets is executed from the centre of the sheet and works towards the perimeter.

When a panel is cut to size, the bevelled edge is often cut away and thus bevelling must be carried out on site in order to obtain a flush finished surface.

8.2.4 Joint Finishing Product

To finish the bevelled edges of the sheets, plaster-based joint filler and reinforcing paper tape can be used. See page 14 for more details.

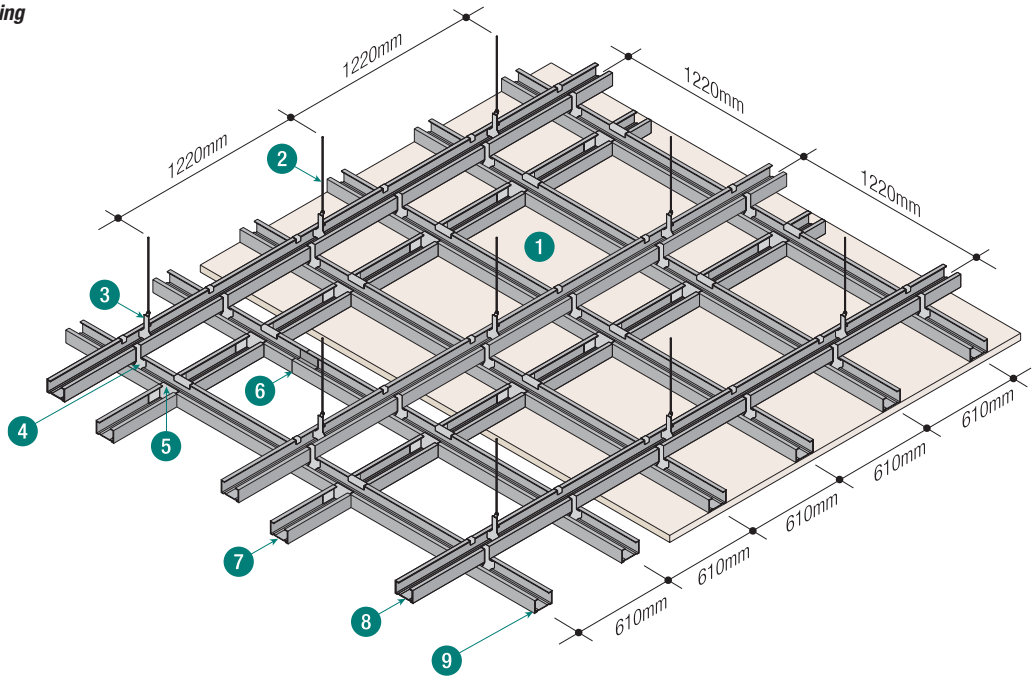
8.3 Construction of Ceiling

8.3.1 Concealed Ceiling

This system is the most appropriate for the installation of large area suspended ceilings. The opening between the end of the profiles and the wall must be 10mm to accommodate possible expansion movements. For ceiling spans in excess of 5000mm, an additional expansion joint should be incorporated within the main tee sections

FIGURE 160 ***Concealed ceiling***

1. ETERPAN[fi] board
2. Hanger wire
3. Hanger
4. Fixing hook
5. Cross fixer
6. Connector
7. Cross profile
8. Primary profile
9. Secondary profile



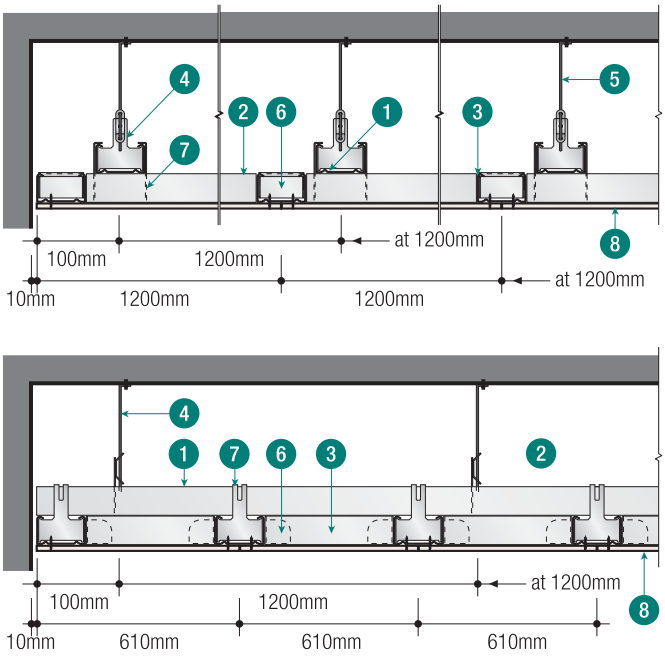
The installation sequence is detailed below:

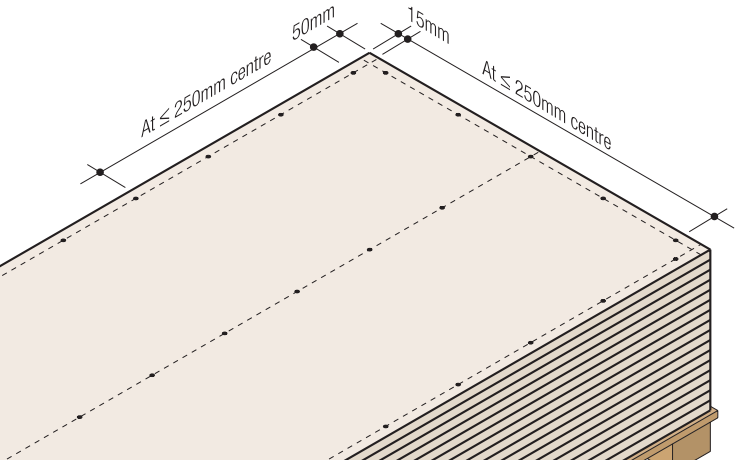
1) First the primary profiles are fixed in parallel at 1220mm centres by means of the hangers and steel wires to the floor slab above. Note that the distance between the fixing points should be at approximately 1220mm centres. The springs of the hangers allow for a perfect levelling of the primary profiles.
2) All primary profiles must be in one perfect plane before the secondary profiles are fixed at 610mm centres by means of fixing hooks.
3) At the position of the longitudinal joints between the sheets, cross profiles of –545mm long are fixed to the secondary profiles at 1220mm centres by means of two cross-fixers.

8.3 Construction of Ceiling *continued from page 75*

4) When a profile must be extended by means of a connector, this must be staggered from profile to profile. The sheets must be installed perpendicular to the secondary profiles in such a way that the end joint of the panels are staggered. No gaps should be left between adjacent panels. Screws are installed at 250mm centres, at 15mm from the edges and at 50mm from the corners. The panels are not fixed to the wall which means that the ceiling is completely independent from the surrounding structure.

FIGURE 161 ***Fixing of boards and distance of fixing points***



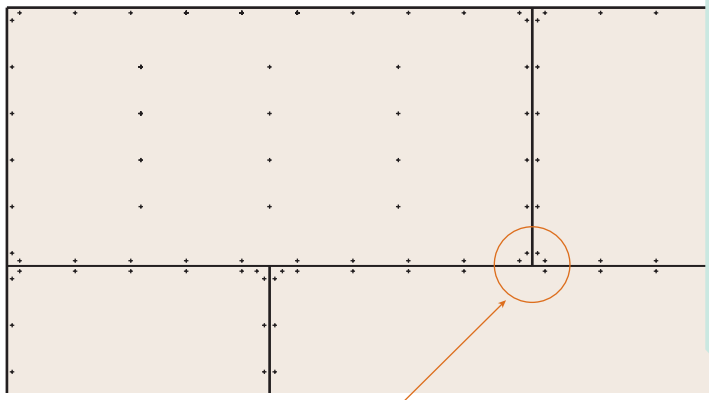


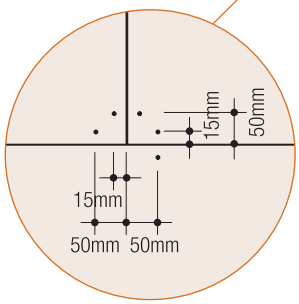
5) Non-parallel parts of the ceiling must be separated with an expansion joint. The layout of boards should follow **FIGURE 162**. Large ceiling areas must be divided by means of expansion joints. Maximum size of one part should not exceed 9760 x 6700mm.

