



Premium Lining Board

KalsiFlex Installation Guide



An industrial company with a proven history and a promising future

What we do

Improving our customers' quality of living with ever more effective lightweight solutions.



Building Performance
Leader in plasterboards and fibre cement boards, and the global reference in passive fire protection solutions for the residential and commercial segments.



Exteriors
Provider of innovative, durable, high performance and beautiful fibre cement exterior materials for architectural, residential and agricultural projects.

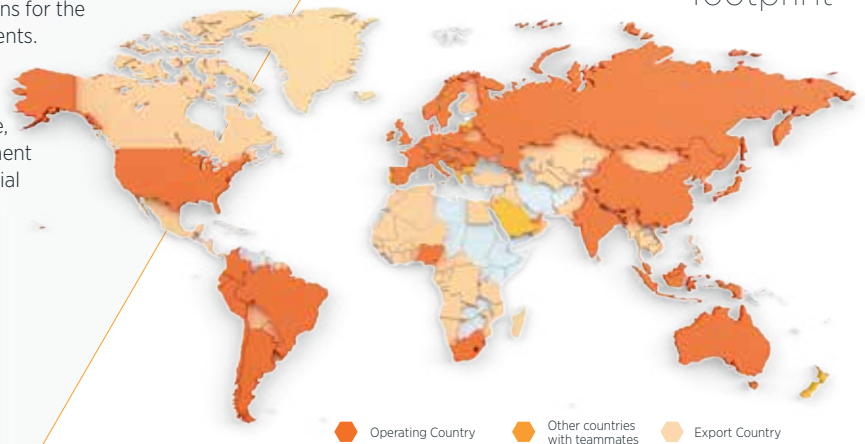


Industry
Front runner of engineering expertise to drive the future of high performance thermal and acoustic insulation as well as passive fire protection in the industrial, aerospace and energy sectors.



New Ways
As a new division created in January 2020, New Ways offers high-tech offsite modular solutions based on wood and steel framing.

Strong manufacturing global footprint



>110
Sites: plants, quarries, offices

42
Operating countries

>11,000*
Teammates

* Excluding the Residential Roofing companies which have been divested in 2020 as well as the personnel of Knauf's former plasterboard business in Australia, as this operation was finalised in February 2021. The figures includes the personnel of FSi Limited, which was acquired by Etex in September 2020.

Our main Commercial Brands

CEDRAL

DURLOCK

Eternit

EQUITONE

Gyplac

Kalsi

Promat

Superboard®

siniat

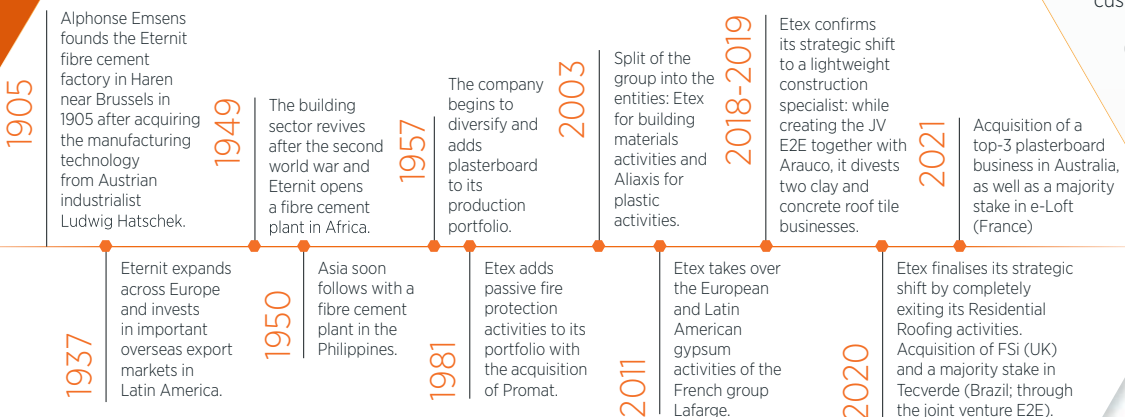
Inspiring ways of living

Our why
We want to inspire people around the world to build living spaces that are ever more safe, sustainable, smart and beautiful. Collaborative, customer-focused.

Our why
We work as one, fostering a collaborative and caring culture, a pioneering spirit and a passion to always do better for our customers.

Our what
Building on our experience and global market needs, we strive to improve our customers quality of living with ever more effective lightweight solutions.

Over a century of sustainable profitable growth



KalsiFlex is the brand name of our fibre cement boards and planks.

Manufactured from a precise combination of cement, silica and cellulose, the boards are cured and stabilised in an autoclave -- a special process involving steam, high temperatures and pressure -- that ensures optimum dimensional stability and mechanical resistance.

