FCLAD® CLADDING PANEL

Architect: Architecture Studio
Photo: K. Khalfi
PRODUCT FClad® cladding panel

ESTP - Cachan
Architect : Architecture Studio
Photo : K.Khalfi
A Ultra High Performance Fibre-Reinforced Concrete, an exceptional material

B The FClad® cladding panel
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PRODUCT FClad® cladding panel

Clinique Rhéna - Strasbourg

Residential project - Rue Charenton - Paris
Architect : AZC - Zündel & Criste a
FCLAD® CLADDING PANEL

A UHPC, an exceptional material
A - UHPC, an exceptional material

Ultra high performance fibre-reinforced concrete is an exceptional construction material possessing a combination of technical and aesthetic qualities which are unusual for concrete.

- no framework required
- resistance 10 x greater than that of traditional concrete in terms of compression / traction (180 Mpa/25Mpa)
- extremely high resistance to abrasion and explosions
- insensitivity to rust, aggressive environments, frost/thaws and UV

It offers outstanding freedom in terms of shape and texture both in architecture and design as well as a particularly wide range of colours.

The qualities of fibre-reinforced concrete go hand in hand with the new architectural trends: pure lines, thinness, with a focus on textures and minerality.

The lack of passive frameworks makes it easier to create complex shapes with relatively thin items. Thanks to its mineral aspect, its ability to reproduce textures faithfully and the wide range of available colours, ultra high performance fibre-reinforced concrete has become the reference for creative concrete.
Residential project Rue Marchal - Paris
Client : SA d’HLM Erilia
Architect : Philippon-Kalt
non-contractual photo
FCLAD® CLADDING PANEL

The FClad® cladding panel with UHPC
B- The FClad® cladding panel

1. Properties

Resistance
Resistance against fire, impacts, adverse weather (frost/thaws) and abrasion. An asset in terms of the life span of buildings.
Fire resistance: FClad® cladding panel, offers excellent performances as far as fire is concerned (classified A2-s1,d0) and does not require any additional treatment or chemical coating to protect against fire. These panels may therefore be used for all types of building subject to particular legislation such as public buildings or high-rise buildings.
Shock resistance: the panels are highly resistant against shocks and abrasion. They may therefore be used just as effectively on ground floors as on higher floors in contrast to many other types of panels which do not offer adequate shock resistance for use on ground floors.
Mechanical performances: the panels offer a high level of resistance against compression and traction as well as excellent tear resistance.

Industrial manufacturing quality
The industrial manufacturing ensures the resistance of the panels and a consistent quality.

Aesthetic & Customisation
A wide range of colours and patterns are available. The lack of passive frameworks makes it easier to create complex shapes with relatively thin items. Numerous variations in design (colours, textures and shapes) are possible whilst maintaining a mineral aspect and the authenticity of a concrete cladding.
The colour is achieved by incorporating pigments directly in the mixture; a wide range of colours is available.
The textures obtained are the exact copy of the formliner thanks to the self-compacting properties of the mix and the fineness of the grain.

A mineral cladding for a lightweight facade
Thanks to its thinness, the FClad® cladding panel allows for a lightweight envelope.

Durability
The mechanical properties of the FClad® cladding panel remain identical for a period of 50 years, preserving the integrity of the panels over time.
Low maintenance requirements & easy upkeep: Depending on the location of the building and the associated constraints in terms of pollution, dirt, etc., it is recommended that the panels are cleaned every 2 to 5 years by a specialised firm. The replacement of damaged panels is a very simple procedure.
2. Description

The FClad® cladding panel is a cladding system consisting of Ultra-High Performance Fibre-Reinforced Concrete implemented with clip-on brackets on a grid of horizontal aluminium rails. These rails are attached to a vertical frame of aluminium profiles, themselves joined onto the load-bearing structure by adjustable bracket feet. The clip-on brackets are attached to the panel using Keil inserts. The system can be implemented with or without insulation. A ventilated air space is systematically formed at the back of the panel to eliminate condensation effects and evacuate moisture. They can therefore be easily integrated in an external thermal insulation system (ETI) as an effective solution to reach the highest thermal efficiency.

