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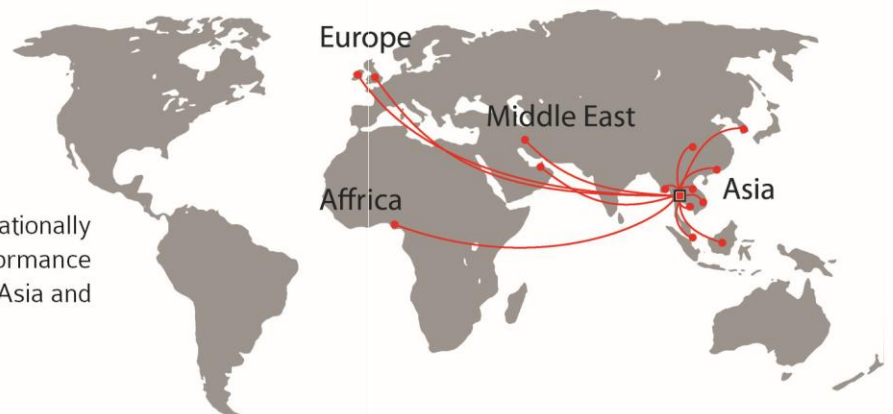


In Today's construction and interior projects, Cement bonded Particleboard is a versatile composite panel used widely around the world. Its advantages give industrial users the design flexibility that is born highly efficient and very productive in any big or small scale projects. Its usage results in tremendous benefits which are a reduction in construction time, transportation cost and the number of on-site personnel required for installation.

Cement boned Particleboards do not sacrifice performance for a competitive price. In fact, Cement bonded Particleboard are highly regarded for their identical high grade characteristic comparable to brick, cement and stone used in construction. Due to its durability and strength, Cement bonded Particleboard has gained more popularity than ever in large scale construction projects with the use of exterior panel incorporating into the structural wall.

In order to meet the increasing global demand for a high quality particleboard for exterior and interior projects, **Panel world Co., Ltd.** was established in 2006 to fulfill these demands within the market. Since then, the company has firmly positioned itself as one of the biggest manufacturers of Cement bonded Particleboard using the utmost innovative solutions and highest manufacturing standard.

As one of the most trusted and internationally recognized brand, our high performance products are widely used in Europe, Asia and throughout the Middle East.

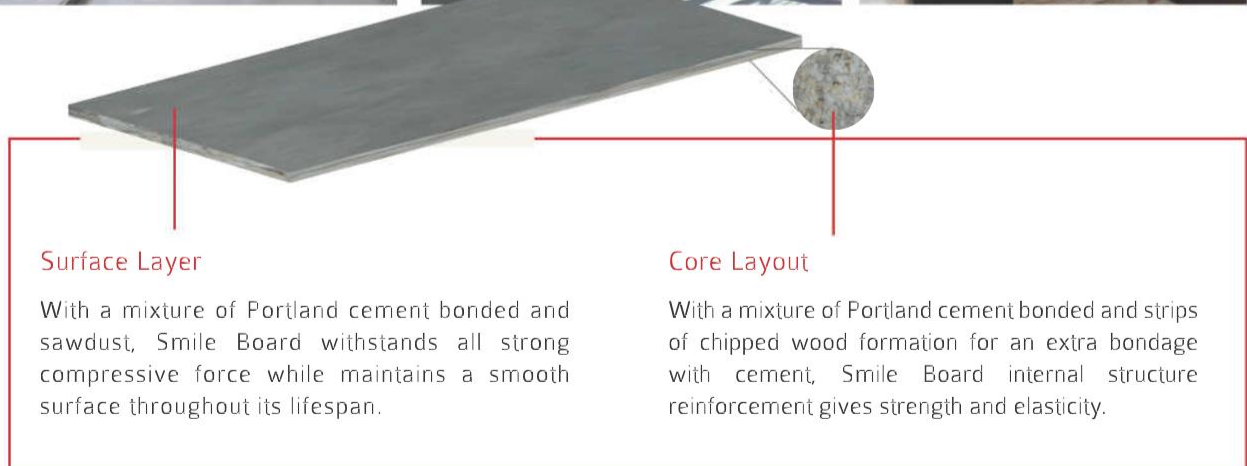








Smile Board possesses its wood-like properties and attribute of cement materials to the highest extent. Smile Board is strong, lightweight, waterproof and fire-resistant material. The surface shields against insects, termites and fungal growth.

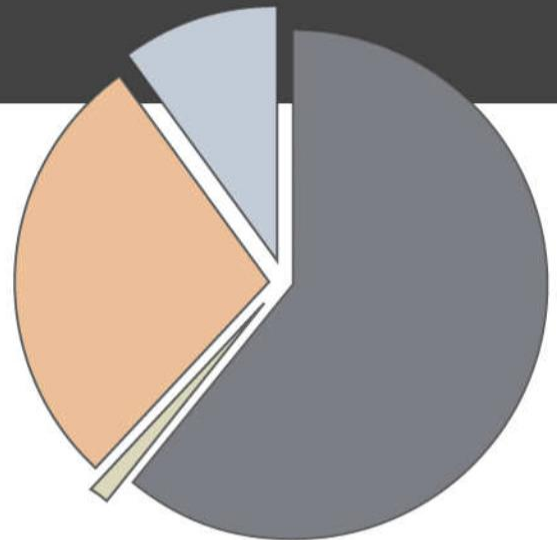
Smile Board is extremely versatile materials that can be used in both interior and architectural projects. It can be used in a wide variety of applications such as for wall partitions, ceiling, flooring, roof sarking, decorative building elements, decking, wall cladding, fencing, lathes and more.










With the manufacturing process using the latest technology available, Smile Boards are produced in homogeneous form, highly durable and highly resilient to scratches and is guaranteed with a smooth finish for the entire surface.