KalsiFlex fibre cement boards and planks are durable and highly resistant to most environmental conditions. They are the best alternative to wood, concrete and masonry constructions.

KalsiFlex fibre cement boards and planks are manufactured in modern production facilities around the Asia Pacific region. The company's factories meet the international quality standards ISO 9001:2008, ISO 14001:2004, and OHSAS 18001:2007.

KalsiFlex Technical Specifications

Dimensions

Thickness (mm)	Length (mm)	Width (mm)	Applications
4.5	2400	300, 450, 600, 750, 900 & 1200	<ul style="list-style-type: none"> Suspended ceilings External ceiling lining Soffit & eaves lining
	2700 & 3000	900 & 1200	
6.0	2400, 2700 & 3000	1200	<ul style="list-style-type: none"> Suspended ceilings External ceiling lining Soffit & eaves lining Subfloor enclosure Wall lining
9.0			
18	2400	1200	<ul style="list-style-type: none"> Floor or deck substrate for ceramic tiles, slate and stone composite products Deck substrate for waterproof membranes
20			

KalsiFlex General Properties

General Technical Properties

Dimensional Conformity (tested to AS/NZS 2908.2)		Pass
Length	mm	± 8
Width	mm	± 5
Thickness		± 10%
Straightness of edges	mm/m	3
Squareness of edges	mm/m	4
Density (tested to AS/NZS 2908.2)	kg/m ³	≥ 1250
Modulus of rupture (tested to AS/NZS 2908.2) (Type B . Category 3)	MPa	≥ 10
Water permeability (tested to AS/NZS 2908.2)		Pass
Moisture content (tested to ASTM C1185)		≤ 15%
Water absorption (tested to ASTM C1185)		≤ 33%
Moisture movement (tested to ASTM C1185)		≤ 0.04%
Thermal conductivity (tested to ASTM C518-76)	W/m ² K	0.27

Reaction To Fire

Combustibility (EN 13501-1+A1)	AI Non-Combustible
Surface spread of flame (tested to BS 476 Part 7)	Class I
Fire propagation index (tested to BS 476 Part 6)	I = 1.6
Heat and Smoke Release (tested to AS/NZS 3837)	Group I
Fire Hazard Properties (tested to AS/NZS 1530.3)	
Ignitability Index	0
Spread of Flame Index	0
Heat Evolved Index	0
Smoke Developed Index	0-1

Scope of Limitations

Scope of Use

Kalsi supply KalsiFlex for use within the following scope:

Location

- In NZS3604:2011 wind zones up to and including extra high or 2.5kPa ULS.
- In all corrosion zones.
- Within 1m of a relevant boundary.

Building Scope

- On new buildings that comply with the New Zealand Building Code (NZBC) or existing buildings where the designer and installer are satisfied that the existing building is suitable for the intended building work.
- On timber or light gauge steel-framed buildings.
- On buildings with a risk score of less than 20, calculated in accordance with E2/AS1, table 2.
- On vertical and horizontal, flat surfaces, except for the tops of balustrades and parapets, which must have a minimum 50 slope.
- With aluminium and wood window joinery that is installed with vertical jambs and horizontal heads and sills.
- On a deck structure that has adequate fall to shed water.
- On flat or raking ceilings and soffits.
- In conjunction with a suspended ceiling design.
- In conjunction with a fire rated wall or ceiling design.

Limitations

- Specification and installation must be in accordance with the KalsiFlex Installation Guide.
- Where restricted building work applies (RBW), KalsiFlex must be installed (or the installation must be supervised) by a Licenced Building Practitioner (LBP).
- KalsiFlex must not be installed on timber framing where the moisture content is greater than 18%. We recommend using seasoned or kiln-dried timber framing.
- Proprietary suspended framing systems must be able to support the applied loads of KalsiFlex panels. Always consult with the supplier/ manufacturer for the recommended load that can be applied and the seismic requirements.
- Consult with suppliers of waterproof membranes, tile adhesive, paint and plaster that selected products are compatible with KalsiFlex.

Working with KalsiFlex

Tools

- Circular saw with a dust extractor - angle grinders are not recommended for 4.5mm and 6.0mm boards
- Hole saw
- Screw gun
- Scoring tool and snap knife
- 150mm broad knife
- Measuring tape
- Hand guillotine
- Straight edge

Accessories

- 40 x 2.8mm galvanised / stainless steel fibre cement nails
- Flexible acrylic sealant
- PVC sheet and mid floor jointers
- Galvanised or aluminium flashings
- Aluminium internal and external corner angles
- Joint reinforcing tape
- Bond breaker tape



Working with KalsiFlex

Site Work

Loading and unloading

KalsiFlex fibre cement boards are usually supplied on pallets suitable for forklift. If crane offloading by slings is envisaged, special notification must be made in advance or upon placing orders.