FIGURE 162 ***Layout of ceiling panels***

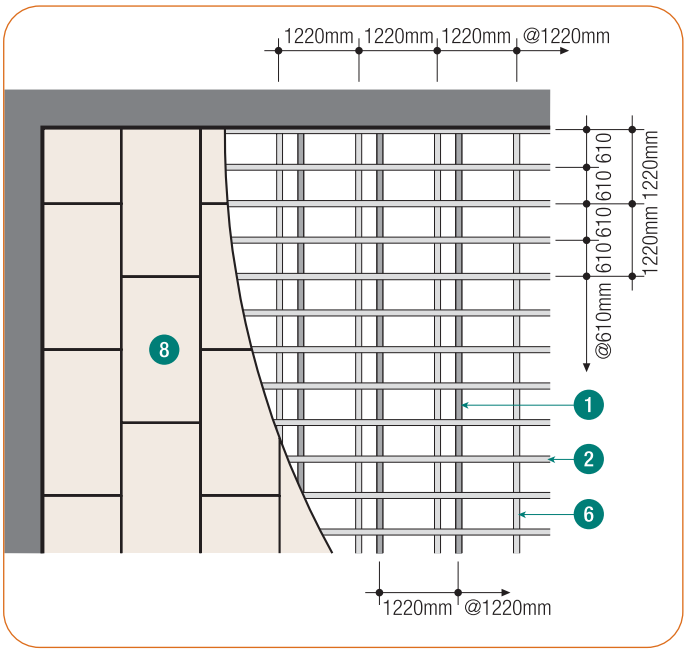
ANNOTATION DETAILS THIS PAGE

1. Primary profile
2. Secondary profile
3. Cross profile
4. Hanger
5. Hanger wire
6. Cross fixer
7. Fixing hook
8. ETERPAN® board





Corner detail



8.3 Construction of Ceiling

8.3.2 Self-supporting Ceiling

During the design stage, choose the right width of the profile taking into account the maximum allowable span. This system is the most appropriate for the construction of suspended ceilings within narrow rooms or corridors.

Selection of Channel Size According to Span

Type of stud	Maximum span (mm)
C-50	2150
C-75	2950
C-100	3500

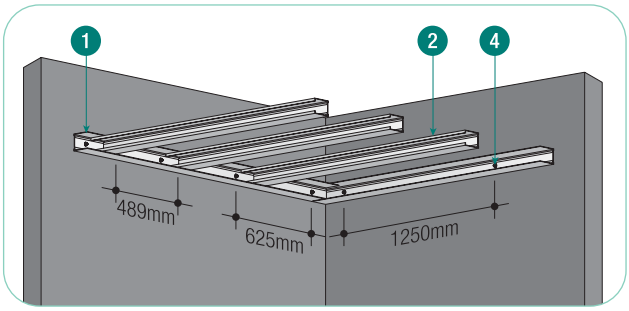
The additional advantages of this system are:

- Independent from the movement of the structural floor slab above.
- No hangers are required, which leads to shorter installation time and a completely free cavity for accommodation of ductwork and services.

The installation sequence for self-supporting ceilings are as follows:

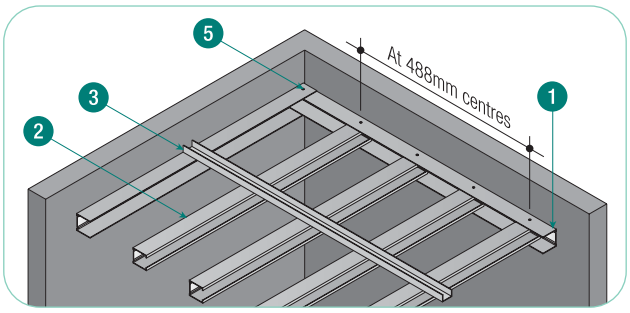
i) Before commencing the installation, mark the position of the U-profiles on two stable opposing walls. The U-profiles are fixed by means of screws and plugs or expansion bolts at nominal 625mm centres.

FIGURE 163 *Fixing of primary and secondary profiles*



ii) C-profiles are cut to size and inserted into the U-profiles at nominal 410mm centres and fixed to them by means of rivets. To avoid buckling and movement of the C-profiles, a U-profile is fixed across, every 2400mm, to act as a tie member. When the span is more than those indicated in the table on the left, please consult Eternit Asia Panels Technical Department.

FIGURE 164 *Reinforcement against buckling and movements*



8.3.3 Tee-grid Ceiling

This is a widely used ceiling system. Simple in installation, the working sequence is as follows.

a) The L-profiles are first fixed at nominal 600mm centres to the walls at the perimeter of the ceiling.

b) The Tee-main profiles are then positioned at nominal 600mm or 610mm centres, by means of steel wire hangers.

c) The Tee-cross profiles are inserted into the main profiles at intervals of nominal 600mm or 610mm.

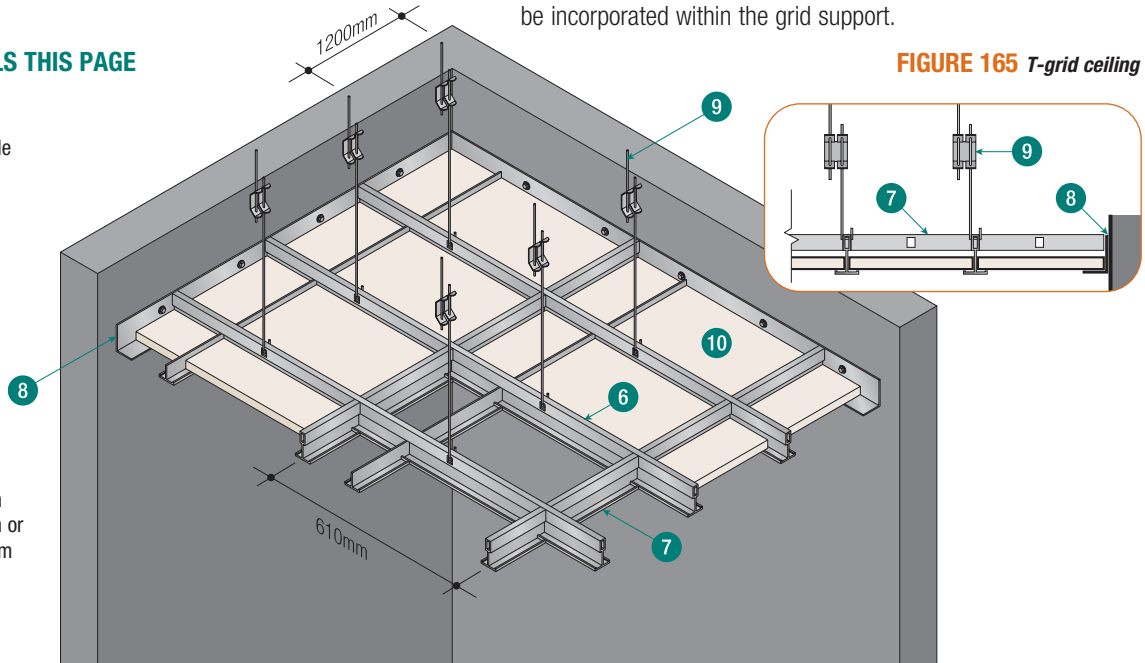
d) ETERPAN[fi] -MD of dimensions either 595mm x 595mm, 605mm x 605mm or 605mm x 1200mm are then laid into the Tee-grid. A cavity of minimum 250mm is recommended above the ceiling line, to allow ease of installation and removal of the ceiling panels.

Note: When heavy elements are to be fixed to the ceiling, additional hangers that are capable of carrying these loads should be incorporated within the grid support.

ANNOTATION DETAILS THIS PAGE

1. Wall U-profile
2. Horizontal C-profile
3. Tie member
4. Fixing point
5. Rivet
6. Main profile
7. Cross profile
8. L-profile
9. Wire ∅ 2mm
10. ETERPAN[fi] board 595mm x 595mm 605mm x 605mm or 605mm x 1200mm

FIGURE 165 *T-grid ceiling*



8.4 Opening in Ceilings

Following are typical methods of creating apertures in ceiling systems. For further details, please consult Eternit Asia Panels Technical Department.