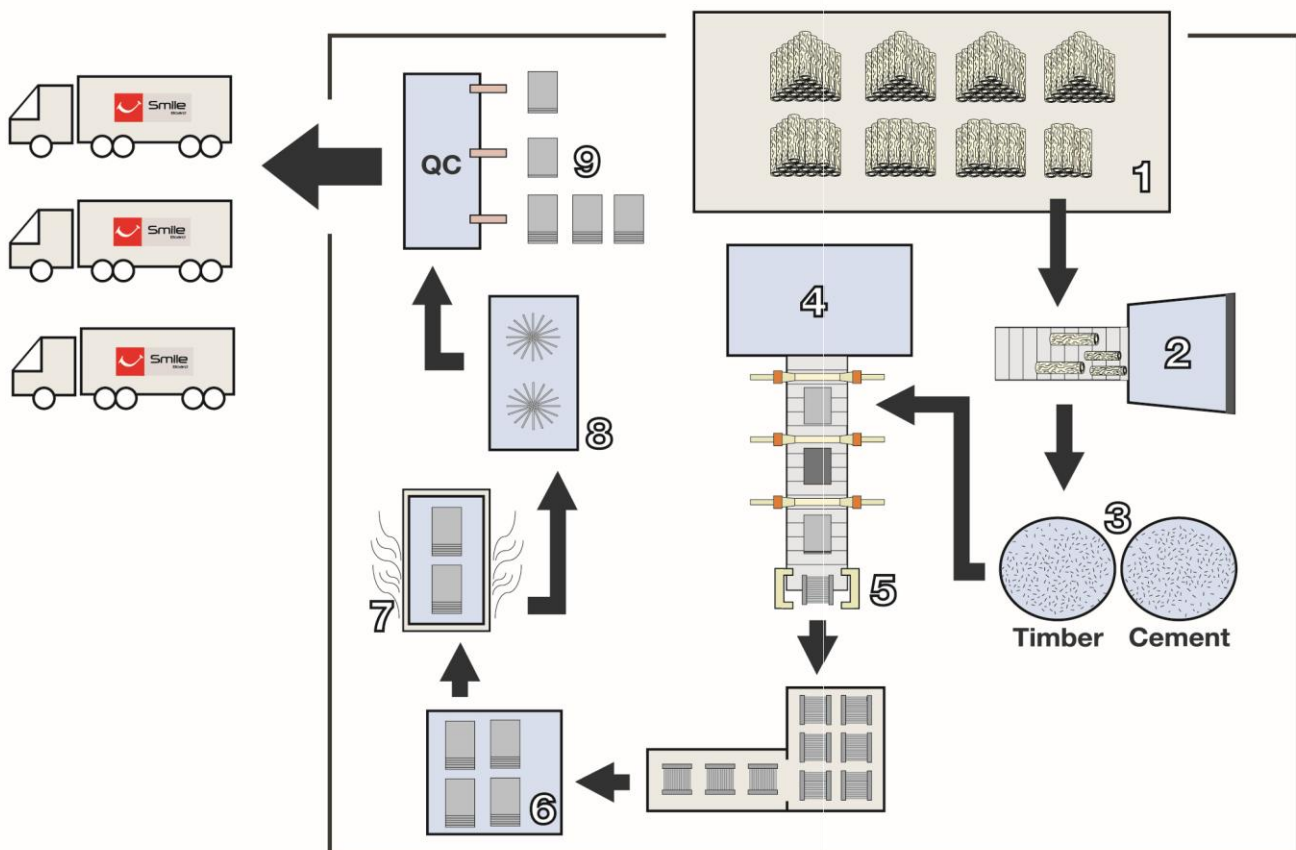
PHYSICAL COMPOSITION

- 
Cement 61% Type 3 High strength Portland cement is suitable for heavy duty applications.
- 
Water 10%
- 
Timber 28% Eucalyptus wood from commercial plantation
- 
Others 1%



- 
 Environmentally Friendly - Non-toxic chemicals or additives such as Asbestos
- 
 High Sound Insulation - 30 – 35 db sound insulation rating
- 
 Ease Of Workability - Only minimal equipment and basic tools (drilling, cutting, stapling, etc.,) required for panel installation
- 
 Fire Proof - Approved by the British Standards BS-476 for fire protection in buildings
- 
 Thermal Insulation - Thermally insulated panels reduces heat transfer and cools down the building
- 
 Asbestos Free
- 
 Termite/Fungus Proof
- 
 Weather Proof
- 
 Economical

PRODUCTION PROCESS



1. Timber warehouse
2. Timber preparation and processing
3. Homogeneous mixing of cement and processed wood
4. Material preparation with '3 Heads Forming'
5. High pressure bonding compressor
6. Baking oven – removing moisture and curing
7. Cutting & surface treatment
8. Quality control & product grading



Timber Preparation

Eucalyptus wood, from commercial eucalyptus plantation farms, is used in the production process due to their fast growing attributes and their superior environment benefits. Fresh eucalyptus timber are usually left outdoors for 3 or 4 months to completely dry out before being transferred to the production process.



Timber Production

Prepared timber goes through a high efficiency chipping machine that processes the timber into, long and thin strip, pieces of wood. The thin and long characteristics of the processed wood will eventually serve to strengthen the Smile Board.

The processed wood will be separated according to its size and characteristics either for use in the surface layer or the core layer of the finished product.



Material Processing

Ingredients consist of Processed Wood, Type 3 Portland Cement, Water and other material mixed together at a ratio of 28%, 61%, 10% and 1% respectively.

The ingredients are then processed into two collective mixes for use either in the surface or core layer of the finished product. The two collective mixes are then finally separated for storage.



Mixing Process

The material compositions are mixed together using the “3-Heads forming” process, to produce thin layer of sheets to make up the panel. The process guarantees a durable and smooth finish throughout the core and surface of the sheets. The sheets are then precisely weighted. Any sheet that does not meet weight requirements will be removed from the production process, and is sent back to the recycling plant.



High Pressure Compressing

The sheets are stacked on one another to form a bundle of sheets. The sheets are then tightly bonded together with a high pressure compressor. This compression stage will bond the sheets together forming a single panel. With this process, the panels are extremely durable and tightly bonded together preventing water molecules from entering the panels.



Baking and Drying

The panels are delicately baked in curing ovens at a controlled temperature of 70 to 80 degrees Celsius. The baking process removes any leftover traces of moisture, helps further strengthen the panels, and increases its maximum lifespan.



Cutting and Surface Treatment

The boards are finally sent through the cutting machine which trims the edges and adds the final finishing touches to the surface of the boards to ensure a smooth and polished exterior.



Thickness Control

Every finished board is inspected at 8-points laser precision to ensure that the thickness of each board remains within requirements.



Quality Control

International quality control standards and regulations ensure that every aspect of the finish products meet the maximum quality production requirement.