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 panels within.

When the crates have to be removed from a box container, care must be taken NOT to expose crates or pallets to the shock of any impact, as the shock could result in cracks in the boards.

Transport to site

Always drive the delivery vehicle as close as possible to the location where the panels are to be installed. When transporting the panels, it is essential to firmly secure the pallets to prevent the panels from sliding or moving while in transit.

Storage

KalsiFlex fibre cement boards are supplied with protective plastic sheeting wrapped around the timber crates. This protection should not be removed until site and structural conditions are prepared and ready for panel installation.

All KalsiFlex fibre cement boards must be stored flat on pallets and placed inside in covered and dry conditions, optimising protection for stored panels against exposure to weather and other unfavourable conditions.

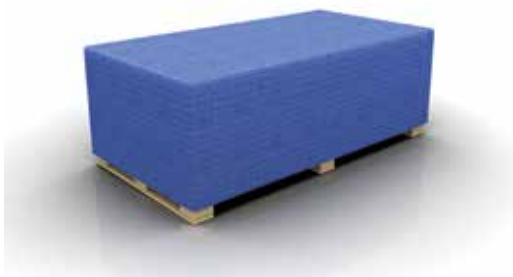


Figure 1
Protective Plastic Sheeting

Handling of Kalsi fibre cement boards

The following must be taken into consideration when handling KalsiFlex fibre cement boards.



Figure 2
Whenever possible, lift the panel from the stack below rather than slide panel or drag off the stack. This will prevent damage by scratches to the lower panel.



Figure 3
Always carry the panel on edge but DO NOT store on edge

Cutting KalsiFlex Fibre Cement Boards

KalsiFlex fibre cement boards offer easy workability with conventional tools, on or off construction sites. The method of cutting is dependent on the amount of cutting. Cutting of the panel can be achieved using stationary table saws, circular saw and jigsaws. Cutting must take place in a dry environment. Dust control is required.

It is recommended that fibre cement saw blades (see figure 4) are used to cut the panels on site. These blades have been designed especially for fibre cement and when correctly employed, a high level of finish can be achieved. The blade is uniquely designed with vibration damping composite body construction and diamond tipped teeth shaped to give a tear-free edge.

When small amounts of cutting are required on site, an alternative to the recommended fibre cement saw blade is a carbide-tipped flat trapezoidal tooth blade. This has limited life and will need regular changing.



Figure 4
Fibre cement blade.

Drilling KalsiFlex Fibre Cement Boards

KalsiFlex fibre cement boards should be drilled using preferred and more efficient tungsten carbide tipped drills with point angles of 60° to 80° rather than the usual 120° type.

Forming Holes

Very often 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 requirement.

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 hole to the required diameter using a hole saw fitted to a electric drill where the central bit is inserted into the pre-drilled hole.

For small irregular holes,

- Small rectangular apertures can be achieved by forming a series of small holes around the perimeter of the opening.
- Tap out the waste piece from the panel face carefully.

Design Specifications

Compliance

Designers and/or contractors responsible for the intended project should follow the details and recommendations specified in this manual.

It is also wise to keep in mind that all designs and constructions should comply with appropriate and relevant requirements of current legal building codes, regulations and standards, both domestic and international.

The information provided in this installation guidelines is valid at the time of publication. Please consult Etex or its nearest official representative for further versions or updates.

KalsiFlex has a CodeMark certificate which is third party certified, allowed under the Building Act 2004. This means that under law, a Building Consent Authority must accept the specification of KalsiFlex as complying with the NZ Building Code, providing that all conditions of the certificate have been met.

Refer to CodeMark certificate CM70106 for further information.

Fixing KalsiFlex Fibre Cement Boards

Consideration of fasteners durability will be influenced by material choice, environmental factors and compatibility of materials in contact with fasteners. In general, the fasteners of choice should be resistant to corrosion.

Fixing requirements

- Screws can be countersunk.
- Nails should be flush with the KalsiFlex surface.
- Do not punch the nails.

