

SFIBRAL

FIBER CEMENT PANELS



DESIGN AND INSTALLATION MANUAL

1 PRODUCT DATA.....	4
1.1 Production	
1.2 Surface and edge finishing.....	
1.3 Colour range	
1.4 Guarantee.....	
1.5 Dimensions and tolerances	
1.6 Technical characteristics	
1.7 Specific advantages of SFIBRAL Nature and SFIBRAL SPECTRUM	
1.8 Transportation, storage and handling	
2 GENERAL GUIDELINES	9
2.1 Execution	
2.1.1 General tips for working	
2.1.2 Fabrication and Tools	
2.1.3 Edge Fabrication	
2.1.4 Health and safety	
3 PROTECTION AND MAINTENANCE	13
3.1 Protection	
3.2 Maintenance	
4 EXECUTION - FACADE CLADDINGS	15
4.1 Scope of application	
4.2 Construction aspects	
4.2.1 Ventilated facade with open horizontal joints	
4.2.1.1 Advantages of the Ventilated Façade Structure	
4.2.1.2 Moisture Regulation	
4.2.1.3 Resistance to Fire	
4.2.1.4 Insulation	
4.3 Execution - Facade	
4.3.1 Subframe	
4.3.1.1 Timber Subframe	
4.3.1.2 Aluminum Subframe	
4.3.2 Thermal Insulation	
4.3.2.1 General / Systems	
4.3.2.2 U-value of Façade Cladding with SFIBRAL Façade Panels	
4.3.2.3 Installation	
4.3.3 Ventilation - Water retention	
4.3.3.1 Ventilation	
4.3.3.2 Water Retention	
4.3.4 Panel Cladding	
4.3.4.1 Intermediate Spacing of the Support Battens and Fixing Points of SFIBRAL Façade Sheets	
4.3.4.2 Edge Distance of the Fasteners	
4.3.4.3 Resistance against Impact	

4.3.5 Fixing facade panels	
4.3.5.1 General	
4.3.5.2 Installation on Timber Battens - Visible Fixing with Screws	
4.3.5.3 Metal subframe - Visible Fixing with Screws	
4.3.5.4 Aluminum Profiles - Visible Fixing with Rivets	
4.3.5.5 Aluminum Profiles - Invisible Fixing with back-fixing anchors	
4.3.6 Joints - Finishing - Profiles	
4.3.6.1 Vertical Joints	
4.3.6.2 Horizontal Joints	
4.3.6.3 Other Finishing Profiles	
4.3.6.4 Saw Cuts - Connections	
4.3.7 Sealant	
4.3.8 Product for finishing the panel edges	
4.3.9 Exceptional Exposure of the panels	

5 EXECUTION - CEILING CLADDING 39

5.1 Principle	
5.2 SUPPORTING FRAME	
5.2.1 Sections and Intermediate Spacing	
5.2.2 Installation of a Subframe	
5.3 Insulation	
5.4 Ventilation	
5.5 Panel cladding	

6 FIGURES 42

6.1 Principle - Timber battens	
6.1.1 Single vertical subframe, battens fixed directly on inner cavity skin	
6.1.2 Single vertical subframe, battens mounted on support brackets	
6.1.3 Visible framing - double subframe, profiles and battens fixed directly on the internal cavity skin	
6.2 Principle - Metal subframe - Rivets	
6.2.1 Single vertical subframe with brackets	
6.3 Principle - Metal subframe - Screws	
6.3.1 Single Vertical subframe with brackets	
6.4 Double subframe - Invisible mechanical fixing with undercut anchor	
6.5 Ceiling cladding - Single Timber subframe with support brackets	

1 PRODUCT DATA

1.1 Production

SFIBRAL Nature and Spectrum panels are manufactured from a homogeneous mixture of Portland cement, selected reinforcement fibres, additives, and water. This mixture is transmitted in thin layers under constant pressure to a format roller by means of a sieve cylinder machine (Hatschek) until the required panel thickness is obtained. The panels are double pressed and autoclaved.

1.2 Surface

Available in smooth brushed finish, SFIBRAL Nature cladding evolves gracefully over time, developing subtle variations and a natural patina that tells a story of timeless charm. Non uniform colours and some small imperfections of the surface are a feature of the product. Both sides of the panel have a transparent hydrophobic coating. The front side of the SFIBRAL Spectrum panels is finished with a high-quality and durable water-based acrylic paint system with a uniform matt look and enhanced UV resistance. A water-based coloured protection layer is applied on the backside of the SFIBRAL Spectrum panels.

1.3 Colour range

The SFIBRAL Nature range consists of 7 standard colors.
SFIBRAL Spectrum has an opaque acrylic coating in custom colors.

1.4 Guarantee

SFIBRAL provides a 10-year guarantee on the SFIBRAL Nature and Spectrum panels, provided that the materials are handled and installed according to the best practice of the trade and in conformity with our prescriptions regarding storage, handling and cleaning, and provided the panels are used under normal conditions in a normal atmospheric environment.

Tampering with the SFIBRAL panels and fastening of objects onto the panels fall outside the guarantee scope of the panels.

1.5 Dimensions and tolerances

SFIBRAL Nature panels are delivered squared.

The squared panels meet the requirements of Tolerance Level I as per norm EN 12467.

Standard formats

2440 x 1220 mm,
3050 x 1220 mm

Thickness 8 mm, 10 mm, 12 mm



1.6 Technical characteristics

Data sheet fiber cement

Property	Value	Standard
Type of product	Flat fiber cement sheets for exterior and interior cladding.	EN 12467:2012
Usable format (maximal value) length and width	Length — 2440 mm, width — 1220 mm	
Thickness tolerance	± 0.2 mm	EN 12467:2012
Width tolerance	± 1.0 mm	EN 12467:2012
Length tolerance	± 1.0 mm	EN 12467:2012
Streightness of edges	Level I, $\leq 0.1\%$	EN 12467:2012
Perpendicularity (mean value)	Level I, 0,1 mm/m	EN 12467:2012
Apparent density (minimum)	1600 ± 50 kg/m ³	EN 12467:2012
Area density (average)		
8 mm sheet	12,8 kg/m ²	EN 12467:2012
12 mm sheet	19,2 kg/m ²	EN 12467:2012
Fire classification	A2-s1, d0	EN13501-1:2018
Surface Burning Characteristics	Flame Spread Index (FSI): 0; Smoke Developed Index (SDI): 40	ASTM E84-24
MOR average both lengthwise and crosswise (wet condition)	≥ 18 Mpa	EN 12467:2012
MOR lengthwise (wet condition)	≥ 23 Mpa	EN 12467:2012
MOR crosswise (wet condition)	≥ 13 Mpa	EN 12467:2012
MOE lengthwise (EMC condition)	≥ 14000 MPa	EN 12467:2012
Moisture movement, 12mm panel, air dried - humid	Lengthwise 0,02%, crosswise 0,06%	EN 12467:2012
Heat conductivity	0.162 W/(m·K)	ASTM C 518-10
Moisture content (Maximum value on dispatch EXW)	≤ 12.0 %	EN 12467:2012
Frost resistance according to EN 12467	Comply with category A	EN 12467:2012
Heat resistance	-60 °C and +80 °C	EN 12467:2012
Water absorbtion	≤ 25.0 %	EN 12467:2012
Water permeability	Pass	EN 12467:2012
Warm water resistance	Pass	EN 12467:2012
Heat/rain resistance	Pass	EN 12467:2012
Soak/dry resistance	Pass	EN 12467:2012

1.7 Specific Advantages of SFIBRAL Nature and SFIBRAL SPECTRUM

- Environmentally sound water based coating system.
- Chemical resistance: resistant to alkalis and diluted acids.
- Resistant to microorganisms, fungi, microbes, insects etc.
- Non-combustible, limited smoke production.

1.8 Transportation, storage and handling

SFIBRAL fiber cement facade panels are supplied on pallets, wrapped in foil. This foil does not provide sufficient protection from weather conditions (rain, condensation, and strong sunlight). The panels must be protected until they are installed.

Closely follow the following instructions:

- SFIBRAL facade panels must be transported under a watertight canvas.
- The panels must be stored in a shaded and dry place.
- Limit the storage period on site to the time that is needed to execute the work and keep the packaging closed until the moment the panels will be installed. If it is impossible to store the panels inside, carefully cover the panels with a vapor-open, watertight canvas and protect them from precipitation and heavy sunshine. Also prevent the panels from becoming wet or dirty due to condensation, water absorption, dust, or any other kind of pollution.
- In case the panels have become wet in the package, dry them as soon as possible. Panels that are stored in wet conditions are not covered by our warranty policy.



- SFIBRAL panels are always stored horizontally, on an even and dry subsoil, clear of the ground.
- Use racks, pallets or supporting laths with a maximal distance of 400mm.
- The panels must be supported sufficiently so that they cannot deform. Maximum 3 pallets stacked on each other.



- SFIBRAL protects the finished surface of the SFIBRAL panels by placing a protective foil between the panels.
- The foil protects the panels against damage during transport, storage, and handling. Despite the protective foil additional care must be taken:
- Avoid big temperature fluctuations.
- Limit the storage period.

Be careful when transporting or handling the panels, in order not to damage the panels.

- Lift the panels with two people, without dragging them or moving them over the panel below.
- Carry them in a vertical position.
- Avoid staining and wear clean gloves when lifting the panels.
- Avoid stains of glue, silicone, polyurethane foam as these can leave irremovable stains.
- Do not stick labels, tape of any type of adhesive tape on the decorative surface of the panels. These can leave glue residue on the panel and could affect the decorative surface.



- Whilst transporting and handling SFIBRAL facade panels, the legislation related to mobile work equipment for hauling and lifting loads must be always respected.

2 GENERAL GUIDELINES

2.1. Execution

- SFIBRAL Nature and Spectrum panels are delivered in full sheets. These panels can be cut to size on request.
- The edges of the panels are not painted.
- After sawing the edges of the panels must be treated with an impregnation sealant, recommended by SFIBRAL.

2.1.1 General Tips for working

- SFIBRAL facade panels are basically treated as a stony sheeting material.
- Always drill and cut SFIBRAL facade panels DRY. Only drill or cut in a dry environment.
- Wear a dust mask and safety goggles.
- Wear woolen gloves in order to avoid sweat and grease stains on the fibre cement material.
- Always use a tool with dust extraction.
- Always drill and/or cut from the front to the backside. This way, the edges of the front side will remain intact.
- Duly support the panel, provide a stable support and avoid tensions and/or vibrations.
- Eliminate sharp cutting edges by means of smooth abrasive paper (no. 220) or a sanding block. It is advised to always sand the edges to achieve the best result.
- Avoid drilling and cutting dust sediment on the panel surface. In case there is dust on the panels, it should be removed immediately by means of a soft, dry and pure micro-fibre cloth or a soft brush, before the panels are processed any further, exposed to rain or restacked. Cement dust that is left on the panel surface causes unwanted visual effects on the panels after their exposition to weather circumstances.

2.1.2 Fabrication and tools

Panel cutting

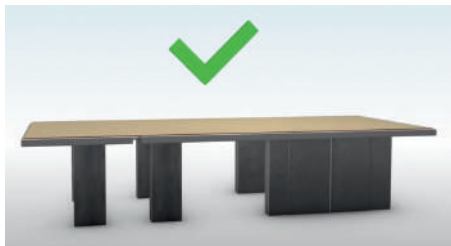
For cutting SFIBRAL fiber cement panels, it is necessary to prepare a stable, solid base table at least in the size of the panel covered with a soft material to prevent scratching the panels. Use dedicated, accurate, non-worn tools with a ruler. Depending on the tools and the type of disc, the plate can be cut with the decorative side up or the internal side up.