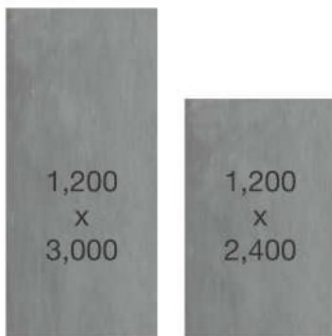
Quality control at every stage of the production process helps to eliminate imperfections and improve the final quality of the products, such as ensuring a finely polished surface, having maximum durability, and maintaining elasticity in the core layer.

PRODUCTS



Standard Board

This is a standard board size widely used in the construction industry with its natural cement grey surface. There are 2 size: 1,200 x 2,400 mm and 1,200 x 3,000 mm. The thickness ranges from 6-24 mm. Your selection depends on the room height. They are suitable for wall, ceiling, floor and other applications as you may apply.

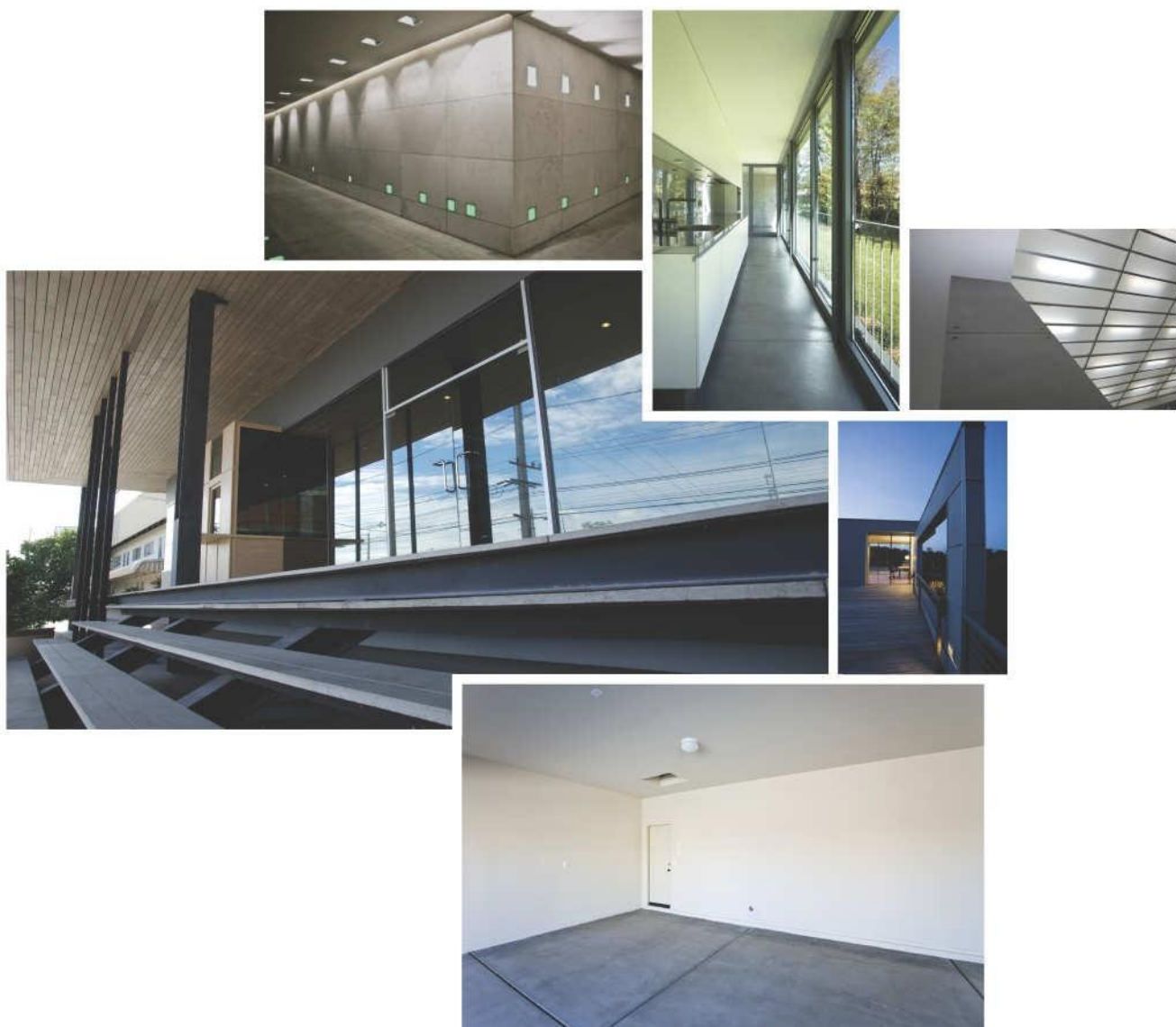


Thickness

6 8 10 12 16 18 20 24

* Board 6 mm Thick is available only 1,200 x 2,400 mm. size.

Thickness (mm.)	6	8	10	12	16	20	24
Decorative Interior Wall	■	■					
Constructive Interior Wall		■	■				
Decorative Exterior Wall		■	■	■			
Constructive Exterior Wall				■	■		
Interior/Exterior Floor						■	■
Ceiling	■						
Laths					■	■	■



PHYSICAL PROPERTIES

Density	Kg./m ³	1,300 ± 10%
Modulus of Elasticity (MOE)	N/mm ²	≥ 4,500
Modulus of Rupture (MOR)	N/mm ²	≥ 9.0
Tensile Strength (Perpendicular to surface)	N/mm ²	≥ 0.5
Moisture Content	%	9 - 15
Elongation of Expansion (after 24 hours immersion in water)	%	≤ 2
Water absorption (after 24 hours immersion in water)	%	10.00
Coefficient in Heat Conductivity (k)	W/m°C	0.1
Acoustic Reduction Rating	dB	30 - 35
pH Measure	pH	12

Sound Insulation

Smile Board has sound insulation solution for interior and exterior projects; wall partitions, ceiling and building exteriors. In addition, Smile board can also be used with other sound absorptive materials, such as acoustic foam and fiberglass, for a perfect interior or exterior acoustic solution.

Fire Resistance

Smile Boards are approved in accordance with British Standards under the fire classifications of Section 476, Part 6 & 7, which Smile Boards are able to withstand fire up to 2 hours in a controlled test environment as specified by the British Standards.