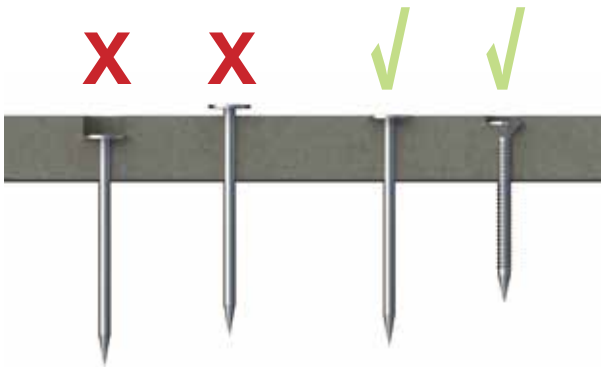


Figure 5
Position of fasteners

Fixing requirement

Steel framing	8 gauge x 22mm self-embedding head screws (SEH). Screws must have a class 3 finish and be embedded 0.5mm below the sheet surface.
Timber framing	2.8mm diameter x 30mm and 40mm galvanised fibre cement nails. Drive nail head flush with the panel surface.

In areas of severe coastal environments, consult fastener manufacturers for recommendations.

If you are fixing the panels over existing or additional wall linings you must increase the length of the nails equal to the thickness of the rigid air barrier.

Installation

Board preparation

Ensure boards are dry to equilibrium moisture content before fixing. Damp boards should not be installed as they are prone to shrinking, which may lead to joint failure.

Fixing

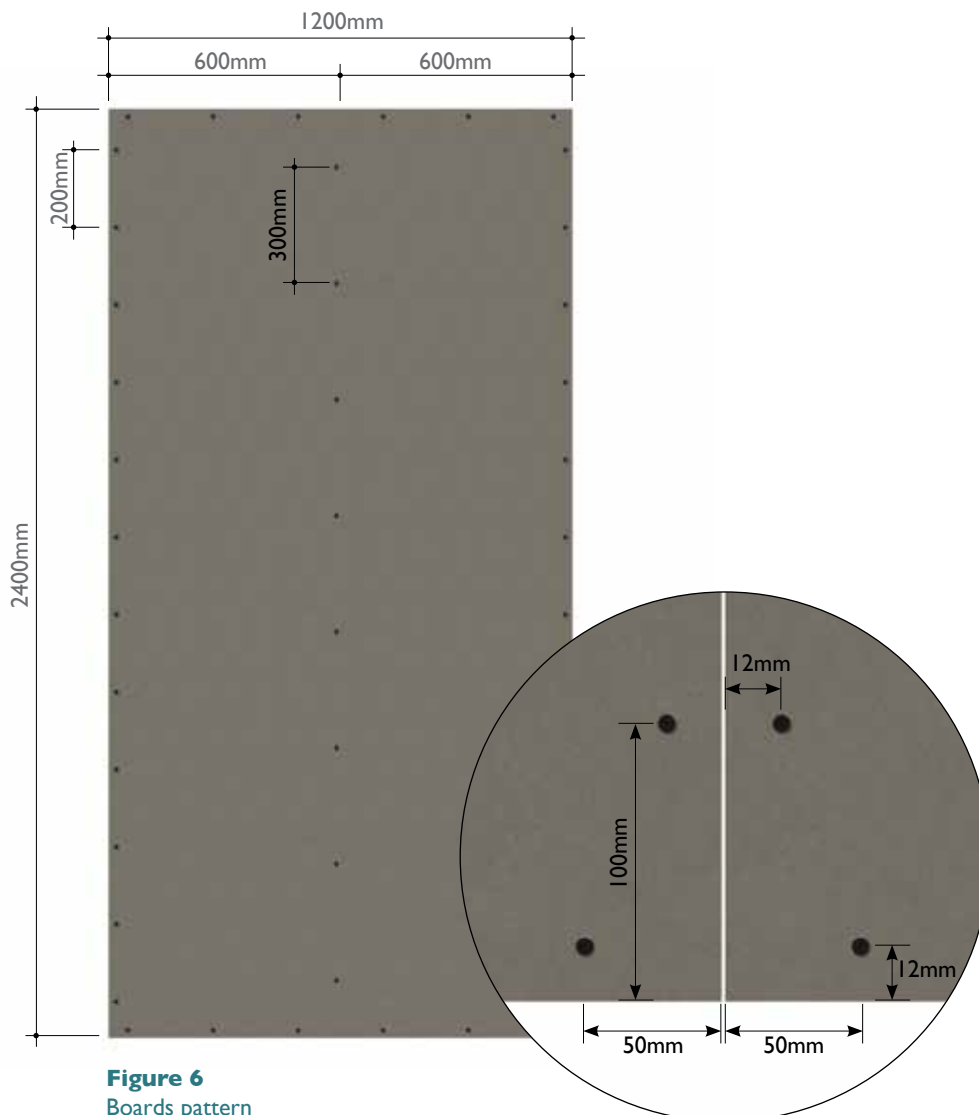


Figure 6
Boards pattern

Installation

Cavity system (6mm & 9mm board)

Check the substrate

Before you install the panels, check the framing structure is square and true.