When starting work, it is necessary to determine which cut will be cleaner while using the available tools.

It is also necessary to test and determine the optimal sawing speed. Cutting equipment (Festool AXT50 LA Plus or similar) must have a vacuum cleaner that sucks up the vast majority of dust - then dust deposits on the board much less and it ensures quality, healthy and safe operation.

A jigsaw should be used for curved cuts. Improperly selected tools and discs can lead to crumbled and burnt edges, edge chips and unstable dimensions.

It is not possible to cut several boards at the same time, the board must lie stably, has to be held to prevent vibration.



Suitable tools



Jig saw, 3000 – 6000 rpm

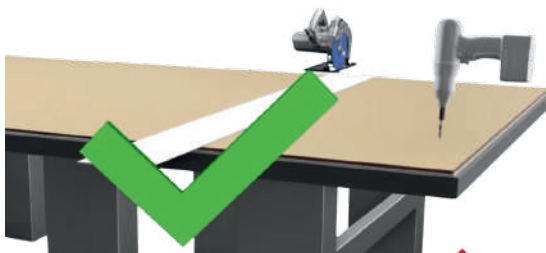


Diamond blade 4", 7" and 9"

Panel drilling

To drill holes in the panels, it is recommended to use drills of the appropriate diameter, which are especially suitable for drilling fibrous cement - the drill does not slip from the required drilling location, drills quickly, does not burn edges, leaves no chips.

When drilling, the panel must lie on a solid base and not bend. The front side of the panel is drilled. Only drill one panel at a time, it is forbidden to use the forging function. After drilling, the chips must be thoroughly cleaned from the surface of the panel. It is possible to use templates, just make sure that its use does not leave any marks.



Suitable tools

Concrete drill bit
9,5mm, 5,2 mm



Drill 0 - 3000 rpm 450 W

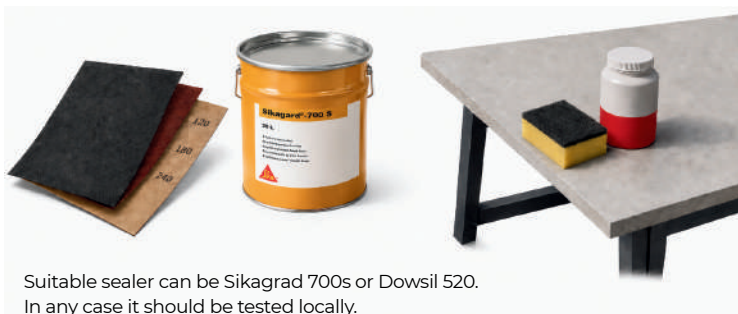


2.1.3 Edge fabrication

After cutting, the edge near the façade plane must be lightly sanded with sandpaper (grain size 80) on a hard base (wooden) block. Scrubbing is required to remove the sharp edge, but without rounding it, so scrubbing is done by pressing it gently upright to the edge and swiping once.

It is necessary to perform testing to get a proper result. If the edge is not scrubbed, there is a particularly high probability of material chips when lifting the panel by hand.

After cleaning, panel edges must be impregnated with impregnation liquid. Before using the impregnation liquid check the expiration date and current temperature conditions. The impregnation liquid is applied with the sponge. Any excess that has come into contact with the surface of the panel must be wiped immediately with a clean cloth to remove any stains from the impregnation liquid.



Suitable sealer can be Sikagard 700s or Dowsil 520.
In any case it should be tested locally.

2.1.4. Health and safety

Cutting, drilling and sanding SFIBRAL façade panels generates dust containing respirable crystalline silica (RCS). Prolonged inhalation of this dust may cause serious respiratory harm.

Always use tools with integrated dust extraction and work in a well-ventilated area.

When processing the panels, always wear the following personal protective equipment:

- an FFP2 (or higher, e.g. FFP3) respirator mask certified for fine dust and respirable crystalline silica;
- safety goggles;
- protective gloves;
- protective work clothing.

Do not dry-sweep accumulated dust; remove it by vacuum extraction or a damp cleaning method.

For complete hazard information, refer to the SFIBRAL Safety Data Sheet (SDS), available on request.

3. PROTECTION AND MAINTENANCE

3.1 Protection

Protection during construction

SFIBRAL façade cladding panels are used for decorative finishing. Try to plan the execution at the end of the building phase, in order to avoid damage and pollution due to subsequent work.

Protection from graffiti

The risk of graffiti is imminent at some locations. For surfaces at risk it is recommended to preventively provide a permanent protection layer against graffiti and other pollution (markers, ink, etc.). SFIBRAL panels are not provided with anti-graffiti layer but are adequate for treatment with protective products against graffiti. These can vary dependent on the panel type. As there are different types of anti-graffiti protection, dependent on the subsurface and wishes of the customer, it is recommended to have this executed by a specialized firm.

3.2 Maintenance

General maintenance guidelines

To maintain the attractive appearance, each façade, independent of the used material, must be maintained on a regular basis.

This way, persistent pollution, which diminishes the durability of the finishing coating, can be avoided. The cleaning frequency depends on the environment and the panel type.

In the first place, we recommend restricting pollution as much as possible, especially irregular pollution, by a well-thought out design (provide good sealing, overhangs, drip edges, etc., avoid marks of corrodible materials such as copper, zinc, lead, etc.).

Due to their low porosity SFIBRAL Nature panels are less susceptible to pollution than more porous panels. For standard maintenance we recommend you using clean city water. For more persistent pollution we recommend using a neutral, non-abrasive all-purpose cleaner with sufficient foaming. Dilute sufficiently following the instruction guidelines.

Never use soaps containing linseed oil, nor an ordinary household detergent. First try out the product on a small area.

- Clean with a sponge or a soft piece of cloth. In case of large surfaces, a SOFT brush can be used for soaping, but ensure it that hard parts of the brush do not cause scratches on the panel.
- Avoid hard scrubbing: this causes a “polishing effect”, which slightly modifies the panel appearance.
- Do not let the soap solution dry in.
- Amply rinse with water.
- For rinsing afterwards, water can be vaporized over the surface WITHOUT PRESSURE (e.g. a garden hose, which vaporizes the water over the panel under a broad angle). For this working method, it is absolutely necessary that the rear construction is carried out impeccably with regard to water evacuation, ventilation and water tightness.

Exceptional pollution – stain removal

Remove stains as soon as possible. Try to first remove the stains by a regular maintenance. If this does not lead to the desired result you can contact our Technical Commercial Department. As there is such a large amount of cleaning products and pollution types, depending of the case, SFIBRAL can help you further or refer you to a specialized firm. This counts as well for pollution by graffiti. If the panels have been treated with anti-graffiti protection we recommend you contact the firm which provided the anti-graffiti treatment.

If no protection is provided please contact our Technical Commercial Department.

4 EXECUTION FACADE CLADDINGS

4.1. Scope of application

These guidelines are valid for applications in buildings up to a height of 40 m with normal exposure to wind. The maximum intermediate distance from the supporting structure is determined, taking into account its own weight and wind loads determined according to Eurocode 1991-1-4 and national building regulations. For countries that are not part of the European Union calculations must be made according to the national regulations. The fact remains that for each construction a study of the facade construction has to be made.

4.2. Construction aspects

4.2.1 Ventilated facade with open horizontal joints

SFIBRAL façade cladding is a façade construction with a well-ventilated cavity and with open horizontal joints. The cavity is ventilated with outside air. The façade cladding is not a watertight shell. As a consequence, the inner cavity wall should be made watertight.

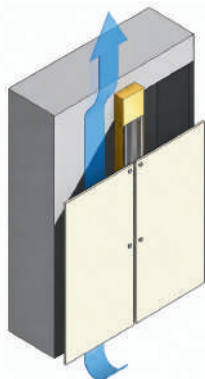
4.2.1.1 Advantages of the Ventilated Façade Structure

- No internal condensation risk: Moisture that migrates from inside the building into the cavity is easily evacuated thanks to ventilation. Condensation usually appears on the cold insulation surface. In case the cavity is ventilated, this moisture can be easily removed, and further condensation is avoided.
- Limited heating of the construction due to sunshine: The surface of a construction can quickly warm up due to sunshine. A dark panel can heat up to a temperature as high as 60° C or more. Thanks to a sufficient cavity ventilation, the basic building structure is not exposed to such high temperatures.

4.2.1.2 Moisture regulation

It is evident that façade cladding materials (including back structure and fixing) are exposed to moisture on a regular basis:

- Rainwater comes down on the panel surface and enters the cavity through the joints. In case of heavy wind, water is blown into the cavity and can horizontally penetrate several centimetres into the cavity.
- Internal moisture migrates through the construction into the cavity. Both when defining the material for the back construction as when determining the façade apertures (windows, roof edge, ...), this moisture load should be taken into account.



SFIBRAL façade cladding is neither water- nor wind-tight. The air- and water-tightness must always be guaranteed by the construction.

4.2.1.3 Resistance to fire

SFIBRAL façade cladding is a construction with open joints. As a consequence, it does neither contribute to the fire resistance, nor to the protection against fire penetration nor flashover of the construction.

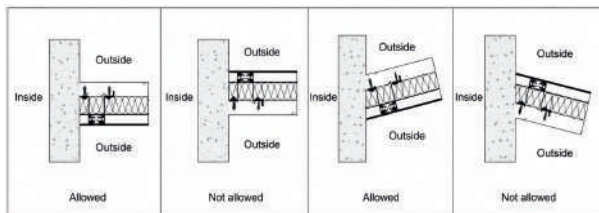
4.2.1.4 Insulation

- The products used for the insulation of the façade construction must comply with the prescriptions.
- Insulation is attached on the exterior side of the wall, in order to limit temperature fluctuations in the internal skin.
- Insulation at the exterior side of the structural wall can be applied almost uninterruptedly; as a consequence, the number of thermal bridges is restricted to a minimum.
- The SFIBRAL facade panel itself does not contribute to the thermal insulation of the construction and is not taken into account in this calculation.

4.3 Execution - Facade

SFIBRAL façade cladding is a self-supporting façade finishing system: the panels transfer their own weight and the wind load through the subframe onto the supporting internal skin. The panels can support no other loads than these, so do not fix any objects directly on SFIBRAL façade panels.

The guidelines mentioned hereafter refer to vertical-no commal, ventilated façade claddings with SFIBRAL façade panels, with open horizontal joints. Installing panels as a roof construction is not acceptable. For ceiling applications etc.: see § 5.



4.3.1. Subframe

The SFIBRAL façade cladding is installed on a timber or aluminum subframe. Always install the panels on vertical studs and provide uninterrupted ventilation.

- Check the stability and the load-bearing capacity of the substrate on which the subframe is fixed.
- Use rust-free fasteners, suitable for the material of the subframe and the back-construction. Use fasteners with sufficient pull-out resistance. This relates both to the fixings of the subframe in the internal skin as to the mutual fixing of the constituent subframe elements.
- The dimensions and intermediate spacing of the subframe must be checked by an engineering agency. Consider wind zone, terrain category and specific circumstances.
- Pay attention to the alignment of the supports. SFIBRAL façade panels follow every unevenness in the structure. The flatness of the supports is identical to the required flatness of the façade cladding.
- Always install panel supporting battens in a vertical position to have a fluent water drainage out of the cavity.
- Provide an expansion joint in the sub-frame at least every 3500 mm (unless the supplier of the subframe imposes other distances). Ensure it that this joint coincides with a panel joint, in order not to have the movement of the subframe creating extra tension on the façade cladding panels.