The installation of ETI under external cladding involves the creation of an insulating envelope around the building; this fulfils the following functions:

- visual appearance of the building;
- thermal insulation and soundproofing;
- shock resistance, particularly on the ground floor;
- imperviousness to air and water;
- transferral of load from the exterior to the structure.

Areas of use:
Installation on:
- timber frame construction
- steel frame construction
- masonry
- For new builds and renovation
- Seismic zone (category 4 and 1 and 2)
Use
- Cladding panel for facade
- Sloping façade
- External positioning of prefabricated composite elements
- Cladding of cornices and window recesses
- Cladding of door and window lintels
- Coping and capping
- Cladding of balconies
- Cladding of bases
- Brise soleil

The advantages for the building
- Convenience of a ventilated curtain facade: protection against rain and noise, evacuation of condensation
- Thermal insulation and soundproofing
- Firewall
- Protection against cold
- Convenience for users

The advantages of the solution
- Thin FClad® cladding panel: 16 mm
- Customisation: colour, texture
- Industrial prefabrication quality
- Resistance: UV, adverse weather, fire resistance (up to +350°C)
3. Sustainable development

The Building Environment Quality study (BEQ) reveals that concrete products offer the best combination of environmental performance, comfort, resistance and construction costs.

Fibre-reinforced concrete products are « eco-efficient » materials when taking into account the environmental performance of the overall structure throughout its entire life cycle.

This solution is particularly relevant considering the ease of implementation of FClad® cladding panel. By using items which have been prefabricated in a factory and assembled on site involving a limited number of operations, work on site is rationalised significantly, resulting not only in an improvement in the direct environmental impact but also the enhancement of the construction quality.

Thanks to the properties of the FClad® cladding panel, greenhouse gas emissions and water consumption are extremely low.

The FClad® cladding panel is the only mineral material product which can be used to create large, textured panels with M0 fire resistance (French legislation).

A life cycle analysis has been carried out on 3 types of cladding panel:
A. Ultra High Performance Fibre-Reinforced Concrete (UHPC)
B. High Pressure Laminates (HPL)
C. Aluminium

Life cycle analysis (LCA)
The life cycle analysis was carried out on the cladding panel alone without taking the insulation and structure into account. The results are expressed by m² of panel. The study was conducted on an 8 storey reference building (the three solutions were intended to attain the same thermal performances).
Comparison of environmental impacts

GREENHOUSE GAS EMISSIONS
Greenhouse gas emissions are very limited for UHPC cladding panels compared to those of HPL and Aluminium solutions (2 to 3 times lower.)

WATER CONSUMPTION
UHPC cladding panels consume 6 times less water than HPL solutions and 3 times less than aluminium solutions.

PRODUCTION OF WASTE
The indicator is more favourable for the aluminium solution, thanks mainly to its reduced weight (the recycling rates are comparable). The HPL solution generates a large amount of waste, mainly in the production phase.
4. Technical data

The FClad® cladding panel can be assembled vertically or horizontally.  
Thickness from 16 to 100 mm

- FClad® cladding panel Classic : up to 3,60 x 1,80m
- FClad® cladding panel XL : up to 10,00 x 4,00m