- The framing must also fully support all sheet edges. It must be rigid and not rely on the cladding sheet for stability.
- All timber framing sizes must be as specified in this installation guide. They must also comply with the NZBC or be suitable for the intended building work.
- Timber framing must be durable and be in accordance with framing manufacturer's specification.
- Lightweight steel framing must be in accordance with Nash Design and NZS 3404 Steel Structures Standard.
- Install a thermal break on all external steel wall framing where KalsiFlex fibre cement boards are used on the external envelope.

Install building wrap

Building underlay or a rigid air barrier must be provided to meet the requirements of the NZBC. The building underlay installation must comply with the NZBC. It must be fixed in accordance with the underlay manufacturer's requirements.

Install the cavity battens

For a cavity construction method, use the following framing:

- Studs spacing: 600mm centres maximum
- Nog spacing: 800mm centres maximum.
- Stud and face nogging edge width:
 - Timber: 40mm minimum
 - Steel: 38mm minimum

Where required, the edge width can be increased by using trim-packing to the side of the studs and noggings. An extra stud is required in internal corners.

The timber battens you use must be minimum of H3.1 and treated in accordance with NZS 3640 (Chemical preservation of rough and sawn timber).

The cavity battens must also be:

- A minimum 18mm thick x 40mm wide
- At least as wide as the width of studs.

When studs are at 600mm centres the battens must be provided at 300mm centres.

The battens must be fixed by the panel fixings to the structural framing through the building underlay. Until you fix the panels, the battens only need to be tacked into their correct place on the framing. You will not require an intermediate batten between studs if the studs are spaced at maximum 400mm centres or you are using rigid sheathing instead of building underlay.

Install the flashings

Before you install the KalsiFlex fibre cement boards, any wall openings, penetrations, intersections, connections, window sills, heads and jambs must be flashed in accordance with E2/AS1.

Penetrations through the building wrap or rigid barrier must be sealed or flashed at the junctions. Lap all flashings so that water tracks down to the exterior on the face of underlay. The flashing you install must comply with the durability requirements of the NZBC.

Boards layout

KalsiFlex 6mm and 9mm cavity system boards are normally installed vertically. This minimises the number of horizontal sheet joints and all of the panel edges must be supported by the framing. If installing horizontally the battens are required to be either castellated or Cavibat™ to ensure adequate ventilation and drainage.

Suspended Ceiling (4.5mm & 6.0mm board)

Where KalsiFlex is specified as part of a suspended ceiling, it must be incorporated into a proprietary suspended metal framing system. Typically, the system is prefabricated using pre-finished aluminium or light gauge galvanised steel.

The framing system is made up of "T", cross "T" and a wall perimeter angle. Once suspended from the structural floor above using hangers, the floor will support the Kalsi fibre cement boards.

The KalsiFlex suspended ceiling system is suitable for use in commercial and office buildings because it provides a ceiling void for building services. KalsiFlex must be installed in accordance with the supplier's instructions.

Once the suspended ceiling system is erected, cut the KalsiFlex fibre cement boards to the size of the support grid (with 3mm clearance), pre-paint them and then lift into place. No mechanical fixing is required.

Soffit & Eave Lining (4.5mm & 6.0mm board)

Eave linings are normally installed before a wall cladding system.

Where 4.5mm & 6.0mm panels are specified as a soffit or eave lining the selection of the correct thickness will be dependent on the framing support. The maximum recommended horizontal support for 4.5mm is 480mm and 600mm for 6.0mm KalsiFlex fibre cement board.

Typically, the fascia will have a preformed groove to accommodate the eave material and the junction of the eave can be supported by the cladding system or the use of a timber finishing line.

PVC or timber battens can be used where sheet joints are required.

Fixings required are: 40 x 2.8mm galvanised / stainless steel fibre cement nails or surefix countersunk screws.

Nails must be hammered flush with the KalsiFlex fibre cement boards surface. When screwed, countersink 0.5mm below the surface. Screws are not recommended where 4.5mm KalsiFlex fibre cement boards are used.

After the installation of the KalsiFlex fibre cement board, holes should be filled, primed and painted.

External Ceiling Lining (4.5mm & 6.0mm board)

Where 4.5mm & 6.0mm KalsiFlex fibre cement boards are specified as a ceiling lining it must be supported by timber or light weight steel framing at maximum of 600mm centres.

KalsiFlex can be installed with PVC jointers mid span between ceiling joists provided the sheet spans do not exceed 600mm.

Fixings required are: 40 x 2.8mm galvanised / stainless steel fibre cement nails or surefix countersunk screws.

Nails must be hammered flush with the KalsiFlex fibre cement board surface. Screws must be countersunk 0.5mm below the surface. Screws are not recommended if you are using 4.5mm KalsiFlex fibre cement board.