The subframe transmits the loads – own weight of the panels and wind load – to the supporting internal skin.

The sections and intermediate distances between the supports are determined regarding the maximum deflection and the acceptable tensions. Take the exposure of the façade surface into consideration (location, façade height, form parameters).

The hereafter given data (measurements) serve only as guidelines, their validity needs to be verified for each project in function of the specific situation.

4.3.1.1 Timber subframe

Always use wood that guarantees the required durability of the façade finishing. Use durable wood (natural durability or treated – cf. EN 335, EN 460 en EN 350-2).

Use wood with strength class C24 (EN338). Only use wood that is clean, dry (moisture < 18%), dust- and grease-free. For countries that are not part of the European Union the national regulations are to be followed.

Horizontal primary battens

In case the insulation is applied between the battens, the dimensions must be based on the fixing distance and on the insulation thickness. The minimum values are: Width: ≥ 60 mm, thickness: ≥ 40 mm.

The intermediate distance of the primary battens is also determined depending on the adhesive strength of the substructure and the insulation panel dimensions.

Rule of thumb: $l \leq 800$ mm.

The intermediate distance of the primary battens also determines the thickness of the vertical battens.

Support brackets

Support brackets should be made of galvanised or stainless steel or aluminum and be resistant to the forces they have to withstand. Moreover, they are protected against rust and other types of degradation. Always use purpose designed support brackets for façade cladding applications.

The permissible distance between the support brackets is determined by a stability study. This takes into account the tensile strength of the fixings in the supporting structure, the wood section and the loadings.

As a rule of thumb the following distances apply:

- vertical subframe: 1000 mm
- horizontal subframe: 500 mm

Vertical panel supporting battens

For screw fixing, the battens need to be at least planed on one side. They must be planed on 4 sides for bonding. It is advisable to use four sides planed wood for all applications.

Use wood with sufficient form-stability, to avoid deformation after alignment of the frame. Leave a 5mm joint between the battens. The dimensions of the battens are determined by calculation. National regulations may impose minimum sections. For screw fixing, the section is also determined by the minimum edge distance and the penetration depth of the screws.

The following indicative values can be taken into account:



Minimum section battens (T x W) Screws

Fixing of battens:	Direct	Support brackets
Vertical joint	40 x 90 mm	50 x 90 mm
Intermediate batten	40 x 40 mm	50 x 40 mm
Angle post	40 x 70 mm	50 x 70 mm

Minimum section battens (T x W) Bonding

Fixing of battens:	Direct	Support brackets
Vertical joint	28 x 95 mm	50 x 95 mm
Intermediate batten	28 x 45 mm	50 x 45 mm
Angle post	28 x 70 mm	50 x 70 mm

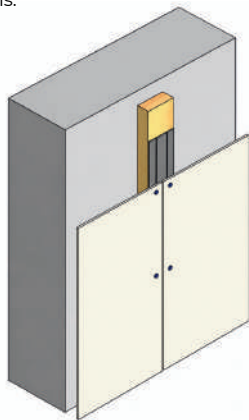
Install the structure carefully:

- Check the straightness of the battens.
- Sign out the battens on the facade in accordance with the plan. Always respect the required intermediate distances.
- Place the supporting structure, with or without support brackets.
- Align the sub-frame.

These are the most commonly applied systems:

Single vertical subframe, battens fixed directly on inner cavity skin

This execution can only be recommended if the surface on which the battens are attached is perfectly even, it is usually applied with wood-frame constructions. When the subframe is directly fixed to the inner cavity skin, alignment with fill plates might be required. The hole of the fill plate is minimally the diameter of the screw + 5mm. Fixing methods: screws or bonding strips.



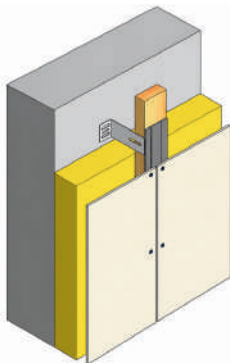
Single vertical subframe, battens mounted on support brackets

This execution has the following benefits:

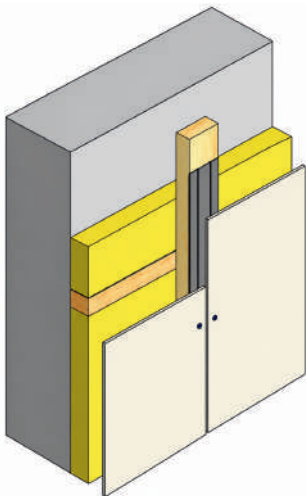
- A higher insulation value as the insulation can be applied almost uninterruptedly. Use a thermal break to minimize thermal bridges at the support brackets.
- The subframe can easily be aligned.
- No direct contact between the battens and the internal skin, which minimizes the risk of moisture ingress.

Support brackets need to be placed alternated right and left of the battens. Moreover they are staggered placed on adjacent battens.

Fixing methods: screws or bonding strips, see § 4.3.5.



Double subframe, profiles and battens fixed directly on the internal cavity skin.



This execution consists of horizontally aligned battens, on which vertical battens are mounted. It is applied when direct installation on the façade with insulation is required and/or the support location does not correspond with the location of the horizontal battens.

Fixing methods: screws or bonding strips, see § 3.5.

In case of double timber frame, the vertical battens are fixed on horizontal battens with two stainless steel wood screws, diagonally applied in the crossing. The screws penetrate at least 30 mm in base batten and the distance of the screw to the edge of the wood is at least 15 mm.

4.3.1.2 Aluminum Subframe

General

Thanks to their durability, aluminum subframes are increasingly applied. Always use purpose designed systems for façade cladding applications.

The subframe consists of profiles and brackets. T-profiles of 120mm and L-profiles of 40 mm wide are commonly used. Use aluminum alloy EN-AW 6060 T5, conform norm EN 573-3 and EN 755-2.

For countries that are not part of the European Union the national regulations are to be followed. The minimum thickness of the profiles is 2 mm.

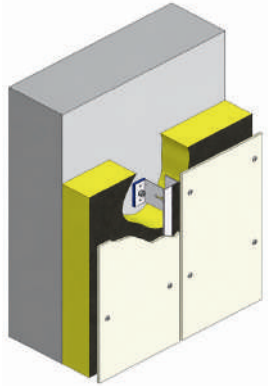
Have the calculation of the structure approved by the proper authorities before starting with the execution and work in compliance with the installation prescriptions and execution details of the subframe supplier.

Use a system with fixed and gliding anchors to facilitate the levelling and thermal dilation of the façade. Follow the prescriptions for expansion joints between the profiles. Ensure it that the position of these expansion joints corresponds with the joints between the façade cladding panels.

The supporting distances applying for wooden supporting structures are not transferable to metal structures.

Single vertical subframe with brackets

- A higher insulation value as the insulation can be applied almost uninterruptedly. Use a thermal break to minimize thermal bridges at the support brackets.
- Always use a system that was developed for façade cladding.
- An aluminum subframe usually consists of a combination of L- and T-shaped vertical profiles on support brackets (see figure).
- Provide a cavity of at least 40 mm to avoid moisture ingress.

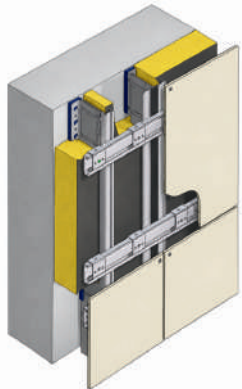


Fixing method: screws, rivets, or bonding strips

Double subframe–invisible mechanical fixing with undercut anchor

- Always use a system that was developed for façade cladding. An aluminum subframe usually consists of a combination of T- and L-shaped vertical profiles and horizontal rails.
- Provide a cavity of at least 40 mm to avoid moisture ingress.

Fixing method: invisible mechanical fixing with undercut anchor 3.5



4.3.2 Thermal Insulation

4.3.2.1 General / systems

The thermal resistance of a façade construction is determined by the thermal insulation of the internal skin and/or by the insulation that is applied on this internal skin.

In order to obtain an optimal insulation, thermal bridges must be restricted to a minimum. For constructions with high insulation demands, a subframe on support brackets or adjustable screws is recommended.

SFIBRAL façade cladding panels are installed with open horizontal joints, as a consequence, insulation must be resistant to weather conditions or protected from weather circumstances during the complete life cycle of the facade cladding panels.

Check whether the chosen insulation type complies with all prescriptions for:

- thermal insulation
- sound insulation
- reaction to fire
- UV-resistance
- moisture resistance

4.3.2.2 U-value of a facade cladding with SFIBRAL façade panels

SFIBRAL façade cladding panels can be used in conjunction with high performance insulation:

- large insulation thicknesses are possible
- thermal bridges are restricted to a minimum

4.3.2.3 Installation

Depending on the type of subframe that is used, insulation is applied between or behind the wooden battens/aluminum profiles. Fix the insulation on the façade in compliance with the manufacturer's prescriptions. Install the insulation panels in close connection with each other and fix them in the construction.

4.3.3 Ventilation - Water retention

4.3.3.1 Ventilation

A façade cladding in accordance with these directives is an open, ventilated construction. To install a durable façade cladding it is of utmost importance that the construction is properly ventilated.

In order to achieve an adequate ventilation a continuous cavity between the back of the panels and the surface of the insulation or the internal skin is required.

Provide a sufficient cavity width:

Building height	Timber sub-frame		Aluminium sub-frame	
	minimum	recommended	minimum	recommended
0 – 10 m	20 mm	40 mm	30 mm	40 mm
10 - 20 m	25 mm	40 mm	30 mm	40 mm
> 20 m	30 mm	40 mm	30 mm	40 mm

It is important that the cavity is not interrupted and that an air entry and exit openings are provided, at the top and the bottom of the façade, but also underneath and above every façade aperture (windows, balconies, ...). This will enable a smooth air circulation and consequently quick drying of the cavity space.

The minimum air entry and exit openings are:

- Façade height ≤ 1 meter: 50 cm² per meter façade length, the voids must have a minimum width of 10 mm. Narrow notches obstruct a good ventilation and cannot be taken into account as a section for air entry and exit.
- Façade height > 1 meter: provide at the top and bottom an uninterrupted void of at least 100 cm² per meter façade length (effective space, after the section loss due to the ventilation profile has been taken into account).

A vertical compartmenting of the ventilated area is advised for big surfaces at the edges.

For fixing on high buildings, we recommend to make horizontal compartments in uninterrupted façade surfaces. At the horizontal compartmenting a profile is used to interrupt the air circulation.

Finish all ventilation voids wider than 10 mm with a perforated ventilation profile, in order to avoid vermin ingress.

For countries where specific ventilation prescriptions are imposed, the most severe of both prescriptions are to be followed.

4.3.3.2 Water retention

Besides ventilation air, moisture will also get into the air cavity. Due to heavy wind, rainwater is blown into the cavity through the panel joints. As a consequence, it is necessary to take measures in order to protect the insulation and/or the internal skin and to avoid water ingress. Use an insulation with a waterproof layer.