FIGURE 166 *Opening for concealed ceiling*

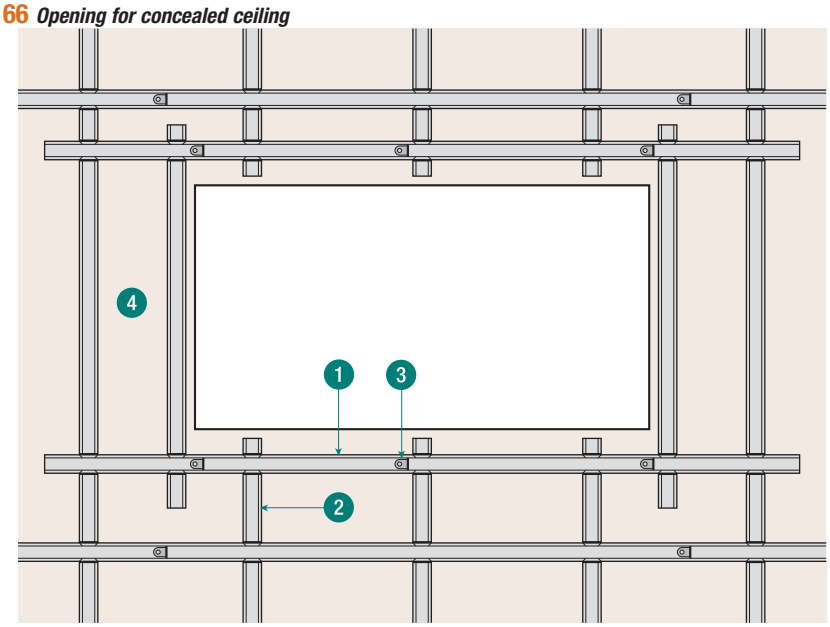
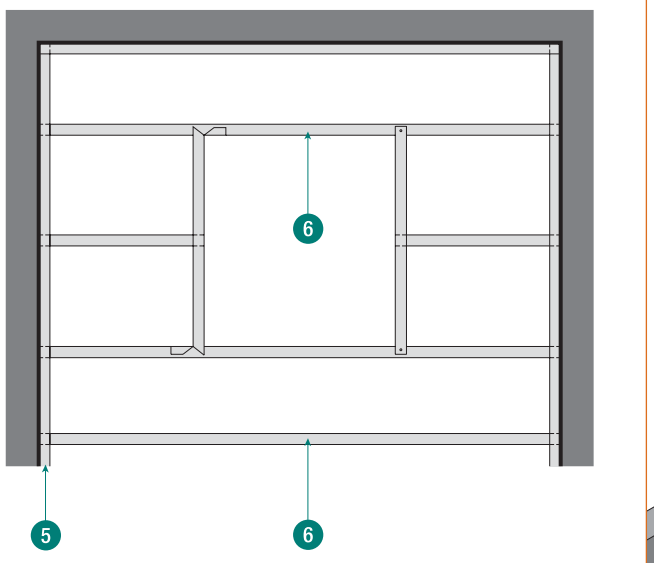
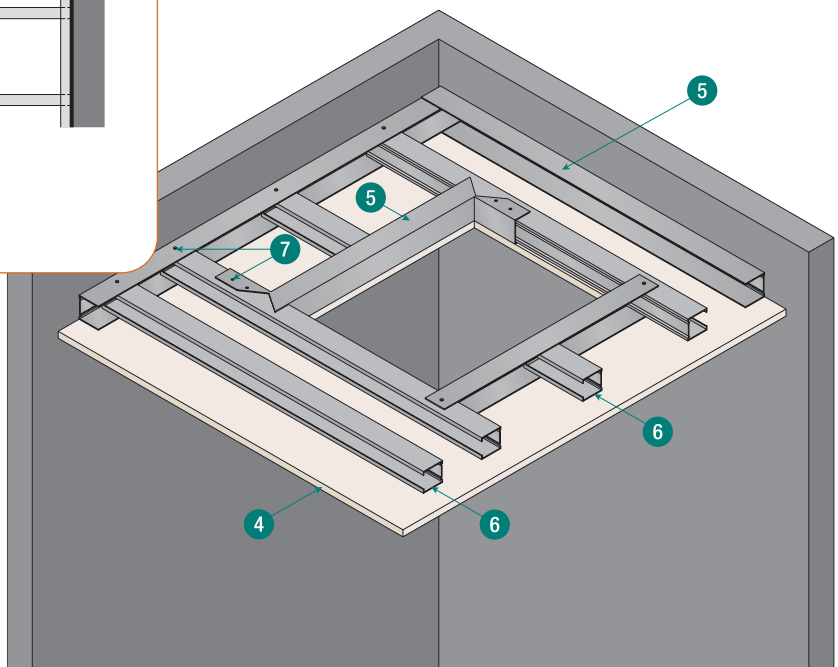


FIGURE 167 *Opening for self-supporting ceiling*



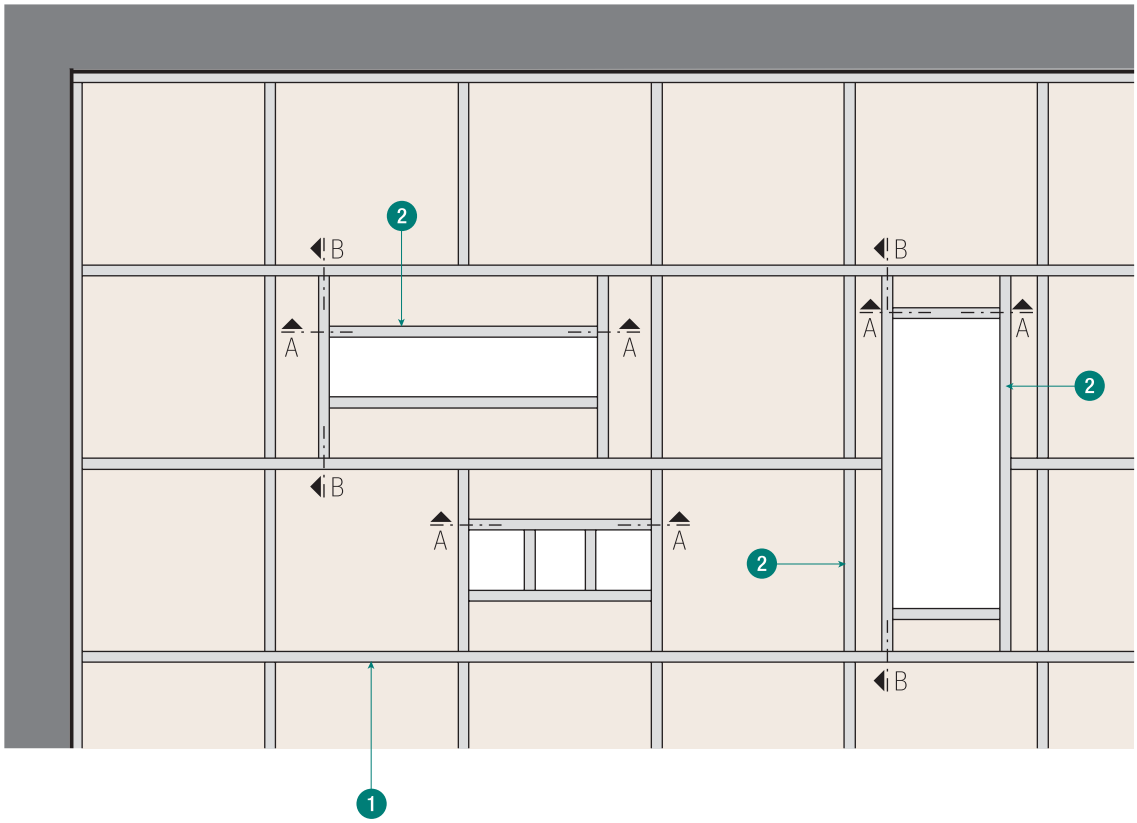
ANNOTATION DETAILS THIS PAGE

1. Primary profile
2. Secondary profile
3. Hanger
4. ETERPAN[fi] board
5. Wall U-profile
6. Horizontal C-profile
7. Rivet

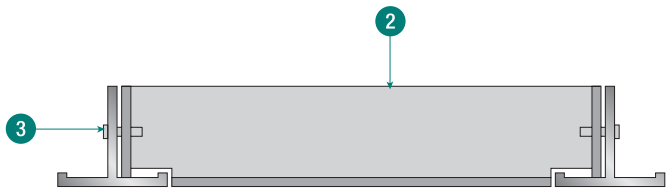


8.4 Opening in Ceilings *continued from opposite page*

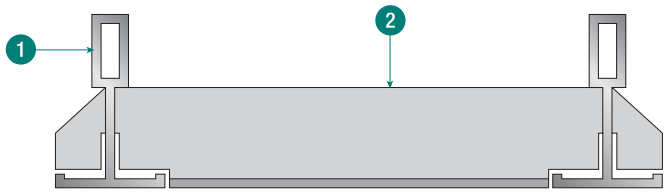
FIGURE 168 ***Opening for T-grid ceiling***



1. Main profile
2. Cross profile
3. Fixing or clip



Section A-A



Section B-B

8.5 Joint Finishing

8.5.1 Finishing of Panel Edges

Before commencing any jointing work, the bevelled edge of the panels must be pre-coated with primer.