After the installation any holes should be filled, primed and painted.

Installation

Sub-floor Enclosure (6.0mm board)

6.0mm KalsiFlex fibre cement boards are suitable for enclosing timber sub-floors. You can carry out this work to limit the under-floor air flow and improve the thermal efficiency of the building, or purely to improve how it looks.

While there is no prescribed construction method for a sub-floor enclosure, we recommend the following requirements as a minimum:

- Install horizontal treated H3.2 timber supports below the floor joist and a minimum of 150mm above ground. The supports can be attached to the sub-floor framing (ie piles, bearers and or joists).
- Place vertical timber supports at maximum centres of 600mm when fixing.
- Ensure the KalsiFlex fibre cement boards are installed clear of the ground to minimise moisture wicking.
- Ensure the sub-floor ventilation is installed in accordance with NZS3604: 2011.

Floor & Deck Substrate (18mm & 20mm board)

18mm & 20mm KalsiFlex fibre cement boards are suitable for use as a rigid floor and deck substrate. The boards can be used in the following applications:

- As a general flooring panel.
- As a flooring panel used in rooms prone to water splash or high humidity.
- As an external deck flooring panel substrate requiring a waterproof membrane overlay.

Design considerations:

- Where 18mm & 20mm KalsiFlex fibre cement boards are installed internally, the designer must consider the floor loadings and the structural floor framing as defined by NZS3604: 2011.
- Where 18mm & 20mm KalsiFlex fibre cement boards are installed as a deck flooring underlay, the designer must consider the floor loadings, the structural floor framing and the specification of a suitable waterproof membrane and overlay finish.

Installation considerations:

- 18mm & 20mm KalsiFlex fibre cement boards can be laid over a timber or lightweight steel frame that complies with the NZBC. Refer to NZS3604: 2011, sec 7 & 14.
- All sheet edges must be supported by structural framing members.
- 18mm & 20mm KalsiFlex fibre cement boards may be installed perpendicular or at right angles to the supporting joist framing. However, in both cases the panels should be laid in brick pattern formation. Allow a minimum of 2mm gap between sheet joints for expansion.
- Expansion joints are recommended at 5.0m centres. Where ceramic tiles are installed, the tile expansion joints must coincide with the panel expansion joint.
- Where the panels are used as a flooring substrate for decks or in areas prone to water splash, a waterproofing membrane that is compatible with 18mm & 20mm Kalsi fibre cement boards must be applied. Consult with suppliers for compatible membrane and over-cladding.

Firewall

Because KalsiFlex fibre cement boards are a non-combustible material they can be designed to be used in conjunction with a fire rated wall system that meets the performance requirements of the NZBC C2-C6 Protection from fire.

A fire wall is a full system, designed with specific components to meet the purpose of the intended use of the building and the area within or external to the building requiring protection.

Vertical Joints

KalsiFlex fibre cement boards can also be used with vertical jointing systems, including timber batten, PVC and flexible sealant jointing. See the drawings below for details:

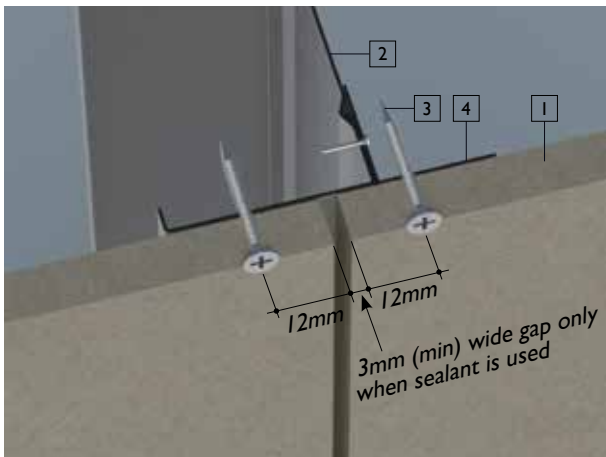


Figure 7
Typical joint detail

1. KalsiFlex fibre cement boards
2. Steel framing
3. Self drilling self embedding head screw
4. Supporting angle secure to steel frame with wafer head drilling screw

Note:

1. Self embedding head screws should be used with 6mm thick panels above.
2. The 3mm minimum gap is for a sealed joint if required.
3. Kalsi fibre cement boards are fixed with standard fibre cement screws and nails.
4. All fixings shall be selected in accordance with environmental conditions and durability requirements as specified Sec.4, NZS3604:2011.