4.3.4 Panel Cladding

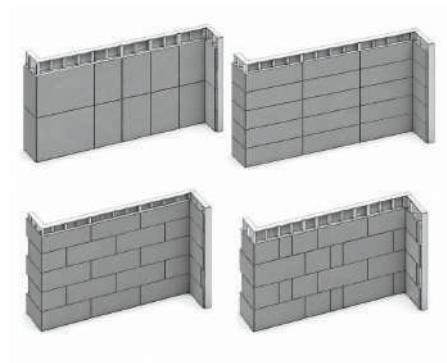
SFIBRAL façade panels are high-quality façade cladding panels. Handle the panels with due care so that the cladding retains its esthetic quality and durability.

If possible, the SFIBRAL façade cladding panels are installed after the structural work has been finished. Avoid pollution and damage when mounting and finishing the building.

Not only the colour but also the bond and the dimensions of the panels strongly influence the overall appearance of the façade.

The following bond patterns are possible:

- Straight bond
- Stretcher bond
- Random bond



Apply SFIBRAL façade cladding panels only with vertical façades.

SFIBRAL Nature panels are directional, they can be placed horizontally or vertically in their longitudinal direction on the same plane. Sfibral Spectrum panels are non-directional, they can be placed horizontally or vertically on the same plane

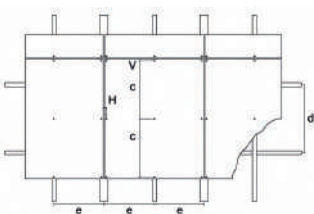
When choosing the bond pattern, consider the requirements for supporting and fixing distances. For executions with alternating vertical joints, the execution possibilities must be taken into account: the subframe must be adjusted, and alignment of the panels must be possible.

In case you choose a bond pattern where the vertical joints are not in line, the façade surface will be polluted in an irregular way below the joint of upper panels. We advise not to apply these bond patterns in areas with increased pollution.

4.3.4.1 Intermediate Spacing of the Support Battens and Fixing Points of SFIBRAL Façade Panels

The distance (e) between the battens and the distance (c) between the fasteners is determined by calculation. These distances depend on

- the sheet dimensions and the number of supports
- the shape and height of the building
- the used substructure system
- the wind zone
- the terrain roughness
- specific local influence factors



V - Vertical distance towards horizontal edge

H - Horizontal distance towards vertical edge

C - Distance between fixing points

d - Distance between horizontal battens

e - Distance between vertical battens/profiles

The wind load shall be determined in accordance with the EUROCODE 1991-1-4 and national annex in which the exact design values are given.

For countries that are not part of the European Union calculations must be made according to the national building regulations.

Whatever the results of the calculations, the screw/rivet distances (c&e) should never exceed 600mm.

4.3.4.2 Edge distance of the Fasteners

The distance from the screws/riquets to the panel edge must be large enough to prevent the edges from breaking. It must not exceed the maximum value either, to guarantee the required flatness. The minima applied in these Technical Data are based on tests.

The minimum and maximum values are:

Edge distance of the screws	Minimum	Maximum
Vertical distance(V)–with open joint	70mm	100mm
Vertical distance(V)–with joint profile(*)	50mm	100mm
Horizontal distance(H)	30mm	100mm

Edge distance of blind rivets

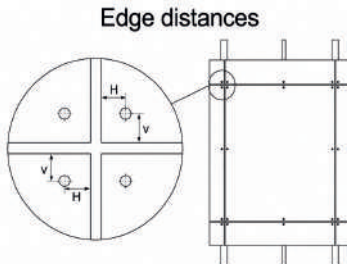
Vertical distance(V)	70mm	100mm
Horizontal distance(H)	30mm	100mm

Edge distance of invisible fixing

Vertical distance(V)	50mm	100mm
Horizontal distance(H)	50mm	100mm

The edge distances that apply in case of bonding are given by the adhesive producer.

The edge distance should never be more than 100mm.



4.3.4.3 Resistance against impact

Depending on the nature and the strength of the exerted forces, when the façade sheets are subjected to possible impact force (hard or soft body), extra precautions may be necessary.

4.3.5 Fixing Facade Panels

4.3.5.1 General

SFIBRAL façade cladding panels are less sensitive to hygro-thermal movement than many other panel materials. However, the panels must not be installed against each other, provide a joint width of 8mm to compensate the movement of the panel and the execution tolerances. The fixing system should not obstruct the hygro-thermal movement, otherwise the panels will be subject to high tensions. Therefore, always use fixing systems that comply with the following criteria.

Working carefully and neatly will deliver the best results with SFIBRAL façade cladding panels.

SFIBRAL façade cladding panels can basically be installed from top to bottom or from bottom to top, except with the invisible mechanical fixing where the installing always must be done from bottom to top. If you wish to restrict the risk of pollution to a minimum, you should work from top to bottom, except with the invisible mechanical fixing where the installing always must be done from bottom to top.

Each panel is fixed with at least 4 fasteners of the same type.

4.3.5.2 Installation on timber battens – visible fixing with screws

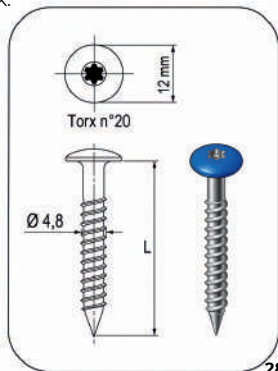
The panels are fixed on the battens with stainless steel screws.

Façade panel screw, timber screw with painted mushroom head $\varnothing 12\text{mm}$, Torx impact no.20.

- Application: visible fixing on timber frame work.
- Material: Quality A2 under normal circumstances, quality A4 in coastal areas or other areas exposed to an aggressive environment.

Applicability to be confirmed by screw supplier.

- Minimum dimension: $4,8\text{mm}$ ($\varnothing$) $\times 38\text{mm}$ (L).
- Fixing the screws is done with an electric screwdriver with a high-quality bit specific for the screw head.

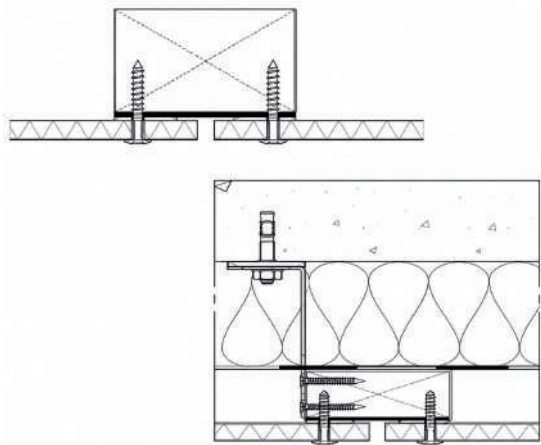


In § 4.3.1.1 you will find the minimum section of the battens. If you respect these minimum values, the minimum penetration depth of the screws as well as the distance of the screws to the edge of the wood and the joint width between the panels (8 mm) will be assured.

The screw apertures in the panel have a diameter of 6,5 mm. This is wider than the screw diameter in order to allow the panels to move. Always insert a screw in the middle of an aperture in order not to prevent movement of the panel. Also take into account the minimum and maximum distance of the screws to the panel edge.

Do not overtighten the screws in order to allow the façade cladding panels to work, limit the torque setting of the screwdriver. Apply the screws perpendicular to the panel surface in order to obtain a tension-free fixing.

Put an EPDM joint gasket with a width of 60-100 mm on the battens behind a joint, which removes the water getting into the vertical joints between the façade cladding panels. This will prevent moisture from getting trapped between the battens and the panels. Also put an EPDM joint strip on the intermediate battens, in order to obtain perfectly even panels. All vertical timber battens behind SFIBRAL panels shall be continuously protected with UV-resistant EPDM; the strip shall cover the full batten width.



4.3.5.3 Metal subframe – Visible Fixing with Screws

The panels are fixed on the profiles with stainless steel screws.

Façade panel screw, self-drilling screw with painted round head $\varnothing$ 12 mm, Torx impact no. 20.

- Application: visible fixing on a metal subframe.
- Material: Quality A2 under normal circumstances, quality A4 in coastal areas or other areas exposed to an aggressive environment. Applicability to be confirmed by screw supplier. Compatibility between the screws and metal subframe to be confirmed prior to installation.
- Minimum Dimension: 4,8mm($\varnothing$) x25mm(L).
- Drilling capacity: to be adjusted to the profile thickness.
- Fixing the screws is done with an electric screwdriver with a high-quality bit specific for the screw head.

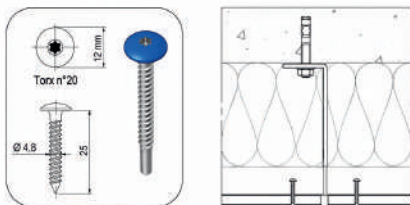
The screw holes in the panel must be pre-drilled with a 9,5 mm diameter. This is wider than the screw diameter to allow the panels to move. The aperture for fixed point's reduced to 5mm. Always insert a screw in the middle of an aperture in order not to prevent movement of the panel. The profiles are predrilled with a hole diameter equal to the screw diameter if required.

Also consider the minimum and maximum distance of the screws to the panel edge. The edge distances of the fasteners and the joint width between the panels (8mm) must be respected.

Do not overtighten the screws to allow the façade cladding panels to work; limit the torque setting of the screw driver.

Apply the screws perpendicular to the panel surface to obtain a tension free fixing.

Use a black adhesive tape behind the panel joint to obtain a uniform dark back ground.



4.3.5.4 Aluminum Profiles – Visible Fixing with Rivets

SFIBRAL rivet with a wide powder coated head $\varnothing 14\text{mm}$ and an EPDM washer.

- Material: Aluminum body with A2 stainless steel mandrel.
- Minimum dimensions: $5,0\text{mm}(\varnothing) \times 14\text{mm}(\text{L})$.
- Always use a blind rivet with appropriate clamping range adjusted to the thickness of the façade sheet and the profiles.
- The edge distances of the fasteners and the joint width between the panels (8mm) must be respected.

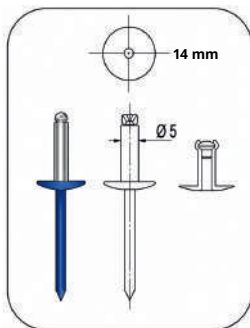
There are 2 options for installation with rivets:

1) Each panel element must have two rigid fixing points with a hole diameter of 5,2 mm in the center of the panel. All other panel openings are sliding points and have a hole diameter of 9,5 mm.

2) In the second installation version, the panel must have all holes with a diameter of 9.5 mm.

In this case a fixed point aluminum

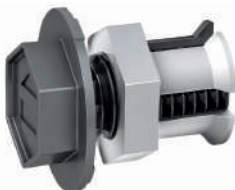
- The profiles are pre-drilled with a diameter of 5,2 mm. Do this using a centering drill bit so that the drill holes in the profile are centered in relation to the drill holes in the panel. Remove all dust caused by drilling.
- Place rivets perfectly perpendicular to the panel surface and centered in the hole so that the movement of the panel is not prevented. Use a riveting tool with a nosepiece to protect the panel. Do not press on the panel with the riveting tool.
- To maintain a uniform dark back ground, it is possible to use black coloured profiles or a black adhesive tape or an EPDM gasket.



4.3.5.5 Aluminum Profiles – Invisible Fixing with undercut Anchors

Invisible mechanical fixing allows the realization of aesthetic facades combined with the highest technical detailing. The façade panels are predrilled on the backside; the front side shows no fixing points.

- The panels are installed on a double metal substructure (minimum thickness of the profiles is 2mm, thickness of the panel hanger is 3mm) by means of a tension-free undercut anchor, socket cap screw and washer.
- Anchor type for 8 mm panels: KeilKH (hs5,5M6), in stainless steel, quality A4.
- All components must be of the same manufacturer/supplier.
- The execution is in accordance with the construction drawings made by the design office, by skilled executioners that are trained for this fixing technique.