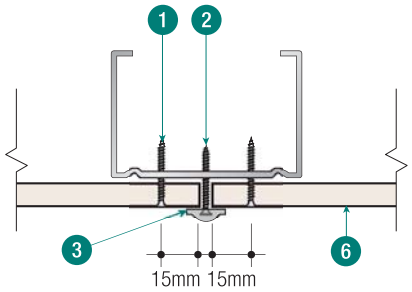
Flush Joint

When flush jointing is required, use panels with bevelled edges. The jointing material used is gypsum-based joint filler and reinforcing paper tape. For more details, please refer to page 14.

Decorative Joint

There are several types of profile which can be used to finish a joint.

FIGURE 169 ***Decorative joint***



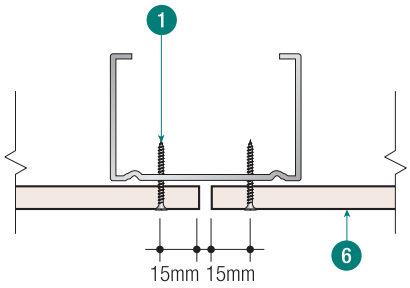
ANNOTATION DETAILS THIS PAGE

1. Self-tapping screw
2. Screw
3. Wooden profile
4. Support profile
5. Edging profiles
6. ETERPAN[fi] board

Open Joint

In some instances, an open joint is preferred for aesthetic reasons. The common method of constructing such finishing is as illustrated below.

FIGURE 170 ***Open joint***



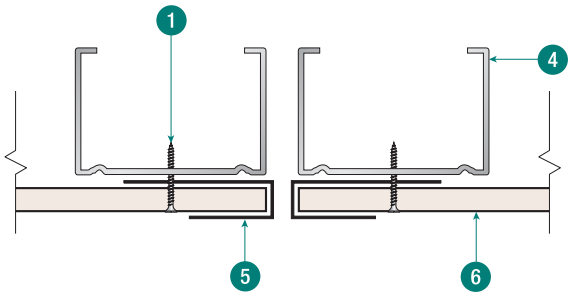
8.5.2 Wall-Ceiling Junction

The connection between wall and ceiling can be constructed in the manner as illustrated in **FIGURE 151**.

8.5.3 Expansion Joint of Ceiling

An expansion joint is essential for ceilings with large area coverage, in order to accommodate any possible movement and deformation of building structure. The simple method of construction is as illustrated in below.

FIGURE 171 ***Expansion joint in ceiling***



8.6 Decoration of Ceiling

Before applying any decoration, the ceilings must be pre-coated with a primer.

For lay-in grid systems, it is important that the rear surface of the panels are primed to ensure bowing or warping does not occur. This is of particular importance in areas of use where there may be markedly different day or night temperature and humidity changes.

Decorative materials can be paint, wall paper, laminates etc.

8.6.1 Paint

Although all kinds of paints are suitable for fibre cement products, water-based acrylic paints are, however, the preferred type. They can be applied by using spray, brushes or rollers onto the board surface. Paints should be applied strictly in accordance with manufacturer recommendations.

8.6.2 Wall Paper, Textile, Laminates

Almost all kinds of flexible wall covering materials can be glued onto ETERPAN[fi] board. Appropriate bonding agent should be applied as per manufacturer recommendations.

8.7 Material Consumption

Based on experience and estimation, the consumption of materials per m^2 of an endless ceiling is tabulated as follows. Note should be taken that these values are for reference only.

8.7.1 Material Consumption of Tee-grid Ceiling

Material	Quantity per m^2
ETERPANfi board	$1m^2$
Cross profile	2.69 pieces
L-profile	2 x (length + width)
Fixing to ceiling	1.64 pieces
Main profile	1.64m

8.7.2 Material Consumption of Concealed Ceiling

Material	Quantity per m^2
ETERPAN[fi] board	$1m^2$
Screws M4 x 25	14 pieces
C-60 primary profiles	0.82m
C-60 secondary profiles	1.64m
C-60 cross profiles	0.74m
Hanger, wire (∅ 4mm) & fixing element	0.67 pieces
Fixing hooks	2.67 pieces
Cross fixer	2.67 pieces
Connector	0.82 pieces
Joint filler	0.25kg

8.7.3 Material Consumption of Self-supporting Ceiling

Material	Quantity per m^2		
ETERPAN[fi] board	$1m^2$		
Screws M4 x 25mm	14pcs		
Material	**C-50**	**C-75**	**C-100**
C-profiles	2.04m	2.04m	2.04m
U-profiles	0.93m	0.68m	0.57m
U-cross profiles	0.47m	0.34m	0.29m
Fixing of U-profile to wall	1.49pcs	1.08pcs	0.91pcs
Fixing of U-profile to C-profile	3.80pcs	3.47pcs	2.92pcs
Joint filler	0.25kg		
Reinforcing paper tape	1.23m		

9.1 General Information

ETERPAN[fi] -MD is eminently suitable for use as floor and staircase decking. For instance, as a base sheet for tiled floor, floors in wet environments or water-proof decks.

Where ETERPAN[fi] -MD is to be used as the sole floor boarding material, fixed above steel purlins or timber joists, and is required to form a loadbearing function, the general recommendation is for the use of a 20mm thickness. However, a lesser thickness of ETERPAN[fi] -MD can be used, depending on the loading requirements, the dimension and span of the supporting structure, and the support centres for the board. With consideration for the appropriate safety factors, calculations can be performed to check on suitability of ETERPAN[fi] -MD for a specific installation. Please consult Eternit Asia Panels Technical Department.

The following tables provide some guidelines for reference when designing a floor system. The supporting framings considered here are of timber. However, alternate steel structures with adequate strength of support are acceptable.

9.1.1 Requirements of 20mm ETERPAN[fi] -MD Flooring

Loadings	Joist spacing (mm)			
	300	400	450	600
Residential (2.0kPa, 1.8kN)	1 layer	1 layer	1 layer	1 layer
Office (2.5kPa, 2.7kN)	1 layer	2 layers	2 layers	2 layers
Garage (2.5kPa), 9.0kN)	2 layers (glued)	2 layers (glued)	Not appropriate	

9.1.2 Residential Floor Loadings / Required Floor Joist Spacing (1.5kPa, 1.8kN)

Floor joist size (mm x mm)	Maximum span of joints (m) at a maximum spacing (mm) of		
	400	450	600
100 x 50	1.80	1.75	1.25
150 x 50	2.80	2.70	2.00
200 x 50	3.80	3.60	3.25
250 x 50	4.80	4.60	4.15
300 x 50	5.75	5.50	5.00

9.1.3 Residential Floor Loadings / Required Floor Joist Spacing (2.0kPa, 1.8kN)

Floor joist size (mm x mm)	Maximum span of joints (m) at a maximum spacing (mm) of		
	400	450	600
100 x 50	1.45	1.40	1.25
150 x 50	2.60	2.40	2.00
200 x 50	3.50	3.35	2.85
250 x 50	4.40	4.25	3.60
300 x 50	5.20	5.05	4.30

ABOVE: ETERPAN[fi] -MD as base sheet for auditorium stage and staircase steps.

9.1.4 Office Floor Loadings / Required Floor Joist Spacing (2.5kPa, 2.7kN)

Floor joist size (mm x mm)	Maximum span of joists (m) at a maximum spacing (mm) of			
	300	400	450	600
100 x 50	1.60	1.45	1.40	1.25
150 x 50	2.60	2.40	2.25	1.90
200 x 50	3.40	3.20	3.10	2.60
250 x 50	4.20	4.00	3.90	3.30
300 x 50	5.10	4.80	4.60	4.00

9.2 Flooring Details

ETERPAN[fi] -MD for floor applications can be constructed as follows.