Thermal Insulation

Smile Board homogeneous mixture of cement and wood materials has a great thermal insulation property required by today's many construction projects, where heat losses and energy savings are major concerns. With a very low heat transfer rate of 0.10 W/m°C, Smile Board is a very efficient construction material.

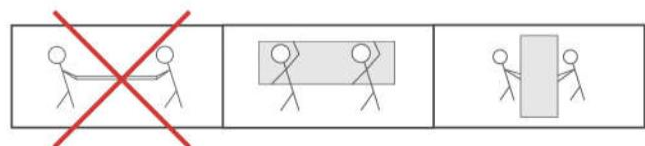
STORAGE GUIDELINE



It is recommended that Smile Board should be stored in designated warehouses areas that are environmentally controlled and weather proof. If outdoor storage is unavoidable, store the pack clear of the ground on level bearers, and protected by water-proof coverings to ensure an all-around moisture free storage environment.

Smile Board must be stacked on pallet boards for forklifts transportation. In order to evenly support the Smile Boards without sagging it, the pallet legs must have a minimum spacing distance of 60 cm. A pallet of length of 240 cm will require 4 legs, and a pallet of length of 300 cm will require 5 legs, and so on.

Transportation along the length or width of the Smile Board requires two or more person to carry, while maintaining the board perpendicular to the floor to strength and prevent sagging of the board. Do not carry Smile Board in parallel with the floor as seen in the picture on the right. Sagging can occur which leads to structural stress and damage.



MACHINING EQUIPMENTS

One of the great advantages working with Smile Boards is the simplicity – involving a few steps and requiring only some of the most basic power tools to do the job.

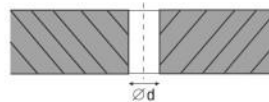


Cutting

Cutting Smile Boards can be done with some of the basic saw tools such as a reciprocating saw or a circular saw. For circular saws, a 1,800 watt rating with a rotational speed of 5,800 rpm and a blade diameter of 7" (or 185 mm) with 40 sets of teeth is recommended. It is also recommended to cut the board from the back side to prevent any damages done to the top decorated surface.

Drilling

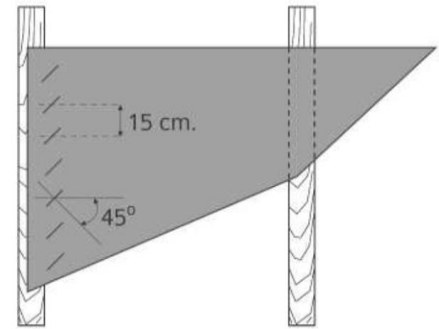
High speed power drills are used to secure the panels in place. Drilling pilot holes first are always recommended. Drilling the board from the back side will prevent any damages done to the top decorated surface.





Air Stapling

Power air stapling gun works with 6 – 10 mm boards to efficiently secure it to wall studs. Stapling should be done at 45 degrees angle parallel to the length of the board with a maximum spacing of 15 cm between staples.



Sanding

Sanding power tools such as disc sanders and flat sanders are used to trim edges, prepare joinery surfaces and smoothen out joints.

Additional Mounting Equipments



Stud

Studs for frame construction made of wood, aluminum, steel or galvanized steel.



Screw

Threaded screws are used to secure the boards. For 12 mm boards or thicker, threaded screws with wing tek are typically used.



Sealant and Coat

Lanko products have been tested with Smile Boards and recommended for board application.

LANKO 603 a single-component polyurethane sealant used to fill joints and smoothen out edges.

LANKO 103 Cement based powder coating ensures a smooth fine finish on walls and ceiling underlay.

STUDDING

Studding in building frames is one of the important elements in construction and the application of Smile Boards.

Typically, there are three types of materials used for studding - wood studs, steel studs, and galvanized steel studs.

Choosing the right material for studding depends on the user's needs and requirements.



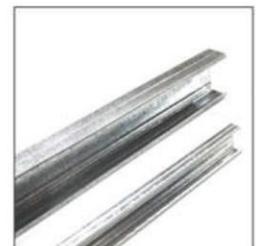
* Although wood studs are extremely rigid, they are not fire-proof and are prone to rot if not properly treated.

Wood Studs

It is essential that Wood Studs are made from hardwood trees that are strong, warp resistant, and perfectly straight and squared on the edges. Use nails to secure Wood Studs while making sure the nails are driven in at a suitable depth.

Galvanized Steel Studs

Treated with zinc coating, Galvanized Steel studs are highly durable, load-bearing, re-proof and corrosion-free. Installation does not require major power tools. Cut it with metal snips and secure it with a drill/screw gun and self-tapping screws.



Steel Stud

Unlike Galvanized Steel Studs, regular Steel Studs are not rust coated, but requires construction techniques to shield it from corrosion. Like Galvanized Steel Studs, simple power tools are used to secure the studs.

	Interior Work	Exterior Work	Flooring	Ceiling
Wood Studs	■	■		
Galvanized Steel Studs	■	■		■
Steel Studs		■	■	■

How to choose Steel Stud with Smile Board 20-24 mm. thick.

■ Steel Stud: C 100 x 50

Thickness	Beam Span	Frame Span	Uniform Load
20 mm.	3 m.	60 cm.	150 - 250 Kg/m ²
		40 cm.	250 - 300 Kg/m ²
		30 cm.	400 - 500 Kg/m ²
24 mm.	3 m.	60 cm.	200 - 300 Kg/m ²
		40 cm.	300 - 500 Kg/m ²

■ Steel Stud: C 150 x 50

Thickness	Beam Span	Frame Span	Uniform Load
20 mm.	4 m.	60 cm.	150 - 250 Kg/m ²
		40 cm.	250 - 300 Kg/m ²
		30 cm.	400 - 500 Kg/m ²
24 mm.	4 m.	60 cm.	200 - 300 Kg/m ²
		40 cm.	300 - 500 Kg/m ²

■ Steel Stud: C 200 x 75

Thickness	Beam Span	Frame Span	Uniform Load
20 mm.	5 m.	60 cm.	150 - 250 Kg/m ²
		40 cm.	250 - 300 Kg/m ²
		30 cm.	400 - 500 Kg/m ²
24 mm.	5 m.	60 cm.	200 - 300 Kg/m ²
		40 cm.	300 - 500 Kg/m ²

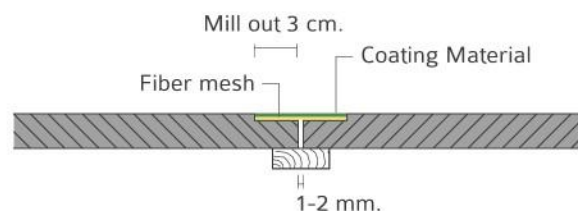
JOINTING

Like any particle-boards, Smile Boards are also prone to minuscule expansion and contraction with temperature and humidity changes.