Design preparation

The stability of the substructure, fixings, and panels must be calculated by an engineering bureau based on local regulations. The panels are supported by at least 4 fixing points. The weight of a sheet is carried by at least 2 fixings (1 fixed point and at least 1 horizontal sliding point). The location of this fixed point needs to be the same for all the panels. The other attachment points are both horizontal and vertical sliding points. The provided minimum and maximal edge distances and 8mm and must always be respected.

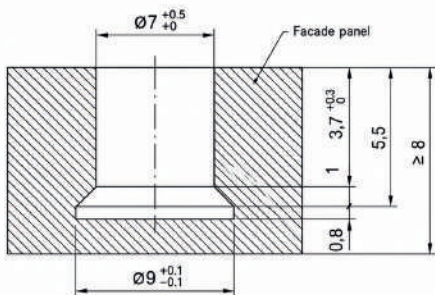
Drilling of the undercut hole

The panels are based on the construction drawings approved by the design engineer or the substructure supplier.

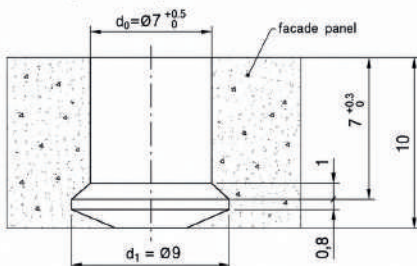
- Place the panels face down on a clean, smooth, flat surface and support as necessary. Ensure that the panels can not bend.
- Mark the locations for the anchor drilling holes and ensure the correct number of holes is marked.
- Fibre cement panels are always drilled dry, do not use water as this can stain the panel surfaces.
- Follow the drilling instructions provided by Keil to achieve the required drilling dimensions.
- After the drilling is done remove immediately the dust of the panels.



Hole geometry $h_s=5,5$



Hole geometry $h_s=7$



CONTROLLING OF THE UNDERCUT HOLE

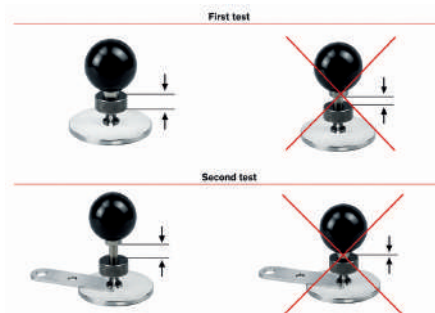
The correctness of the undercut holes is checked by the control apparatus.

- First test is done by inserting the control gauge base part in the undercut and moving the gauge up to the block. The gauge should be pushed to the base part. If the gauge cannot be pushed to the base part, it means that the drilling hole is too deep or that no undercut is provided.
- Second test is done by moving the probe between the panel and the control gauge base part. If the gauge is pushed to the base with the under played probe, it means that the drilling hole is not deep enough.
- Both tests must result positive for a correctly drilled undercut hole. The correctness of the cylindrical hole is checked by a caliper.

At least 1% of all drilled holes must be controlled.

- For example, if you have 25 panels with 10 holes each (total 250 holes) then at least 3 holes should be controlled.
- During this control, if an incorrect drilled hole is noted then 25% of all drilled holes (equal 63 holes) must be controlled. No additional incorrect holes should be noted.
- If additional incorrect holes are noted, then all the holes (equal 250 holes) should be tested.
- All incorrect holes are to be discarded and new holes should be drilled. Keep a minimum center distance of 20 mm when drilling the new hole and ensure that the edge distances are respected.

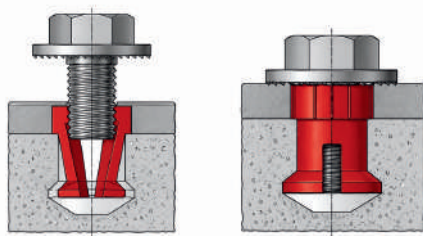
After the drilling is done remove the dust immediately of the panels.



Installation

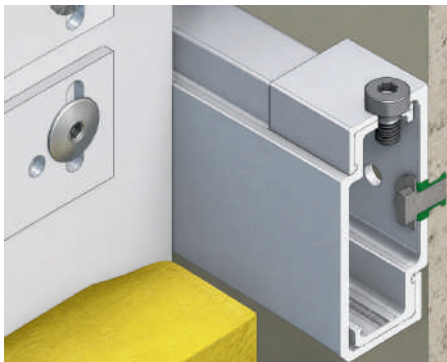
After the panels have reached the construction site, the assembly of the system can start. If the panels are stored on site, consider the storage and handling instructions as mentioned in our technical data.

- Ensure the holes are clean and free from any dust or debris.
- Insert the Keil Anchor in the hole and position the panel hanger on the panel.
- Insert the socket cap screw through the panel hanger in the anchor and tighten up ($2,5\text{Nm} \leq T_{\text{inst}} \leq 4,0\text{Nm}$). Be careful to not over tighten the screw as this could damage the anchor and reduce the pull-out resistance of the fastening.
- This way a tension free connection between façade panel and substructure is achieved.



Because of the nature of the invisible mechanical fixing, it is required to install the panels from bottom to top, it is not practical for an installer to adjust and fix the panel hanger unless there is sufficient free space above the panel. The panels are supported individually, and they do not rest on each other (8mm joint around each panel).

The panels are installed on horizontal rails by means of the panel hangers. Each panel is provided on the top with 2 panel hangers with adjustable height, the other panel hangers cannot adjust the height. The adjustable screws on the 2 top panel hangers allow for the leveling of the panels. The horizontal sliding of the panels is restricted by firmly fixating one of the panel hangers on the horizontal rail with a screw. The location of this fixed point needs to be the same for all the panels.



Provide an expansion joint in the vertical battens and horizontal rail at least every 3500 mm (unless the supplier of the subframe imposes other distances) to avoid undesired joint distances between the panels due to expansion of the aluminum profiles.

To narrow the risk of damage, a work sequence must be established. SFIBRAL façade panels are finished products and are usually installed as the last component. If additional work needs to be done after the installation of the panels, precautions need to be taken to avoid pollution or damaging of the panels.

The installer controls the aluminum substructure, the flatness, and the fixing points.

In case of irregularities, the contractor/architect must be informed immediately.

4.3.6 JOINTS – FINISHING – PROFILES

A joint of 8 mm between the SFIBRAL panels is required, this joint allows the hygro-thermal movement of the panels.

4.3.6.1 Vertical joints

Timber subframe – screws:

Provide a good sealing and an easy evacuation of water at the vertical joints. To this end, attach a UV-resistant EPDM gasket on the wood. The gasket could be glued or stapled. The screws are applied between the ribs. Use a gasket with a width which covers the entire surface of the batten. Also apply a joint strip at the intermediate battens in order to obtain an even façade surface and to avoid moisture accumulation behind the panel. Moreover, the gasket provides a regular black background at the level of the panel joints.

Aluminum subframe – screws

No gasket is required. Apply preferably black coloured profiles otherwise apply a black tape behind the joints in order to obtain an attractive appearance.

Aluminum subframe – rivets:

No gasket is required. Apply preferably black coloured profiles otherwise apply a black tape or a gasket behind the joints in order to obtain an attractive appearance.

4.3.6.2 Horizontal joints

It is highly recommended to leave horizontal joints open, independent of the type of sub-frame and the fixing method.

Only consider using horizontal joint profiles in the lower 3 meters of the façade in order to prevent undesired objects from getting into the cavity.

4.3.6.3 Other Finishing Profiles

A large range of PVC and aluminum profiles are available for finishing façade claddings. In certain cases, an EPDM or flexible joint strip can replace a finishing profile.

- To prevent entry by birds, vermin or insects we strongly advise to protect the ventilation openings wider than 10 mm (air in- and outlet) by a profile. Always use profiles guaranteeing a ventilation section of at least 100 cm²/lm.

- For top edge finishing without overhang, a roof edge profile is applied. Rain water must be guided away and ventilation must be provided here as well.
- Ensure it that window openings and all other façade apertures are finished according to the same principles as is the case with bottom and top edges.
- Corners are usually finished with PVC or aluminum façade profiles, distributed by specialized companies.

Do not use finishing profiles of materials that can leach out (zinc/copper/lead/...). Pollution due to sediment on the panels is hardly or not at all removable.

Profiles must be able to expand and shrink independently of the façade cladding panels, this is especially the case with aluminum profiles. Provide a small expansion joint between the adjacent profiles and see to it that the joints between these profiles coincide with the panel joints. Finishing profiles can be ordered from specialized companies.

4.3.6.4 Saw cuts - connections

At voids or apertures where façade cladding panels connect with another construction, or where another material is going through the panels, the hygro-thermal movement of both materials must remain possible: make the aperture slightly larger and finish, if required, with an elastic remaining neutral kit. Make sure not to close ventilation voids.

4.3.7 Sealant

Panel joints are never filled with sealing sealant. Flexible connections to the shell, windows, etc are carried out with sealing sealant. Only use a neutral sealing sealant in order to avoid stains.

4.3.8 Product for finishing the panel edges

The panel edges must be finished with the impregnation sealant, see page 15

4.3.9 Exceptional exposure of the panels

Examples of exceptional exposure include, but are not limited to: repeated contact with aggressive chemicals (e.g. concentrated acids or alkalis, or cleaning agents not listed under § 3.2), continuous exposure to a marine or de-icing-salt environment, exposure to industrial pollutants or fumes, prolonged contact with standing water, and sustained mechanical abrasion or impact beyond normal use.

5.EXECUTION CEILING CLADDING

5.1 Principle

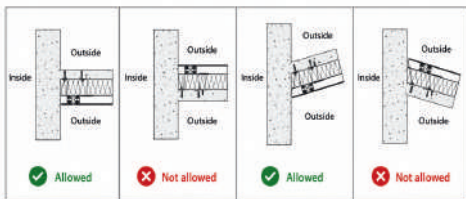
A ceiling cladding is a self-supporting ceiling finishing system: the panels transmit their own weight and the wind load through the subframe to the supporting floor or roof construction. The panels are not able to support any other load, as a consequence, fixing objects on the cladding surface is not allowed.

The guidelines mentioned hereafter are valid for ventilated ceiling claddings with SFIBRAL panels. The panels can be installed horizontally or sloped.

Ceiling cladding can only be installed if the construction above is watertight.

The panels are installed on a timber or aluminum subframe.

Except for the guidelines given hereafter, the general execution of façade panels are applicable.



5.2 Supporting frame

5.2.1 Sections and intermediate Spacing

The following maximum support distance values must be considered for ceiling cladding:

Primary battens:

- Panel carrying battens: the intermediate distance between the panel carrying battens and between the fixings is determined by calculations. The values in the table below can be used as guidelines.
- The density of the fixings of the insulation panels and the panel carrying battens in the internal skin is increased. The section is determined by calculations.
- Brackets are placed on both sides of the battens.