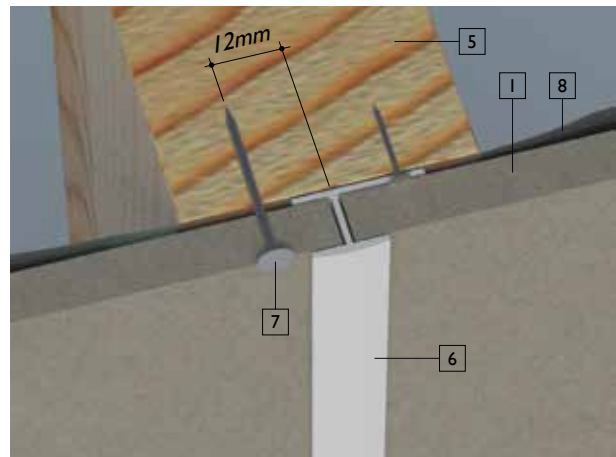


Figure 8
Typical joint detail with PVC joint

5. Timber framing
6. PVC jointer nail fixed at 200mm centres
7. Galvanised fibre cement nail
8. Vapour permeable sarking

Horizontal Joints

Horizontal joints are likely to occur when a building's wall height is more than one sheet in length.

You must use exterior grade PVC or galvanised flashing for all Kalsi fibre cement boards horizontal joints.

When the building height is more than one storey high, provide a horizontal control joint along the junction of the floor joist on the upper storey.

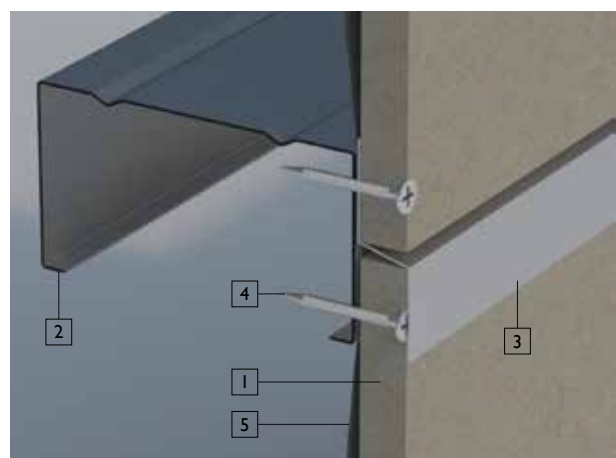


Figure 9
Horizontal joints

1. KalsiFlex fibre cement boards
2. Galvanised steel frame
3. PVC or metal flashing
4. Self embedding head, self drilling screws
5. Vapour permeable sarking

Installation

Internal & External Wall Corners

KalsiFlex fibre cement boards corner joints can be battened with treated timber or finished with proprietary metal or PVC corner moulds or back flashings.

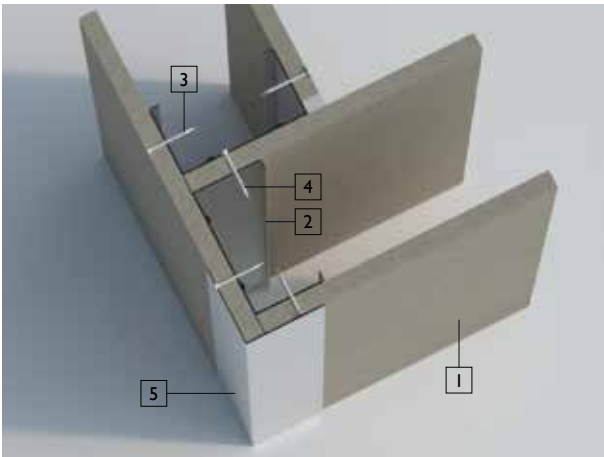


Figure 10
External corners

1. KalsiFlex fibre cement boards
2. Galvanised steel framing
3. Self embedding head, self drilling screws

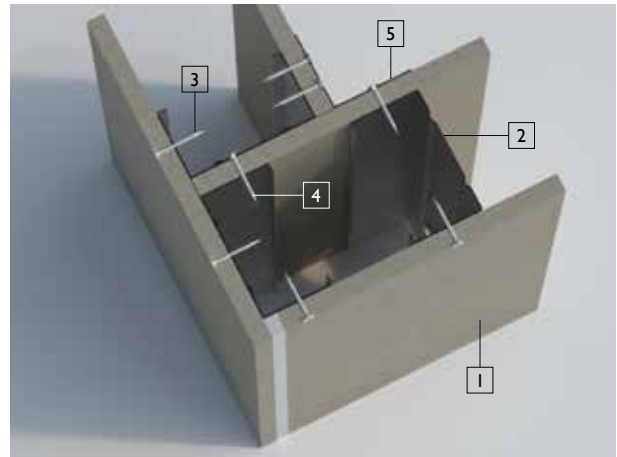


Figure 11
Internal corners

4. Wafer head screw
5. Aluminium corner angle

4.5mm & 6mm board layout

4.5mm & 6.00mm Kalsi fibre cement boards can be laid parallel to – or across – the ceiling joist which ever provided the best optimisation of the panel.