An expansion gap must be provided between the panel edges to allow for any linear expansion.

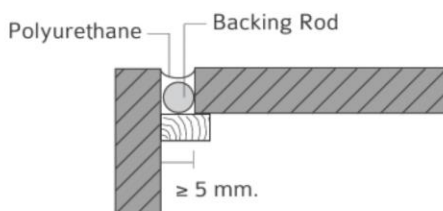
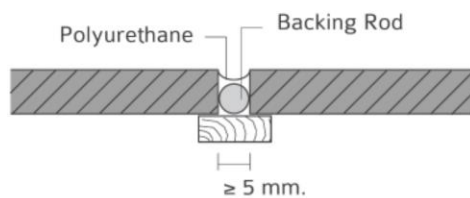
There are three techniques of achieving this - Mill Joint, Jointing with Polyurethane sealant, and V-Groove.

■ Mill Joint



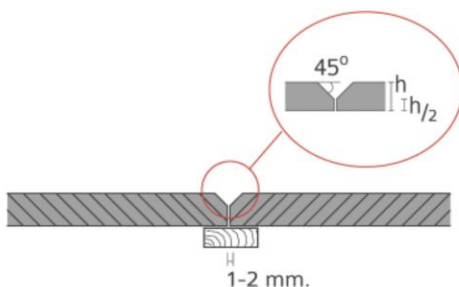
1. Mill out a 3 cm wide groove along the connecting edges of the panels at a depth of 1 mm.
2. Clean the surface along the groove line to ensure it is completely dry and dust-free.
3. Apply the first thin layer of coating in the groove line to fill in micro gaps and to even out the surface.
4. Carefully place the fiber mesh in the coated groove line. The flexible fiber mesh will keep the panels secured.
5. Further apply the final layer of coating on to the fiber mesh. This coating should be smoothed out and flush with panel surface.
6. Leave it to dry for 2 – 3 days, after of which further surface applications are possible.

■ Jointing with Polyurethane sealant



1. Mount panels with a minimum gap of 5 mm.
2. Clean the panels to ensure that the surface is completely dry and dust-free.
3. For panels thicker than 8 mm, insert backing rod along the gap. This will reduce the amount of sealant needed to fill in the gaps.
4. Tape over the top surface of the panels along the edge of the gaps with paper-based tapes. Taping will protect the top surface of the panels when applying sealant.
5. Fill in the gaps with Polyurethane Sealant.
6. Run a wet soapy finger along the gap to push the sealant further in, ensuring a tight fill. Remove excess polyurethane sealant from finger with a wet paper towel.
7. Wait for 9 minutes, and then carefully remove the paper-based taping along the edge of the gaps. Leave the polyurethane sealant for 2 hours to dry.

■ V-Groove



1. Cut a 45 degree bevel at half the depth of the panel's thickness.
2. Fine sand the beveled edges to smoothen out the surface.
3. Apply matching paint along the beveled edges.

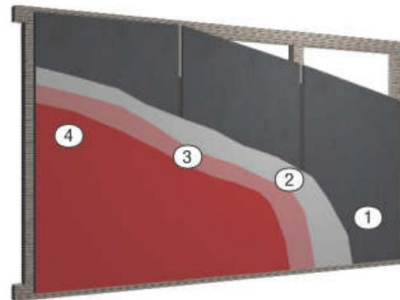
** This method works with interior partitioning and internal structure walling only.

SURFACE FINISHING

Our Smile Boards application can be aesthetically decorated with a huge selection of finishes.

Some of the more common panel decoration includes paint, stone tiles, wallpaper, carpet, rubber flooring and many more to suit your needs.

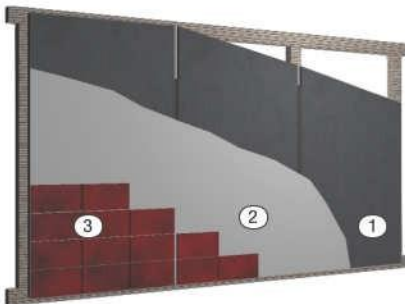
■ Painting



Instruction

1. Prepare the panel surfaces by wiping down any dust and dirt with a damp cloth.
2. Apply primer and carefully letting it dry. A layer of primer evens out the surface for an even color. Priming the panels first also ensures a more durable and finished surface.
3. Applying water-based paint or acrylic-based paint to the panels evenly and wait for it to dry.
4. Repeat the painting process by painting another layer for 2 – 3 more times, while making sure the paint dries first between layers. This ensures an even and vibrant paint finish.

-
- ① Smile Board
 - ② Primer paint
 - ③ Water/Acrylic paint (1st Layer)
 - ④ Paint (2nd Layer)



■ Tiling

Instruction

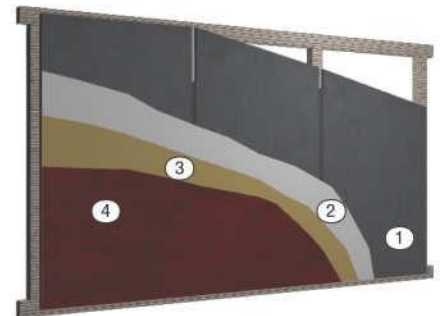
1. Prepare the panel surfaces by cleaning down with a damp cloth.
2. Apply cement-base glue or plaster evenly on the surface. Make sure the entire surface area is covered.
3. Attach the tiles firmly against the panel surface.

① Smile Board ② Cement-based glue ③ Tile

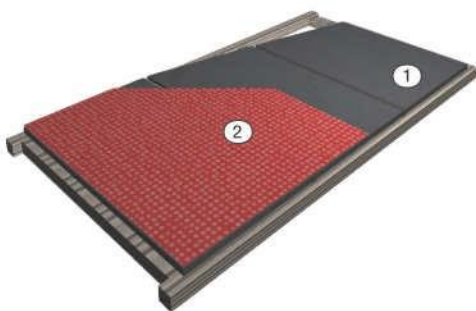
■ Wallpapering

Instruction

1. Prepare the panel surfaces by cleaning down with a damp cloth.
2. Apply primer and carefully letting it dry. A layer of primer evens out the surface for an even color. Priming the panels first also ensures a more durable and finished surface.
3. Apply wallpaper adhesive to the panel surfaces.
4. Place and hang the wallpaper.