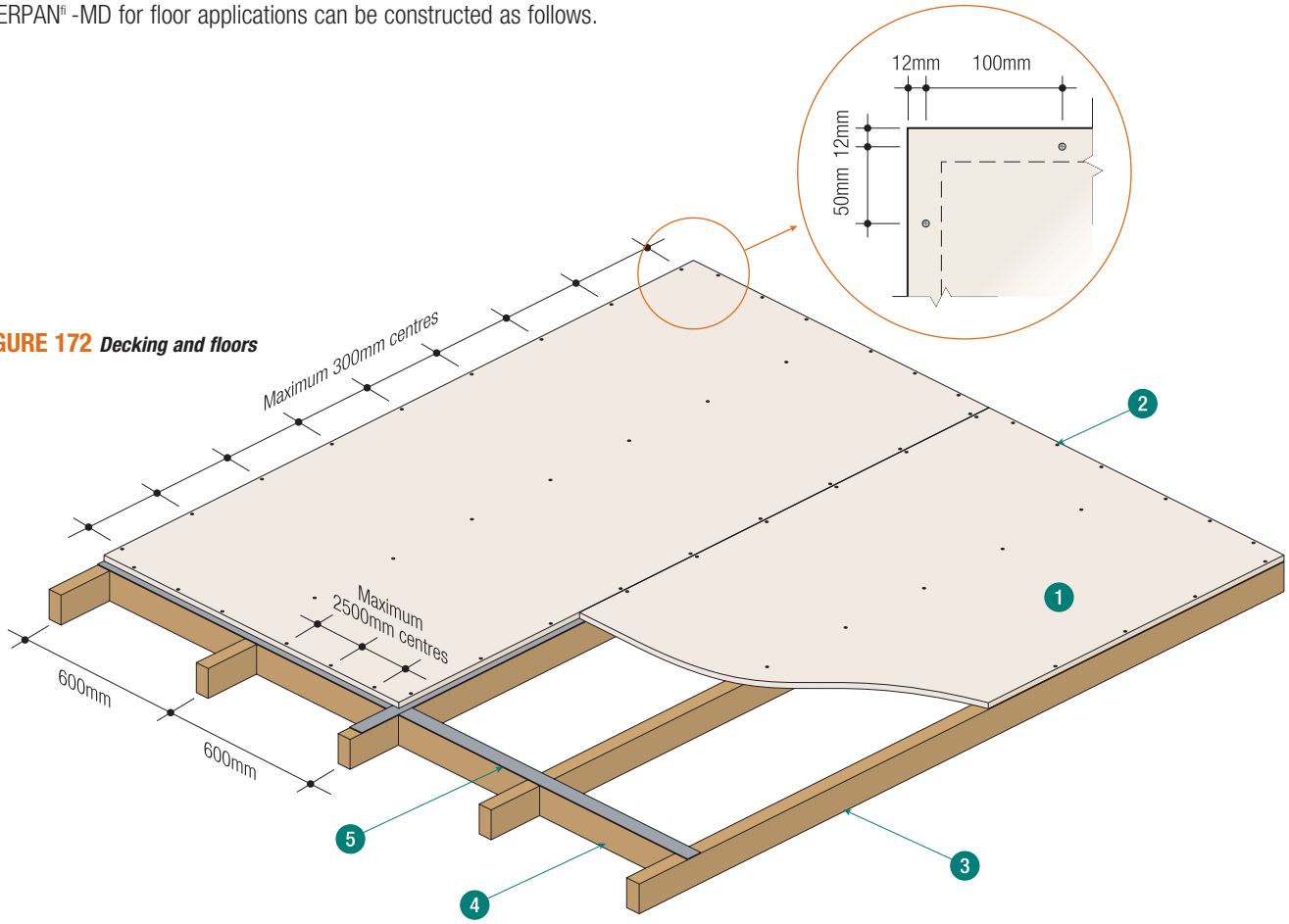
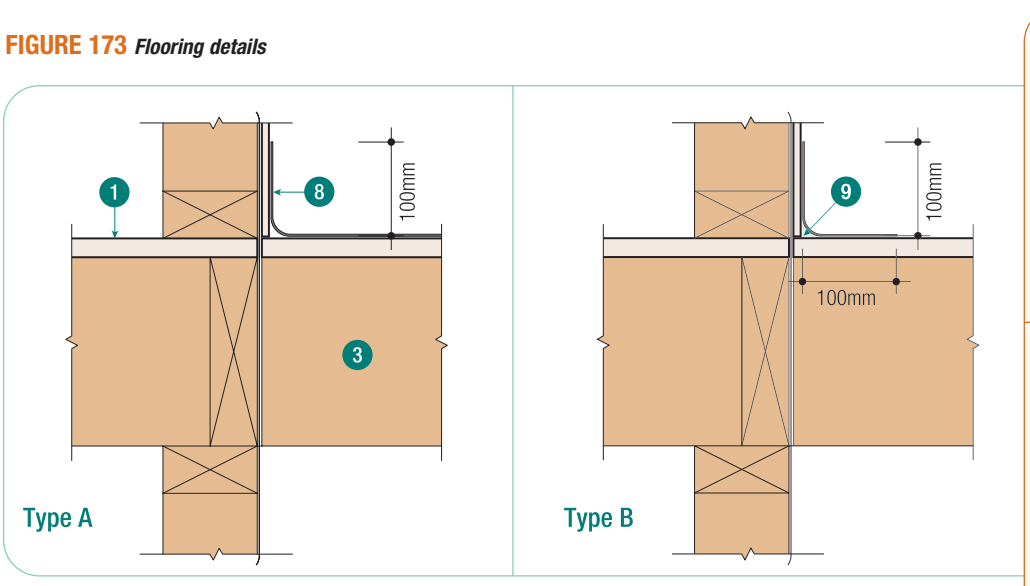
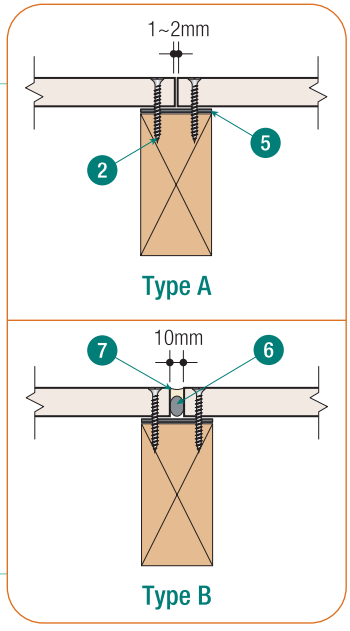


FIGURE 172 ***Decking and floors***

FIGURE 173 ***Flooring details***





NOTE: Square edges ETERPAN[fi] -MD should be used in this case.