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Classic : 3,60 x 1,80 m</th>
<th>XL : up to 10,00 x 4,00 m</th>
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<tbody>
<tr>
<td>Max ratio</td>
<td>width = length/7</td>
<td></td>
</tr>
<tr>
<td>Panel thickness</td>
<td>from 16 to 100 mm</td>
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<tr>
<td>Assembly</td>
<td>horizontal</td>
<td>vertical</td>
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<tr>
<td>Density</td>
<td>2300-2400 kg/m³</td>
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<tr>
<td>Coefficient of thermal expansion</td>
<td>10,5 μm/m/°C</td>
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<td>Nominal surface density</td>
<td>37,6 kg/m²</td>
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<td>Fire classification</td>
<td>M0 - A2s1d0</td>
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<tr>
<td>HHV (higher heating value of the materials)</td>
<td>0,260 MJ/kg</td>
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</tr>
<tr>
<td>Mechanical characteristics</td>
<td>100 - 130 MPa</td>
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</tr>
<tr>
<td>Compressive strength</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flexural strength</td>
<td>10 - 20 MPa</td>
<td></td>
</tr>
<tr>
<td>Young modulus</td>
<td>40 - 50 GPa</td>
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</tr>
<tr>
<td>Durability properties</td>
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<td></td>
</tr>
<tr>
<td>Density</td>
<td>2,2 - 2,4</td>
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</tr>
<tr>
<td>Total porosity</td>
<td>10 - 13 %</td>
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</tr>
<tr>
<td>Permeability at 20°C</td>
<td>2 e-19 m²</td>
<td></td>
</tr>
<tr>
<td>Permeability at 105°C</td>
<td>5 e-18 m²</td>
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</tr>
<tr>
<td>Dimensional tolerances of elements after cutting</td>
<td>Length : ±2 mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Width : ±2 mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thickness : ±2 mm</td>
<td></td>
</tr>
<tr>
<td>Squareness</td>
<td>2mm/m</td>
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</tr>
<tr>
<td>Straightness</td>
<td>5mm with length of</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.6m i.e. 1.4mm/m</td>
<td></td>
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</tbody>
</table>
5. Special cuts and items

Panels can be L-shaped, U-shaped or with a special shape/cross-section, with the same mechanical properties as the FClad® cladding panel. These items are used for the cladding of columns, coping and spandrels, or as a design choice for the facade.

These items are only 16mm thick and are held through two fixings.

Dimensional tolerances of elements after cutting:
- Length: ±2 mm
- Width: ±2 mm
- Thickness: ±2 mm
- Squareness: 2mm/m
- Straightness 0,5mm with nominal surface density of 37,6 kg/m² (16 mm)
6. Customisable appearance

A wide range of colours and textures are available whilst maintaining the mineral aspect of the concrete. The FClad® cladding panel, is mass-coloured: the required colour is injected directly during the manufacturing process. The colour forms an integral part of the product, which is what gives it a particularly natural appearance.

The colours are resistant against light, UV and adverse weather conditions. Fibre-reinforced concrete is a natural, living product: its mineral grain is «imperfect» and its surface is not completely homogeneous.

Variations in colour may be observed depending on the intrinsic colour of the cement used. It is therefore recommended that single orders are placed for the total number of panels required for a structure in order to guarantee uniformity in the colour. In addition, any changes in colour are due to differences in temperature and moisture in the air. Fibre-reinforced concrete absorbs moisture and releases it: for this reason a given panel can dry at different speeds.

Colours

The colour is treated by incorporating pigments directly in the mixture. The resistance of colours to UV and adverse weather is therefore guaranteed.

Each color is homogenised with a tinted lasure.

*The RAL references are given as an indication, it is the closest to the colour of the concrete. Each colour can be homogenised by a matching tinted treatment. However, it is possible to choose a tinted treatment according to the RAL colour chart.*

![Colour Swatches](image)

Textures

The self-compacting behaviour of the material and the fineness of the grain mean that the texture incorporated in the mould can be reproduced with extreme precision.

![Texture Swatches](image)
### Aspects / Finishes

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Slick</th>
<th>Architectural</th>
<th>Custom-made architectural</th>
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</thead>
<tbody>
<tr>
<td>Rough aspect</td>
<td>The + : natural</td>
<td>The + : choice of a texture</td>
<td>The + : choice of a custom-made texture</td>
</tr>
<tr>
<td></td>
<td>The + : marbled</td>
<td>from the range</td>
<td></td>
</tr>
<tr>
<td>Sandblasted aspect</td>
<td></td>
<td>more uniform colour</td>
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</table>

### Treatment

<table>
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<tr>
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<th>Colorless</th>
<th>Standard stain</th>
<th>Custom-made stain</th>
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</thead>
<tbody>
<tr>
<td>Rough aspect</td>
<td>The + : mineral aspect</td>
<td>The + : choice of a shade</td>
<td>The + : choice of a custom-made colour</td>
</tr>
<tr>
<td></td>
<td>and random</td>
<td>from the catalogue</td>
<td>The + : possibility of counterfeiting</td>
</tr>
<tr>
<td>Sandblasted aspect</td>
<td></td>
<td></td>
<td>possibility of application in the factory or on site</td>
</tr>
</tbody>
</table>