① Smile Board ② Primer ③ Wallpaper adhesive ④ Wallpaper

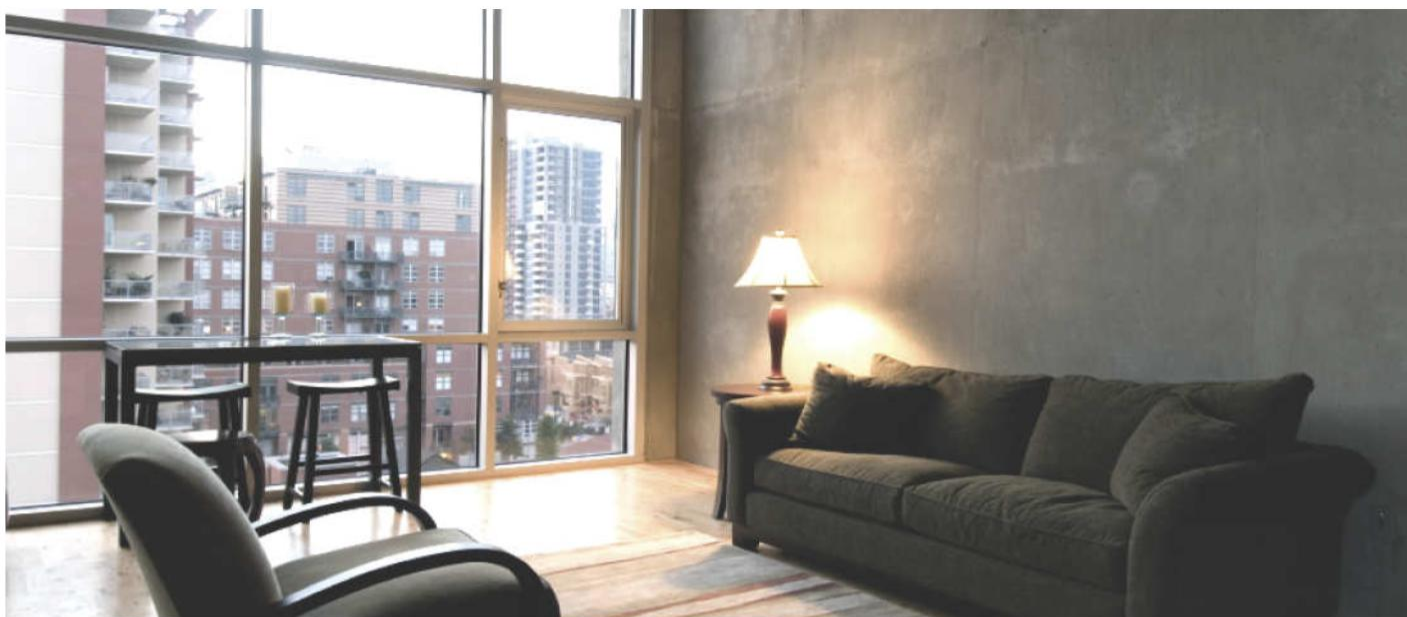


■ Carpeting

Instruction

1. Prepare the panel surfaces by cleaning down with a damp cloth.
2. Start layering the carpet.

① Smile Board
② Carpet material



WALL APPLICATION

Smile Board is used for many interior applications. Smile Board is extremely durable and water resistant material results in better performance compared to other material used for construction.

Smile Boards can be applied in both interior and exterior applications, such as wall partitioning, sound absorbing wall, decorative elements and even as part of a building enclosure.

Due to the ease of installations, Smile Board is fast to build, efficient with less time consumption for wall application.

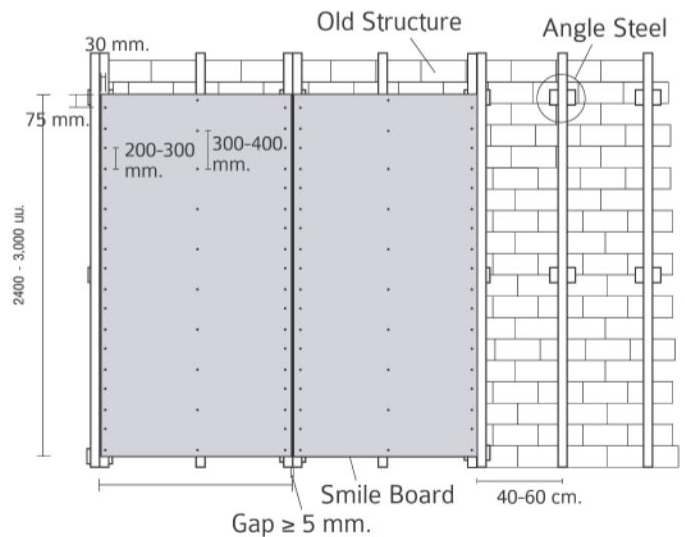
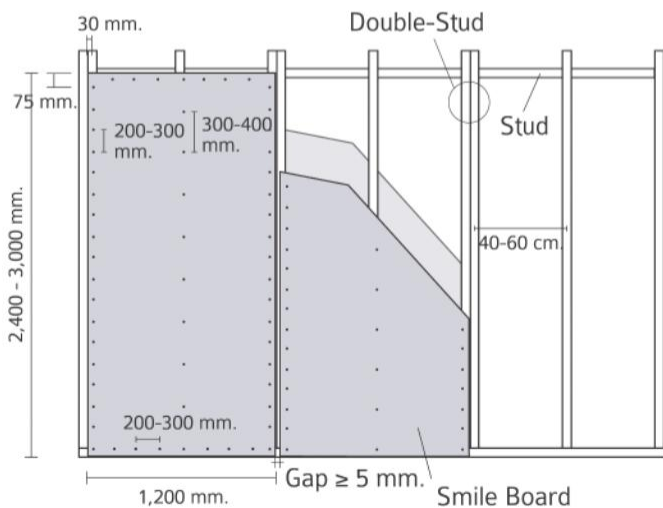
SMILE BOARD FOR WALL APPLICATION