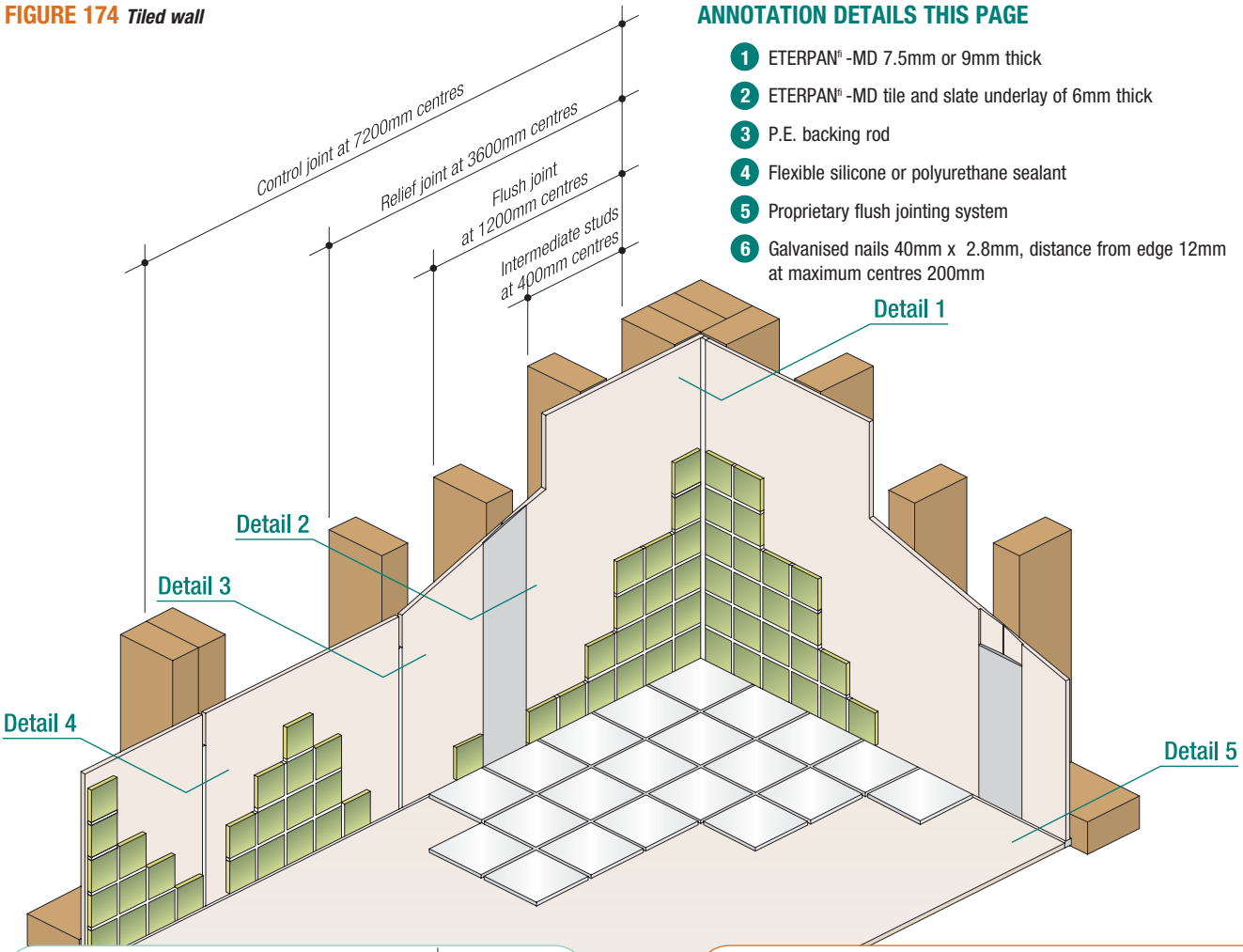
ANNOTATION DETAILS THIS PAGE

1. ETERPAN[fi] -MD of appropriate thickness
2. Screws 50mm long
3. Joist minimum width 50mm
4. Noggings at all butt joints, minimum width 50mm
5. Foam tape 50mm x 1mm
6. P.E. backing rod
7. Trafficable sealant
8. Bituthene membrane
9. Polyurethene sealant

The versatility of ETERPAN[fi] board is practically unlimited. It can be used in different areas and for multiple applications. The following are some areas where ETERPAN[fi] -MD has been widely used other than the traditional partition and ceiling constructions. ETERPAN[fi] -MD can be used as backing boards and underlay for tiles especially in sanitary areas such as bathrooms, kitchens, etc. Minimum board thickness should be of at least 6mm thick depending on the area of application, the type of framing and the surface finish.

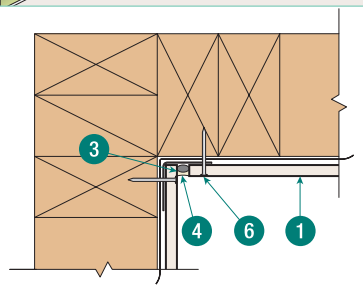
10.1 Decoration of Tiled Wall

FIGURE 174 ***Tiled wall***

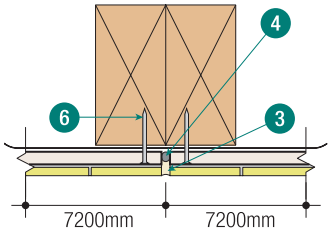


ANNOTATION DETAILS THIS PAGE

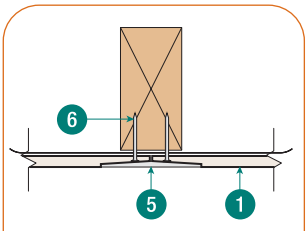
1. ETERPAN[fi] -MD 7.5mm or 9mm thick
2. ETERPAN[fi] -MD tile and slate underlay of 6mm thick
3. P.E. backing rod
4. Flexible silicone or polyurethane sealant
5. Proprietary flush jointing system
6. Galvanised nails 40mm x 2.8mm, distance from edge 12mm at maximum centres 200mm



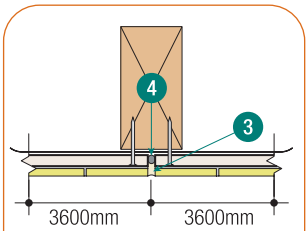
Detail 1: Relief joint at every change of direction



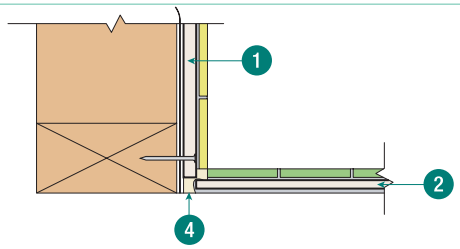
Detail 4: Control joint



Detail 2: Flush joint



Detail 3: Relief joint

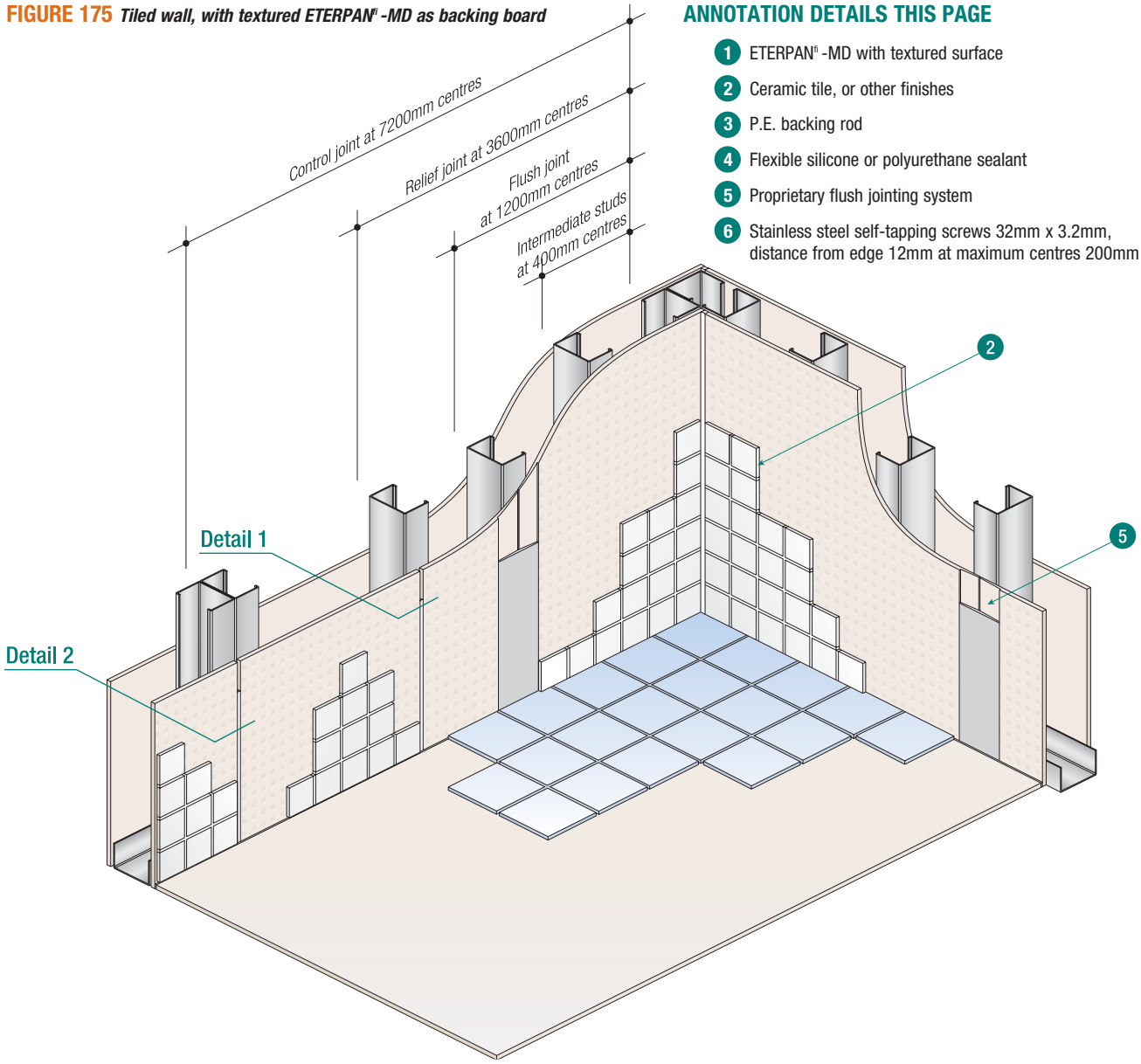


Detail 5: Relief joint at floor wall junction

10.1 Decoration of Tiled Wall *continued from opposite page*

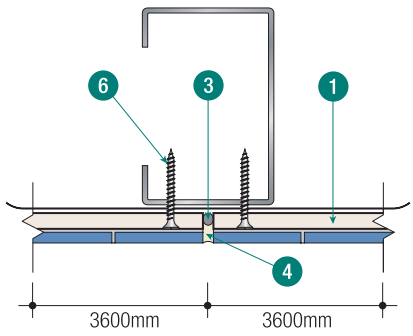
Generally, the use of timber studs is interchangeable with steel channels. Also, in order to provide better surface for tile bonding, ETERPAN[fi] -MD of 7.5mm thickness with a textured surface has been developed to aid improved adhesion.