Panel with intermediate support(s)
in the middle of the ceiling

Panel without intermediate support
and/or ceiling edge

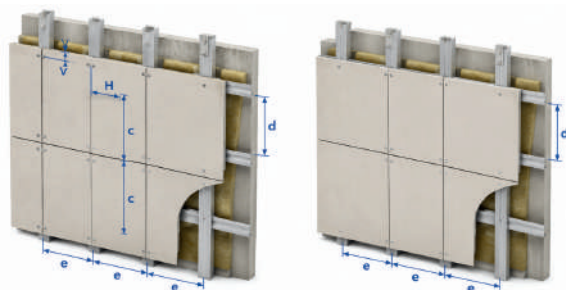
Intermediate distance sub-frame (e)	450 mm	400 mm
Intermediate distance screws (c)	450 mm	400 mm

Edge distance of the screws	Minimum	Maximum
Vertical distance (V) – with open joint	20 mm	100 mm
Vertical distance (V) – with joint profile ^(*)	50 mm	100 mm
Horizontal distance (H)	20 mm	100 mm

Edge distance of blind rivets		
Vertical distance (V)	70 mm	100 mm
Horizontal distance (H)	30 mm	100 mm

Edge distance of invisible fixing		
Vertical distance (V)	50 mm	100 mm
Horizontal distance (H)	50 mm	100 mm

^(*) This is not a standard execution



- V** Vertical distance towards horizontal edge
- H** Horizontal distance towards vertical edge
- c** Screw distance
- d** Intermediate distance horizontal batters
- e** Intermediate distance panel vertical batters

5.2.2 Installation of a subframe

See § 4.3.1

5.3 Insulation

See § 4.3.2

5.4 Ventilation

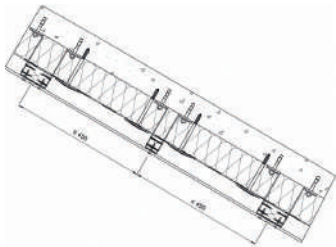
SFIBRAL façade cladding constructions are ventilated constructions. If you wish to have a durable ceiling cladding, it is very important that the construction is properly ventilated.
Provide sufficient cavity height:

Ceiling length (in the ventilation direction)	Timber sub-frame		Aluminium sub-frame	
	Minimum	Recommended	Minimum	Recommended
0 – 10 m	20 mm	40 mm	30 mm	40 mm
10 – 20 m	25 mm	40 mm	30 mm	40 mm
> 20 m	30 mm	40 mm	30 mm	40 mm

It is important that the cavity is uninterrupted, and that an air inlet and outlet are provided at the ceiling edges and also on both sides of every aperture, in order to guarantee sufficient ventilation of the cavity.
Provide an uninterrupted ventilation void of at least 100 cm² per meter at the edge of the ceiling (effective space, taking into account the section loss due to the ventilation profile).
Narrow notches obstruct a good ventilation and must not be included into the section for air inlet and outlet.
Finish all ventilation voids wider than 10 mm by means of a perforated ventilation profile, in order to avoid ingress of vermin.
For countries where specific ventilation prescriptions are imposed, the most severe of both prescriptions are to be followed.

5.5 Panel Cladding

When bonding fixing is used to ceiling cladding you can apply support cleats during the hardening period of the adhesive. Apply support cleats (10x10 cm) in the intersection of 4 panels. These support cleats are screwed into the sub-frame. Leave the support cleats on the façade no longer than required for the glue to harden. Do not overtighten the stud cleats in order to keep a constant adhesive thickness and use a substance that does not affect the panel surface.



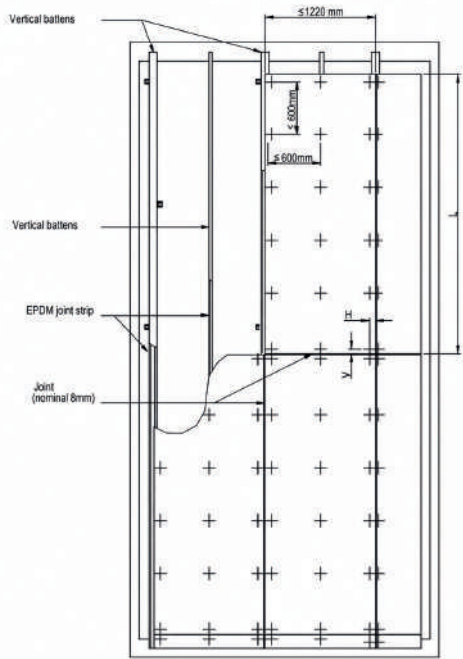
6. FIGURES

The purpose of these types of details is to only illustrate a correct installation of façade cladding panels. As a consequence, not all construction details have been included in the drawings.

Hereafter you will find the general figures of the different systems for façade cladding.

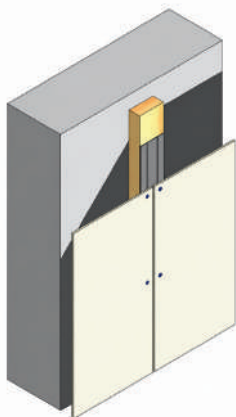
Besides these there are more execution details available, you can request them by email (info@sfibral.com).

6.1 Principle - Timber Battens



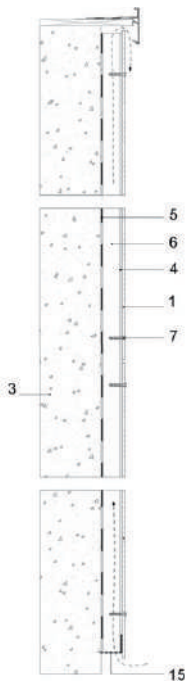
	H min-max	V min-max	L max
SFIBRAL	20 - 100 mm	20 - 100 mm	3050 mm

6.1.1 Single vertical subframe, battens fixed directly on inner cavity skin



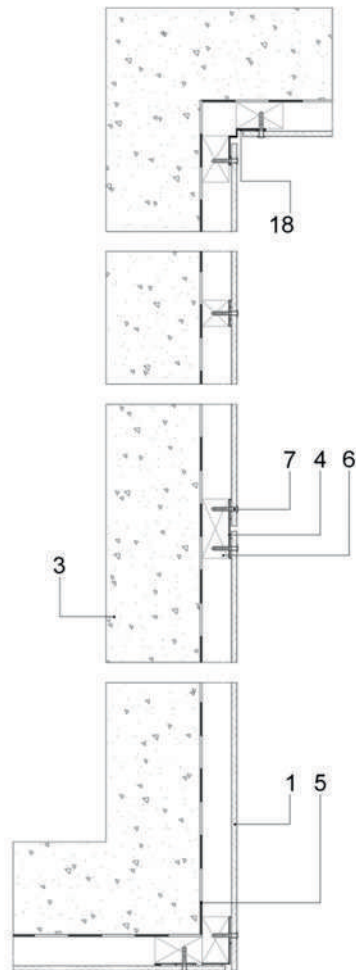
Legend:

- 1.SFIBRAL Facade
2. Insulation
- 3.Supporting internal skin
4. EPDM joint strip
5. Watertight, breather membrane
6. Wooden subframe
7. Screw
8. Bracket
9. Adjustable screw
10. Metal subframe
11. Blind rivet
12. Panel Hanger
13. Undercut anchor
14. Horizontal rail
15. Ventilation profile
16. Bonding system
17. Horizontal joint profile
18. Corner profile
19. U-profile
20. Sill flashing
21. Roof Flashing
22. Expansion joint
23. Plywood frame
24. Interior finish
25. Sealant
26. Thermal break

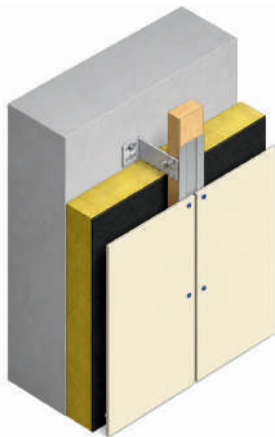


Legend:

- 1.SFIBRAL Facade
2. Insulation
- 3.Supporting internal skin
- 4.EPDM joint strip
5. Watertight, breather membrane
6. Wooden subframe
- 7.Screw
8. Bracket
- 9.Adjustable screw
10. Metal subframe
11. Blind rivet
12. Panel Hanger
13. Undercut anchor
14. Horizontal rail
15. Ventilation profile
16. Bonding system
17. Horizontal joint profile
18. Corner profile
19. U-profile
20. Sill flashing
21. Roof Flashing
22. Expansion joint
23. Plywood frame
24. Interior finish
25. Sealant
26. Thermal break

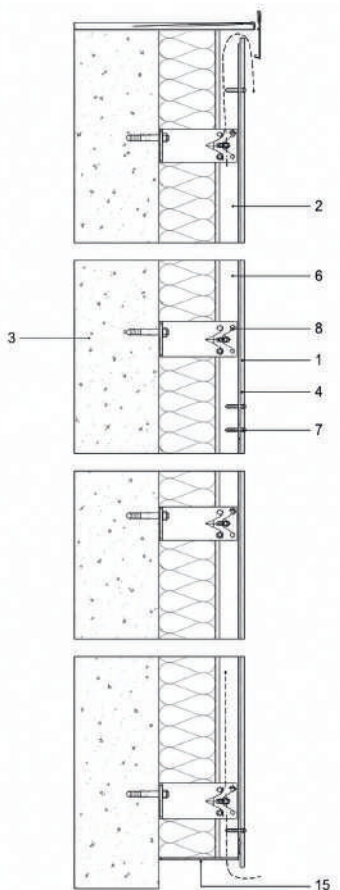


6.1.2 Single vertical subframe, battens mounted on support brackets



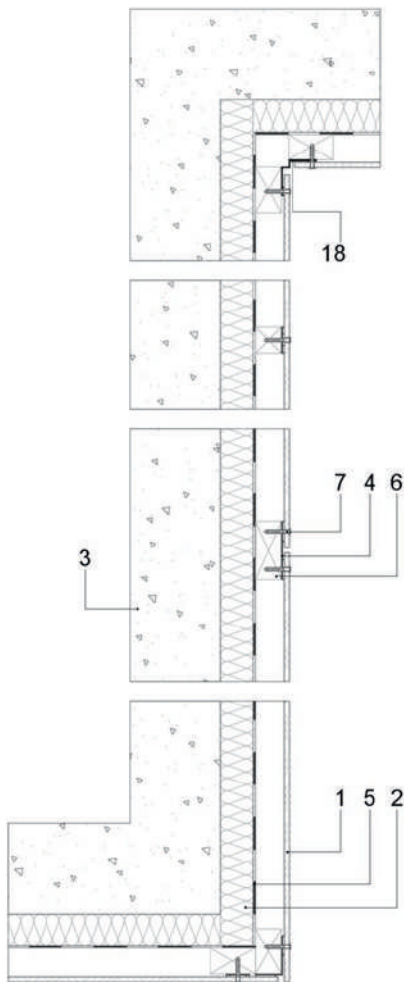
Legend:

- 1.SFIBRAL Facade
2. Insulation
- 3.Supporting internal skin
4. EPDM joint strip
5. Watertight, breather membrane
6. Wooden subframe
- 7.Screw
- 8.Bracket
- 9.Adjustable screw
10. Metal subframe
- 11.Blind rivet
12. Panel Hanger
- 13.Undercut anchor
14. Horizontal rail
15. Ventilation profile
16. Bonding system
17. Horizontal joint profile
18. Corner profile
19. U-profile
20. Sill flashing
21. Roof Flashing
22. Expansion joint
23. Plywood frame
24. Interior finish
25. Sealant
26. Thermal break

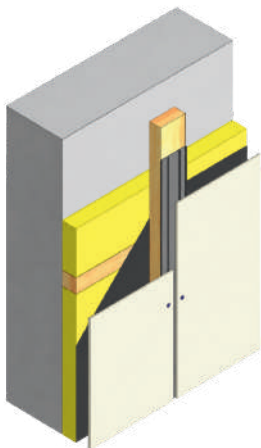


Legend:

- 1.SFIBRAL Facade
2. Insulation
- 3.Supporting internal skin
- 4.EPDM joint strip
5. Watertight, breather membrane
6. Wooden subframe
- 7.Screw
8. Bracket
- 9.Adjustable screw
10. Metal subframe
11. Blind rivet
12. Panel Hanger
13. Undercut anchor
14. Horizontal rail
15. Ventilation profile
16. Bonding system
17. Horizontal joint profile
18. Corner profile
19. U-profile
20. Sill flashing
21. Roof Flashing
22. Expansion joint
23. Plywood frame
24. Interior finish
25. Sealant
26. Thermal break

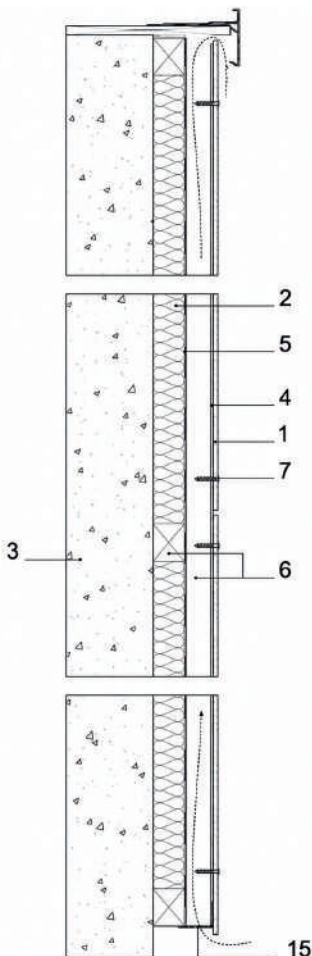


6.1.3 Visible framing - Double subframe, profiles and battens fixed directly on the internal cavity skin



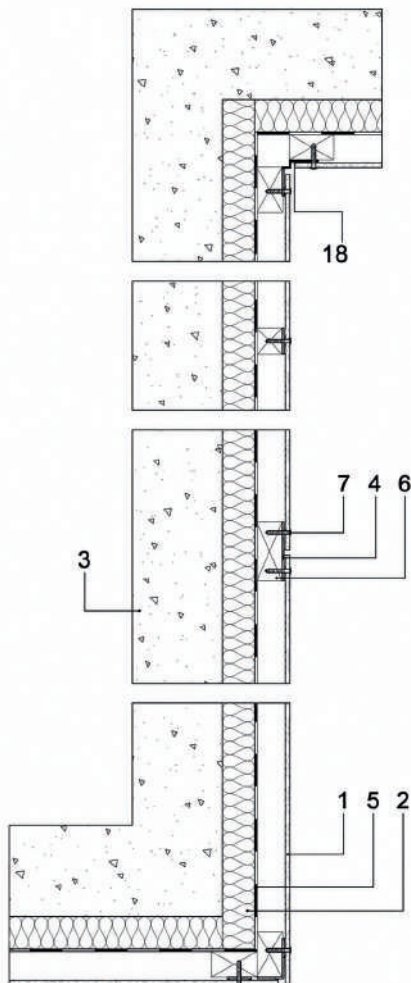
Legend:

- 1.SFIBRAL Facade
- 2.Insulation
- 3.Supporting internal skin
- 4.EPDM joint strip
- 5.Watertight, breather membrane
- 6.Wooden subframe
- 7.Screw
- 8.Bracket
- 9.Adjustable screw
- 10.Metal subframe
- 11.Blind rivet
- 12.Panel Hanger
- 13.Undercut anchor
- 14.Horizontal rail
- 15.Ventilation profile
- 16.Bonding system
- 17.Horizontal joint profile
- 18.Corner profile
- 19.U-profile
- 20.Sill flashing
- 21.Roof Flashing
- 22.Expansion joint
- 23.Plywood frame
- 24.Interior finish
- 25.Sealant
- 26.Thermal break

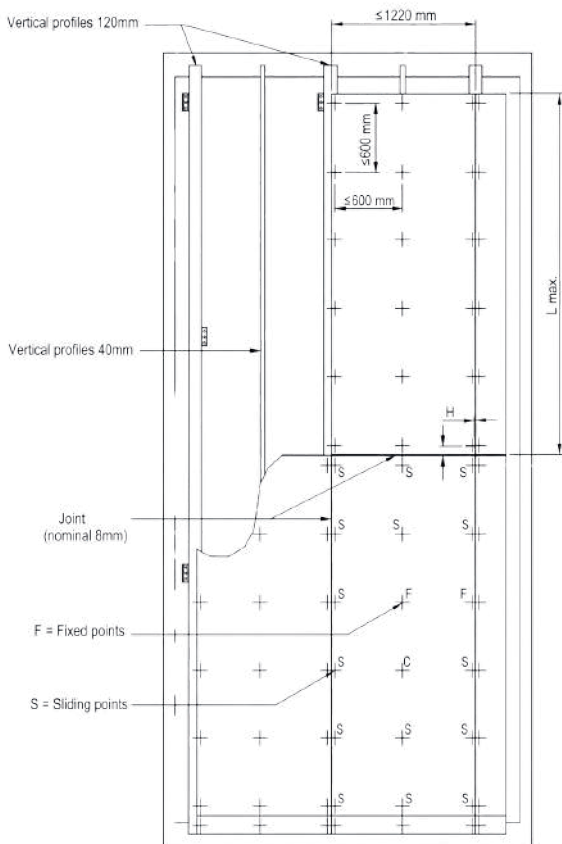


Legend:

- 1.SFIBRAL Facade
2. Insulation
- 3.Supporting internal skin
- 4.EPDM joint strip
5. Watertight, breather membrane
6. Wooden subframe
7. Screw
8. Bracket
9. Adjustable screw
10. Metal subframe
11. Blind rivet
12. Panel Hanger
13. Undercut anchor
14. Horizontal rail
15. Ventilation profile
16. Bonding system
17. Horizontal joint profile
18. Corner profile
19. U-profile
20. Sill flashing
21. Roof Flashing
22. Expansion joint
23. Plywood frame
24. Interior finish
25. Sealant
26. Thermal break

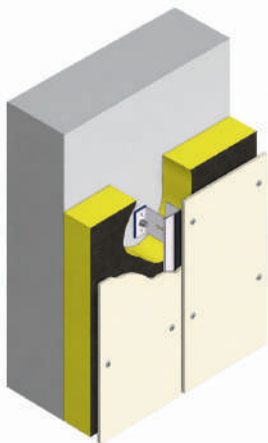


6.2 Principle - Metal subframe - Rivets



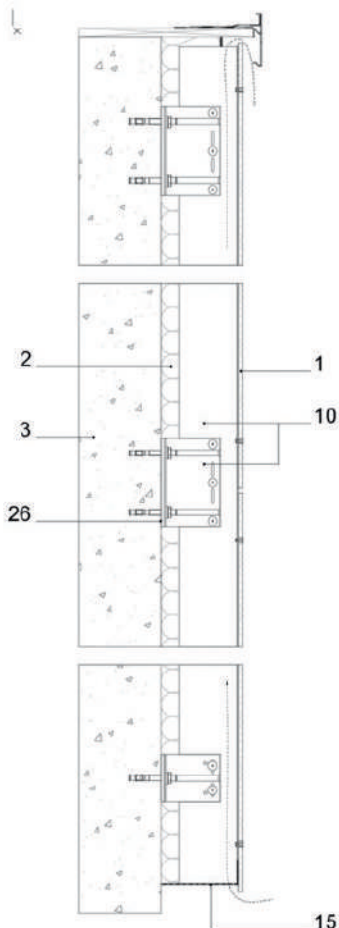
	H min- max	V min- max	F	S	L max
SFIBRAL	30 – 100 mm	70 – 100 mm	5,2 mm	9,5 mm	3050 mm

6.2.1 Single vertical subframe with brackets



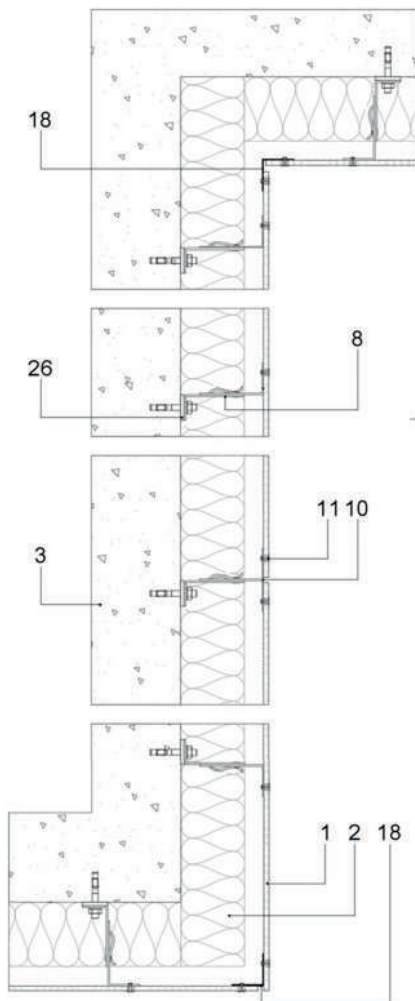
Legend:

- 1.SFIBRAL Facade
2. Insulation
- 3.Supporting internal skin
4. EPDM joint strip
5. Watertight, breather membrane
6. Wooden subframe
- 7.Screw
8. Bracket
- 9.Adjustable screw
10. Metal subframe
11. Blind rivet
12. Panel Hanger
13. Undercut anchor
14. Horizontal rail
15. Ventilation profile
16. Bonding system
17. Horizontal joint profile
18. Corner profile
19. U-profile
20. Sill flashing
21. Roof Flashing
22. Expansion joint
23. Plywood frame
24. Interior finish
25. Sealant
26. Thermal break

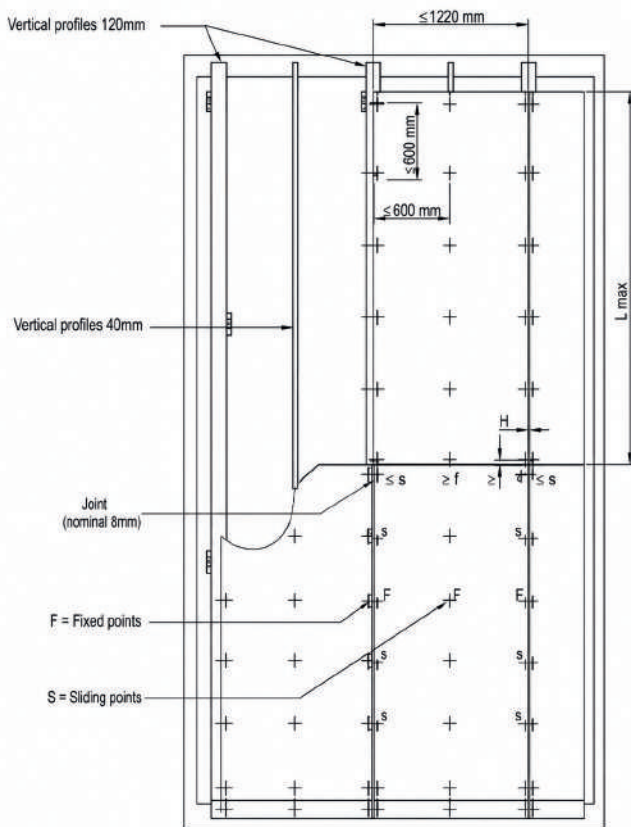


Legend:

- 1.SFIBRAL Facade
2. Insulation
- 3.Supporting internal skin
4. EPDM joint strip
5. Watertight, breather membrane
6. Wooden subframe
7. Screw
8. Bracket
9. Adjustable screw
10. Metal subframe
11. Blind rivet
12. Panel Hanger
13. Undercut anchor
14. Horizontal rail
15. Ventilation profile
16. Bonding system
17. Horizontal joint profile
18. Corner profile
19. U-profile
20. Sill flashing
21. Roof Flashing
22. Expansion joint
23. Plywood frame
24. Interior finish
25. Sealant
26. Thermal break



6.3. Principle - Metal subframe - Screws

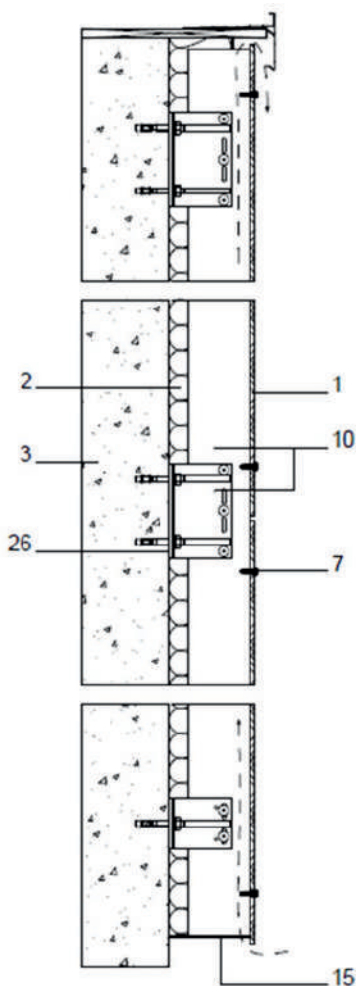


	H min- max	V min- max	F	S	L max
SFIBRAL	30 – 100 mm	70 – 100 mm	5,2 mm	9,5 mm	3050 mm

6.3.1 Single vertical subframe with brackets

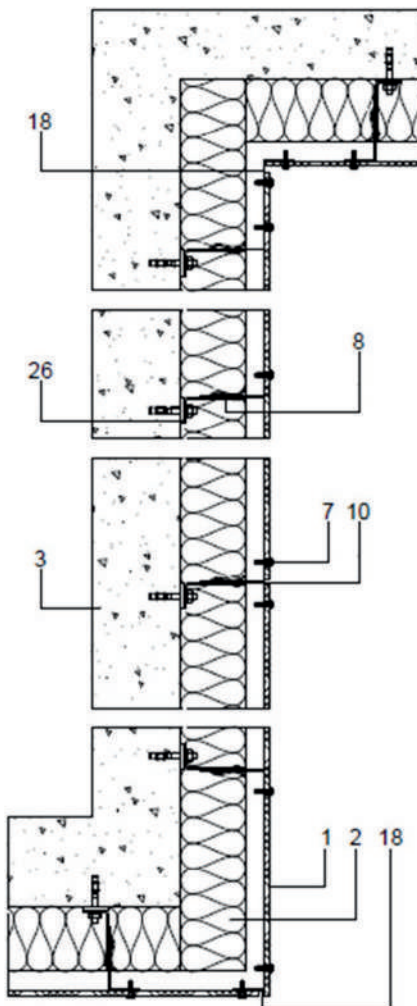
Legend:

- 1.SFIBRAL Facade
- 2.Insulation
- 3.Supporting internal skin
- 4.EPDM joint strip
- 5.Watertight, breather membrane
- 6.Wooden subframe
- 7.Screw
- 8.Bracket
- 9.Adjustable screw
- 10.Metal subframe
- 11.Blind rivet
- 12.Panel Hanger
- 13.Undercut anchor
- 14.Horizontal rail
- 15.Ventilation profile
- 16.Bonding system
- 17.Horizontal joint profile
- 18.Corner profile
- 19.U-profile
- 20.Sill flashing
- 21.Roof Flashing
- 22.Expansion joint
- 23.Plywood frame
- 24.Interior finish
- 25.Sealant
- 26.Thermal break

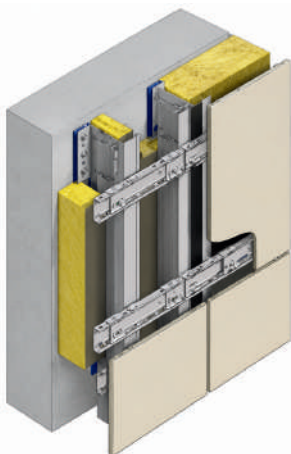


Legend:

- 1.SFIBRAL Facade
2. Insulation
- 3.Supporting internal skin
- 4.EPDM joint strip
5. Watertight, breather membrane
6. Wooden subframe
7. Screw
8. Bracket
- 9.Adjustable screw
10. Metal subframe
11. Blind rivet
12. Panel Hanger
13. Undercut anchor
14. Horizontal rail
15. Ventilation profile
16. Bonding system
17. Horizontal joint profile
18. Corner profile
19. U-profile
20. Sill flashing
21. Roof Flashing
22. Expansion joint
23. Plywood frame
24. Interior finish
25. Sealant
26. Thermal break

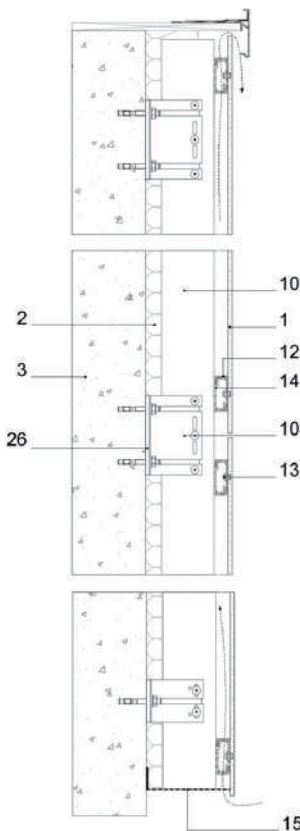


6.4. Double subframe - Invisible mechanical fixing with undercut anchor



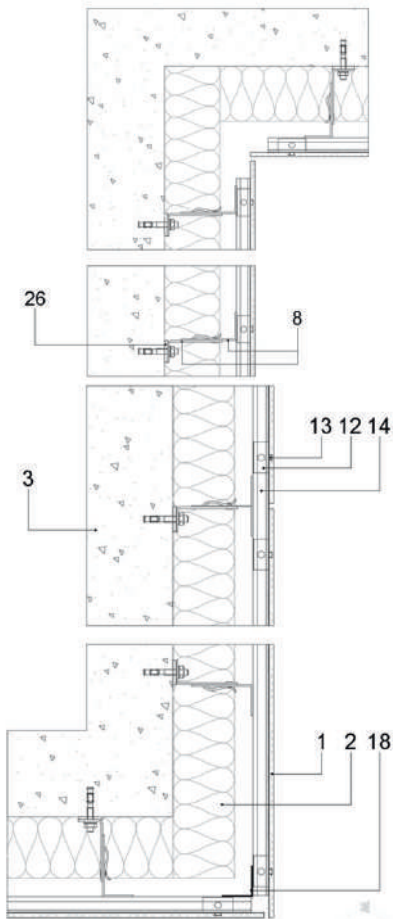
Legend:

- 1.SFIBRAL Facade
- 2.Insulation
- 3.Supporting internal skin
- 4.EPDM joint strip
- 5.Watertight, breather membrane
- 6.Wooden subframe
- 7.Screw
- 8.Bracket
- 9.Adjustable screw
- 10.Metal subframe
- 11.Blind rivet
- 12.Panel Hanger
- 13.Undercut anchor
- 14.Horizontal rail
- 15.Ventilation profile
- 16.Bonding system
- 17.Horizontal joint profile
- 18.Corner profile
- 19.U-profile
- 20.Sill flashing
- 21.Roof Flashing
- 22.Expansion joint
- 23.Plywood frame
- 24.Interior finish
- 25.Sealant
- 26.Thermal break

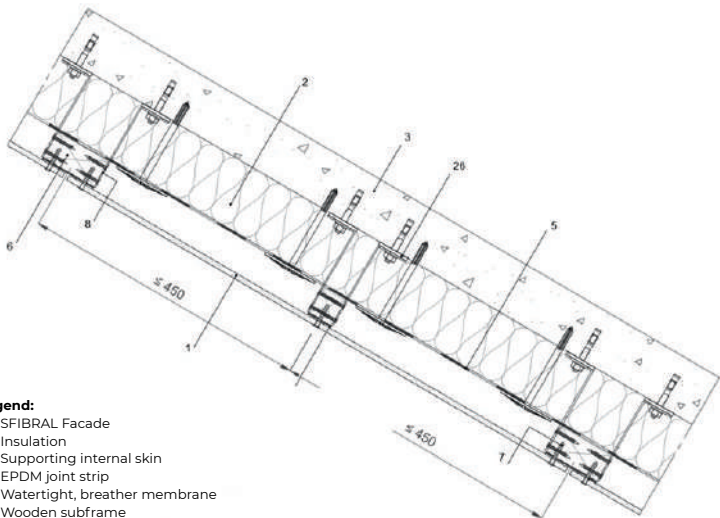


Legend:

- 1.SFIBRAL Facade
2. Insulation
- 3.Supporting internal skin
- 4.EPDM joint strip
5. Watertight, breather membrane
6. Wooden subframe
7. Screw
8. Bracket
9. Adjustable screw
10. Metal subframe
11. Blind rivet
12. Panel Hanger
13. Undercut anchor
14. Horizontal rail
15. Ventilation profile
16. Bonding system
17. Horizontal joint profile
18. Corner profile
19. U-profile
20. Sill flashing
21. Roof Flashing
22. Expansion joint
23. Plywood frame
24. Interior finish
25. Sealant
26. Thermal break

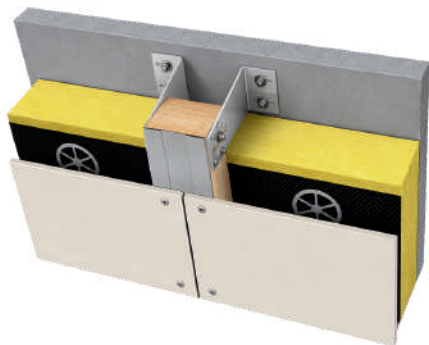


6.5. Ceiling cladding - Single timber subframe with support brackets



Legend:

- 1.SFIBRAL Facade
2. Insulation
- 3.Supporting internal skin
- 4.EPDM joint strip
5. Watertight, breather membrane
6. Wooden subframe
- 7.Screw
- 8.Bracket
- 9.Adjustable screw
10. Metal subframe
- 11.Blind rivet
12. Panel Hanger
- 13.Undercut anchor
14. Horizontal rail
- 15.Ventilation profile
- 16.Bonding system
- 17.Horizontal joint profile
- 18.Corner profile
- 19.U-profile
- 20.Sill flashing
- 21.Roof Flashing
- 22.Expansion joint
- 23.Plywood frame
- 24.Interior finish
- 25.Sealant
- 26.Thermal break



SFIBRAL

FIBER CEMENT PANELS

 www.sfibral.com

 info@sfibral.com

 S. Žukausko 20, LT - 08234 Vilnius, Lithuania