	Thickness (mm.)	Length (mm.)
Interior Wall	6	1,200 x 2,400
Interior Wall (with loads)	8 - 10	1,200 x 2,400
		1,200 x 3,000
Exterior Wall	12 - 16	1,200 x 2,400
		1,200 x 3,000

Board Color	Natural Cement-Grey Color
Studding	Wood / Galvanized Steel
Tools for Installation	Staple Gun, Nails, Screws with wing-tex
Sealant & Finishing	Clear or Matted Primer, Water-base Paint, Acrylic-base paint, Ceramic Tiles, and Wallpaper

INSTALLATION PROCEDURE

1. Prepare stud frames for boarding by spacing out the studs at 60 cm intervals. Double stud frames should be used along the connecting board joint. For External wall, Steel frames are recommended.
2. Align the board along the stud framing, where the edges of the board should be directly on top of the stud frames. Make sure to leave expansion gaps of 5 – 10 mm between the boards. Expansion gaps allow the board to naturally expand and shrink in changing temperature and humidity.
3. Secure the boards onto the stud frames:
For boards of 8 – 12 mm thickness, use 35 mm screws.
For boards of 16 mm thickness, use 45 mm screws.
For boards of 6 mm thickness, power air stapling guns can be used.
4. Drilling pilot holes first are always recommended for screws.
5. Screws spacing are recommended at 20 – 30 cm intervals along the edges of the board, while 30 – 40 cm intervals are recommended along the central area of the board.
6. To avoid splitting the boards, leave a spacing of 75 – 80 mm between the screws from the top and bottom edge of the panel, and leave a spacing of 30 – 35 mm between the screws from the left and right edges.
7. Clean panel surfaces and cover the expansion gaps by filling it with Polyurethane Sealant. For panels thicker than 8 mm, insert backing rod along the gap first before filling sealant. Inserting backing rods will reduce the amount of sealant needed to fill in the gaps.
8. Apply primer and decorate the panels with water-based or acrylic-based paint, ceramic tiles or wallpaper. For internal structural walls, surface treatment is not necessary. Using oil-based paint is not recommended.





CEILING & ROOF SARKING APPLICATION

Smile Board is used in Ceiling and Roof Sarking applications as it exhibits a great energy saving properties.

Smile Boards has coefficient of heat conductivity of $0.10 \text{ W/m}^2\text{C}$, less than any other wood replacement materials. This helps to cool down internal building and save energy costs.

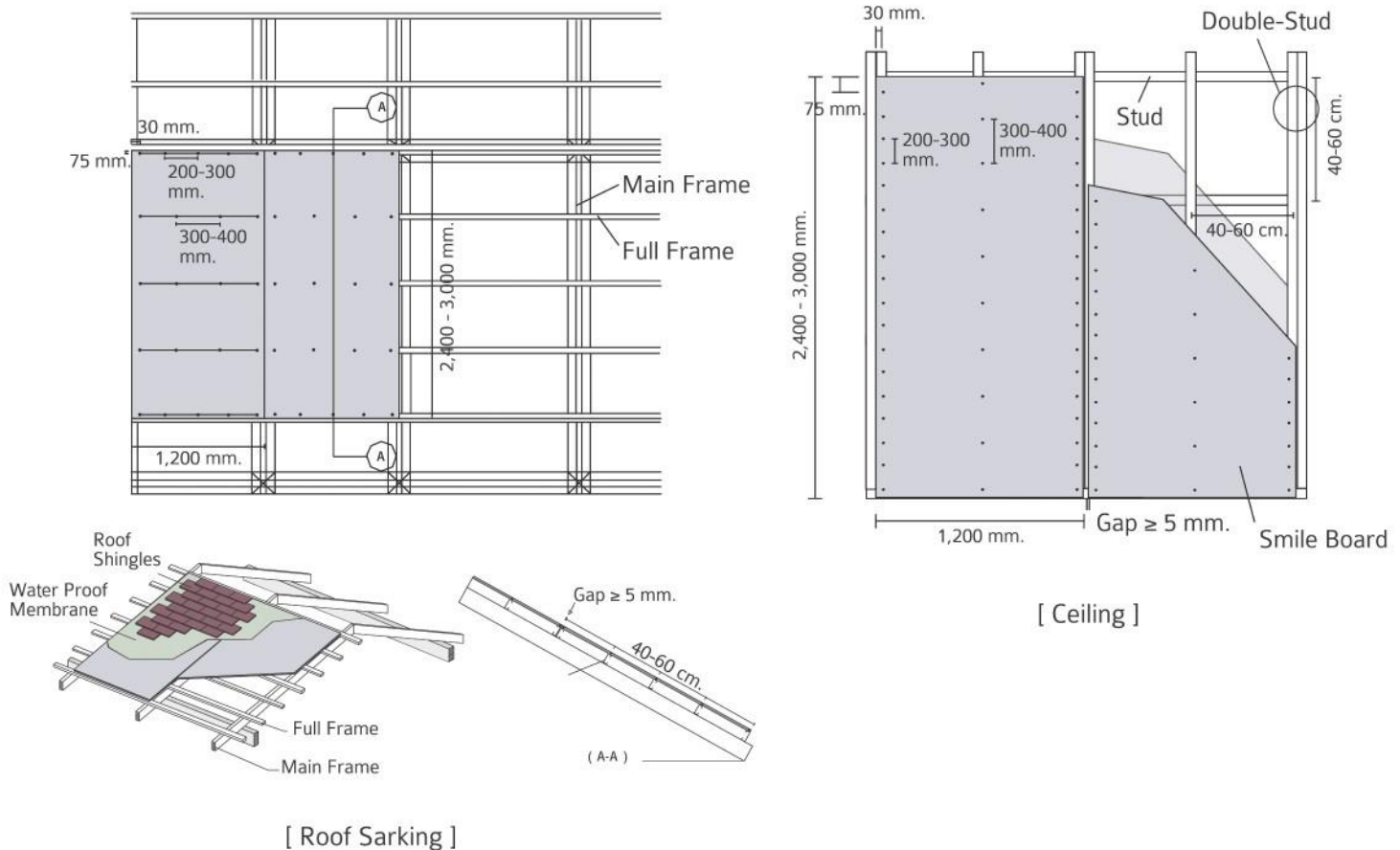
SMILE BOARD FOR CEILING & ROOF SARKING APPLICATION

	Thickness (mm.)	Length (mm.)
Interior Ceiling	6	1,200 x 2,400
Roof Sarking	12 - 16	1,200 x 2,400 1,200 x 3,000