FIGURE 175 ***Tiled wall, with textured ETERPAN[fi] -MD as backing board***

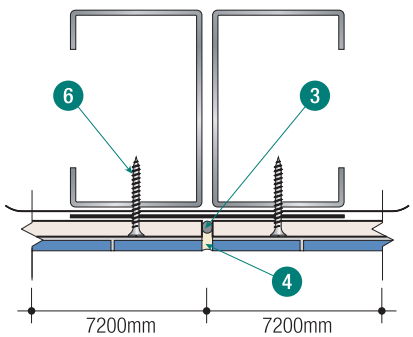


ANNOTATION DETAILS THIS PAGE

1. ETERPAN[fi] -MD with textured surface
2. Ceramic tile, or other finishes
3. P.E. backing rod
4. Flexible silicone or polyurethane sealant
5. Proprietary flush jointing system
6. Stainless steel self-tapping screws 32mm x 3.2mm, distance from edge 12mm at maximum centres 200mm



Detail 1: Relief joint



Detail 2: Control joint

10.2 Bath Tub Vanity Panels

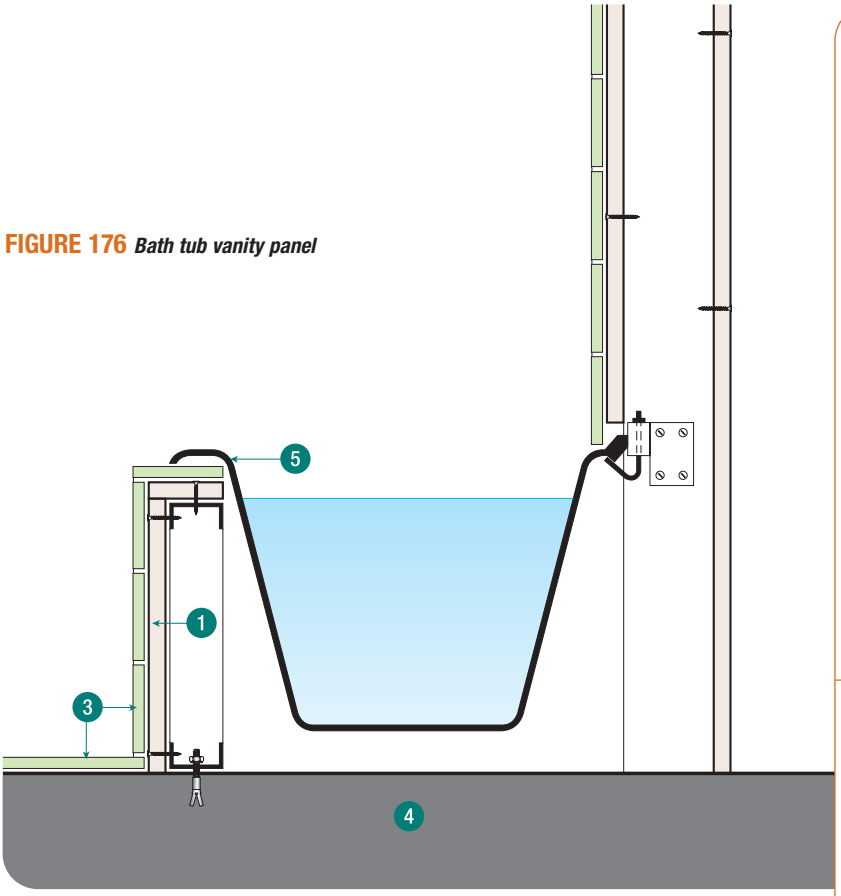
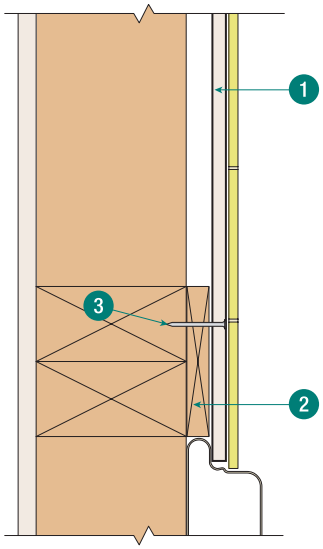
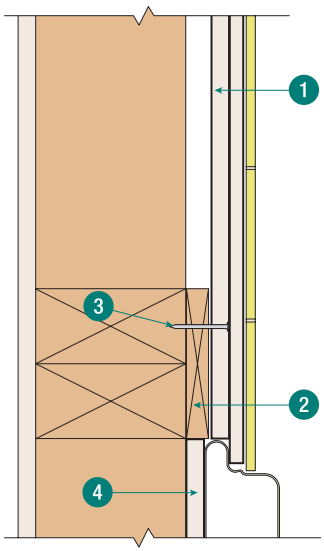