Supporting Framing Distance for Ceiling

Board thickness	Support Framing Centre Distance (mm)	
	Ceiling eaves/soffit lining	
	Joist	Trimmer
4.5mm	600	600
6.0mm	600	1220

You must use the following framing:

Horizontal timber framing support will depend on roof framing centres or ceiling joists. However, we recommend maximum spacings of 600mm centres. If you are using 4.5mm Kalsi fibre cement boards with spans greater than 600mm, the framing should be reduced to a maximum of 480mm centres.

4.5mm & 6mm KalsiFlex fibre cement boards are suitable for horizontal and racking soffits.

Horizontal framing fixing width:

- Timber: 40mm minimum
- Steel: 38mm minimum

Where required, the edge width can be increased by using trim-packing to the side of the horizontal support.

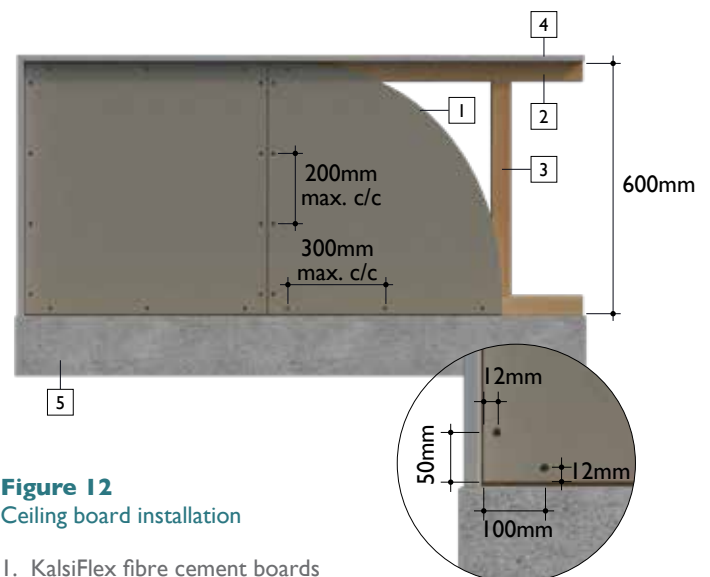


Figure 12
Ceiling board installation

1. KalsiFlex fibre cement boards
2. Timber battens at 600mm max. c/c
3. Timber rafter at 600mm max. c/c
4. Fascia board
5. Perimeter wall

Finishing & Maintenance

Finishing

Use a paint system that is compatible with fibre cement panels and appropriate for where the product has been used e.g., externally, internally in a non-wet area, or internally in a semi-wet area. Kalsi recommends obtaining advice from your preferred coating supplier.

When used externally, ensure all panel joints are sealed and filled, if necessary, use a suitable exterior grade flexible acrylic sealant and filler prior to painting. Once the joints are dry remove any dirt, grease or dust from the panel surfaces.

Maintenance

Under normal conditions, KalsiFlex fibre cement boards will not need maintenance, as long the protective paint system is maintained.

If water damage does occur to an area where Kalsi fibre cement boards has been used, first remove the protective paint layer. Then make sure the area is allowed to dry before replacing the protection.

Maintain the paint finish in accordance with the manufacturer's requirements. This will depend on the finish chosen, but will typically include:

- Regularly washing or wiping clean protective surfaces.
- Ensuring the paint or plaster system is maintained.

Health & Safety

As for all products containing quartz (e.g. concrete and clay), KalsiFlex when machined mechanically (cutting, sanding, drilling) will release dust which may contain quartz particles. Inhalation of high concentrations of dust may irritate the airways. Dust may also cause irritation of the eyes and/or skin. Inhalation of dust containing quartz, in particular the fine (respirable size) dust particulate matter, in high concentrations or over prolonged periods of time, can lead to lung disease (silicosis) and an increased risk of lung cancer.

- Avoid dust inhalation by using cutting equipment which features dust extraction or suppression accessories where practicable.
- Ensure adequate ventilation in the work place.
- Avoid contact with the eyes and skin and inhalation of dust by wearing appropriate personal protective equipment (safety goggles, protective clothing) and approved respirator; a dust mask of at least type P2.

For more information, consult the appropriate Product Data Sheet, available upon request.

For further information, refer to:

- [The Absolutely Essential Health and Safety Toolkit](#)
- [Worksafe New Zealand Quick Guide](#)



KalsiFlex

Premium
Lining Board

Installation Guide

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