Board Color	Natural Cement-Grey Color
Studding	Wood / Galvanized Steel
Tools for Installation	Staple Gun, Nails, Screws with wing-tex
Sealant & Finishing	Clear or Matted Primer, Water-base Paint, Acrylic-base Paint, Ceramic Tiles, Roof Shingles, and Waterproofing Membrane

INSTALLATION PROCEDURE

1. Prepare roof purlin frames, or interior ceiling stud frames, for boarding by spacing out the frames at 60 cm intervals. Double frames should be used along the connecting board joint.
2. Align the board, where the edges of the board should be directly on top of the frames. Make sure to leave expansion gaps of 5 – 10 mm between the boards. Expansion gaps allow the board to naturally expand and shrink in changing temperature and humidity.
3. Secure the boards onto the stud frames:
 - For boards of 8 – 12 mm thickness, use 35 mm screws.
 - For boards of 16 mm thickness, use 45 mm screws.
 - For boards of 6 mm thickness, power air stapling guns can be used.
4. Drilling pilot holes first are always recommended for screws.
5. Screws spacing are recommended at 20 – 30 cm intervals along the edges of the board, while 30 – 40 cm intervals are recommended along the central area of the board.
6. To avoid splitting the boards, leave a spacing of 75 – 80 mm between the screws from the top and bottom edge of the panel, and leave a spacing of 30 – 35 mm between the screws from the left and right edges.
7. Clean panel surfaces and cover the expansion gaps by filling it with Polyurethane Sealant. For panels thicker than 8 mm, insert backing rod along the gap first before filling sealant. Inserting backing rods will reduce the amount of sealant needed to fill in the gaps.
8. For roofing application, cover the entire boarding with waterproofing membrane and glue down the roofing components (shingles or ceramic roof tiles) with proper roofing cement.





FLOOR APPLICATION

Smile Boards are able to sustain heavy weight and can withstand heavy impact on the material. 20 and 24 mm boards can be used to build or renovate existing floorings.

Flooring application consists of elevating and leveling floors, both in basic interior and exterior construction.

Due to the ease of installations, Smile Board is fast to build, efficient, time saving materials for any floor installation project.

SMILE BOARD FOR WALL APPLICATION

	Thickness (mm.)	Length (mm.)
Floor (Elevated & Leveled)	20 - 24	1,200 x 2,400 1,200 x 3,000

Board Color	Natural Cement-Grey Color
Studding	Steel
Tools for Installation	Staple Gun, Nails, Screws with wing-tex
Sealant & Finishing	Clear or Matted Primer, Water-base Paint, Acrylic-base Paint, Ceramic Tiles, Parquet, Wood Planks, Carpeting

INSTALLATION PROCEDURE

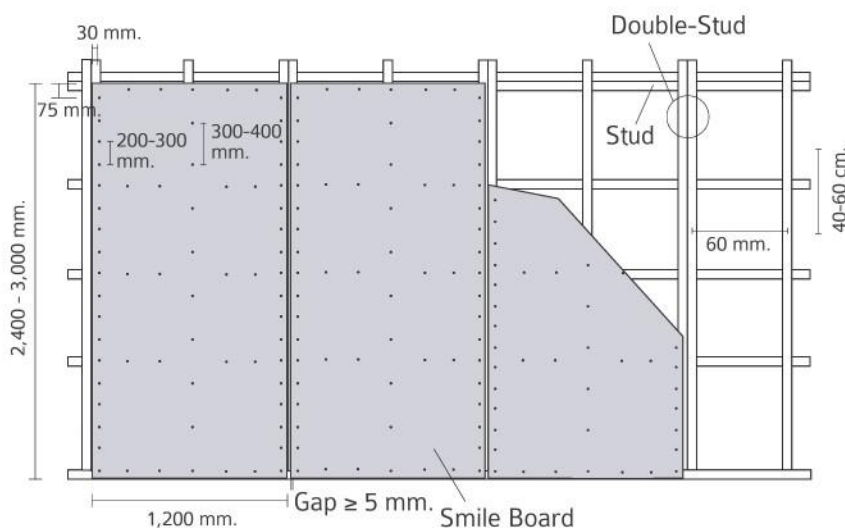
1. Prepare stud frames for boarding by spacing out the studs at 40 - 60 cm intervals, and the beam at 120 cm. Double stud frames should be used along the connecting board joint.

Align the board along the stud framing, where the edges of the board should be directly on top of the stud frames. Make sure to leave expansion gaps of 5 - 10 mm between the boards. Expansion gaps allow the board to naturally expand and shrink in changing temperature and humidity.

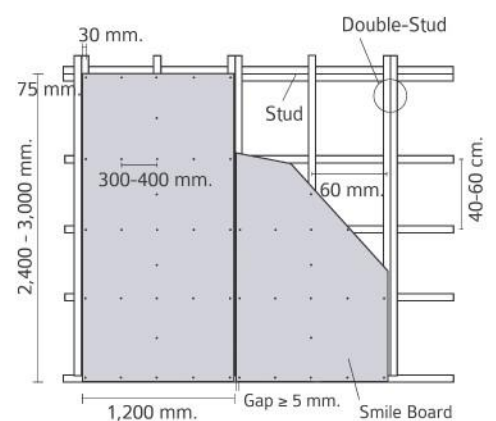
3. Secure the boards onto the stud frames by using 45 mm. screw. Screws spacing are recommended at 20 - 30 cm intervals along the edges of the board, while 30 - 40 cm intervals are recommended along the central area of the board. Drilling pilot holes first are always recommended for screws.
4. To avoid splitting the boards, leave a spacing of 75 - 80 mm between the screws from the top and bottom edge of the panel, and leave a spacing of 30 - 35 mm between the screws from the left and right edges.

5. Clean panel surfaces and cover the expansion gaps by inserting backing rod along the gap and filling it with Polyurethane Sealant. Inserting backing rods will reduce the amount of sealant needed to fill in the gaps.

Apply primer and decorate the panels with water-base or acrylic-base paint, ceramic tiles, parquet, wood planks or carpets.



[Coated Flooring]



[Uncoated Surface Flooring]



Together, we save....