FIGURE 176 *Bath tub vanity panel*



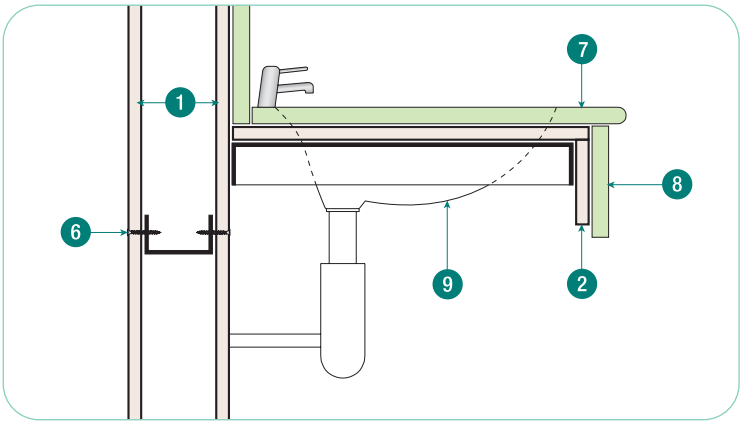
Bath or shower recess detail



Bath or shower recess detail for fire rated wall

10.3 Kitchen/Bathroom Unit Top

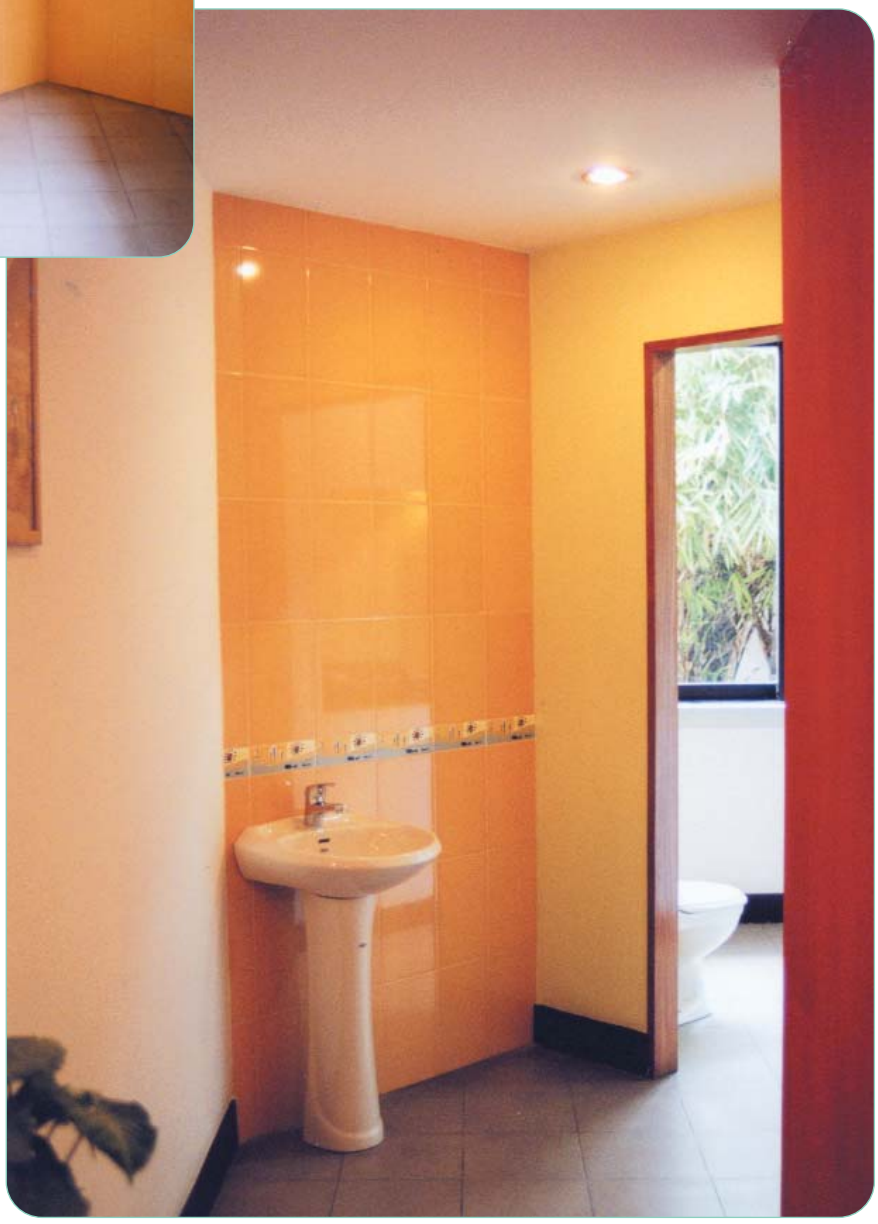
FIGURE 177 *Kitchen or bathroom unit surface*

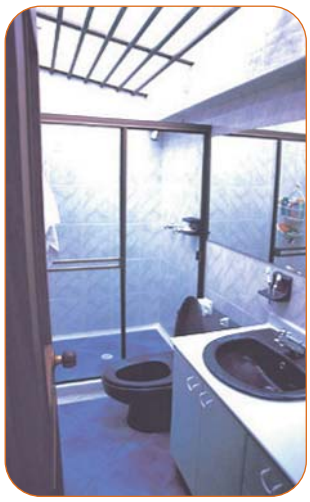


ANNOTATION DETAILS THIS PAGE

1. ETERPAN[fi]-MD minimum 7.5mm or 9mm thick
2. ETERPAN[fi]-MD minimum 12mm thick
3. Tiles, stone or other finishes
4. Floor slab
5. Steel or timber supported bath tub
6. Galvanised nails or screws 40mm x 2.5mm, distance from edge 12mm and from corner 50mm
7. Vanity top
8. Decorative finish
9. Basin

10.4 Reference





MATERIAL SAFETY DATA SHEET ETERPAN[fi] -MD

1 Trade Name

ETERPAN[fi] -MD.

2 Manufacturer

Eternit, Etex Group.

3 Product Appearance

Light yellowish with smooth surface.

4 Product Composition

Natural organic fibre cement, calcium silicates hydrates, selected quartz.

5 Product Approved Uses

General building material for external and internal applications.

6 Physical Data

Nominal Density:	1300kg/m^3
Nominal specific gravity (H_2O = 1):	1.35
pH (10% solution):	10-11
Odour:	Nil
Solubility in water:	Nil

7 Fire & Explosion Data

Non-combustible in accordance with BS 476: Part 4, ISO 1182-90.

8 Health Hazards

Occupational exposure limits:	10mg/m^3 (total inhalable dust) 0.1mg/m^3 (respirable quartz particles)
Primary route(s) of entry:	Inhalation of dust.
Medical conditions (which may be aggravated):	Respiratory conditions.
Target organ(s):	Lungs.

9 Health Effects

Inhalation:	Acute over exposure to dust may cause irritation of the respiratory tract.
Skin contact:	Prolonged contact could lead to irritation for sensitive persons.
Ingestion:	Mild discomfort.
Eyes:	Mild transient irritation or inflammation.

10 First Aid / Emergency Procedures

Inhalation:	Remove to fresh air.
Skin contact:	Wash thorough with water.
Ingestion:	Give plenty to drink.
Eyes:	Flush copiously with fresh water. Seek medical advice if irritation or discomfort persists.

11 Storage Precautions

Storage at site/warehouse:	Pallets should be stored on flat surface in a dry, covered and well ventilated area, protected against dust and rain.
During transport:	Should be covered with tarpaulin.

12 Precautions for Safe Handling & Use

Handling:	Use sufficient natural or mechanical ventilation to reduce dust level below the Threshold Limit Value (TLV).
Goggles:	Use safety glasses whenever machining the product (drilling, sawing, sanding, etc.)
Clothing:	Use working clothes and gloves to protect against mechanical injury.
Respirator:	Approved respiratory protective equipment should be made available while working in concentrations above or around TLV.
Overalls:	Normal protective working overalls are adequate.

13 Spill or Leak Procedure

Spilled materials:	Collect dust with vacuum cleaner during fabrication. If sweeping is necessary, use a dust suppressor or wet-sweep work areas.
Waste disposal:	Dispose as a building product waste, according to the local regulations. The collected dust is to bind with cement before disposing in a landfill.

The health and safety information contained herein is believed to be accurate and correct based on our current knowledge at the date of issue and no liability can be accepted for any loss, injury or damage resulting from its use. It is intended as a guide for the safe handling, storage and use under normal conditions, but does not necessarily refer to the particular requirements of a customer when further advice should be obtained.

This data sheet and information it contains is not intended to supercede any terms or conditions of sale and does not constitute a specification. Nothing contained herein is to be construed as a recommendation for use in violation of any patent or applicable laws or regulations.

1 Trade Name

ETERPAN[fi] -LD.

2 Manufacturer

Eternit, Etex Group.

3 Product Appearance

Off white/grey with smooth surface.

4 Product Composition

Natural organic fibre cement, calcium silicates hydrates, selected quartz.

5 Product Approved Uses

General building material for external and internal applications.

6 Physical Data

Nominal Density:	980kg/m^3
Nominal specific gravity (H_2O = 1):	0.98
pH (10% solution):	11
Odour:	Nil
Solubility in water:	Nil

7 Fire & Explosion Data

Non-combustible in accordance with BS 476: Part 4, ISO 1182-90.

8 Health Hazards

Occupational exposure limits:	10mg/m^3 (total inhalable dust) 0.1mg/m^3 (respirable quartz particles)
Primary route(s) of entry:	Inhalation of dust.
Medical conditions (which may be aggravated):	Respiratory conditions.
Target organ(s):	Lungs.

9 Health Effects

Inhalation:	Acute over exposure to dust may cause irritation of the respiratory tract.
Skin contact:	Prolonged contact could lead to irritation for sensitive persons.
Ingestion:	Mild discomfort.
Eyes:	Mild transient irritation or inflammation.

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Inhalation:	Remove to fresh air.
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Overalls:	Normal protective working overalls are adequate.

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Spilled materials:	Collect dust with vacuum cleaner during fabrication. If sweeping is necessary, use a dust suppressor or wet-sweep work areas.
Waste disposal:	Dispose as a building product waste, according to the local regulations. The collected dust is to bind with cement before disposing in a landfill.

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Eternit is the world s largest manufacturer of fibre cement products. The company is part of the Etex Group, one of the largest manufacturers of construction materials in the world. The Group operates all over the world, has turnover of approximately 1.5 billion Euros and 13,000 employees. The company pays enormous attention to environmentally-sound manufacturing (ISO 14001) and the development of environment-friendly products. Total Environmental Protection and Quality Assurance System have already been or are being introduced in all the production companies. Eternit s quality control system for the production and finishing of fibre cement materials have been awarded ISO 9000: 2000 certification.









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