### Colours

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Natural white</th>
<th>Standard colours</th>
<th>Custom-made colors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rough aspect</td>
<td>The + : formulation basic</td>
<td>The + : formulation catalogue</td>
<td>The + : custom-made</td>
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<tr>
<td></td>
<td></td>
<td>The + : pigmented to get closer to the desired RAL</td>
<td>The + : pigmented to get closer to the desired RAL</td>
</tr>
<tr>
<td>Sandblasted aspect</td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

| Sandblasted aspect | - | - | - |
7. Typical cross-section

1 - FClad® cladding panel  
2 - waterproofing membrane  
3 - thermal insulation

4 - vertical section  
5 - hanging rail  
6 - wall console  
7 - stonework

Open angle  

Mitre cut

One-piece corner panels can be produced. Since these items come from the same production line as the flat panels, their mechanical characteristics are identical. The maximum height of a one-piece corner panel angle is 3600mm and the developed length is 300mm.

9. Joints

Open joints do not affect the appearance of the facade (width of joints min. 8mm)

For best appearance results, it is advised for the installer to paint the rail section behind the joint.
10. Standards and approvals

Surroundings and location of the project
An external activity area (EAA) may be:
- a play area,
- a garden,
- a public area, pavement, pedestrian route, ramp, stair step
- the floor surface of a passageway, gallery, terrace, step, balcony, loggia

The external activity area (EAA) may be situated (according to standard P08-302):
- on an upper floor
- on the ground floor
- on the protected ground floor

**Q1 Upper floor**
A system is considered to be on an upper floor if it is at least 2.50 m away from the external activity area (EAA) regardless of the location or internal floors...

**Q4 Ground floor**
+ passageway, terrace, balcony
A system is considered to be on the ground floor if all or part of the system is located at a height of less than 2.50 m compared with the external activity area regardless of the location or internal floors.

**Q4 Protected ground floor**
A ground floor is said to be « protected against external shocks » if it is located behind another structure making the cladding layer inaccessible at this point.

Reference texts

P08-302 of October 1990 - exterior walls of buildings - impact resistance - test methods and criteria.
DTU 20.1 - AFNOR reference DTU P10-203 - masonry works of small wall and wall elements.
CSTB 2929 booklet of December 1996 - classification of thermal insulation systems for façades from the outside.
Extract from Information Note n°11 - Impact resistance of reported claddings, clothing and clothing, CSTB 3546-V2 specifications - February 2008.
FCLAD® CLADDING PANEL

Installing FClad® cladding panels
C- Installing FClad® cladding panels

The panels are attached by means of invisible attachments (clip on rails)

The attachment of the clips to the panels is done using a Keil KH-AA-10 insert from the manufacturer Keil Werkzeugfabrik, Karl Eischeid GmbH (DE-51766 Engelskirchen). A KH spacer is added to the panel surface. The length of the Keil screw used is 19mm (M6*19). A serrated washer is used between the clip and the screw.

The panel is perforated in the factory; the inserts, washers, screws and "staple" clip on brackets are fitted on-site.

The vertical profiles are aluminium.
The horizontal rails are attached to the vertical aluminium frame by two self-perforating screws made of A2 Ø5.5*25 stainless steel of Etanco PERFIX 3 TH8/A2 Ø5.5 x 25 Stainless Steel type, with a characteristic tear resistance Pk of 4300N in an aluminium base 3mm thick.
Other screws of identical dimensions and equal or superior mechanical characteristics may be used.
Special items for mounting the panels bear the reference codes:
- Etanco C+ rail made of 6060 T5 aluminium, thickness 3mm and length 3m, ref. 611 368
- Etanco C+ adjustable clip and fulcrum made of 6060 T5 aluminium, thickness 3mm and length 50mm, ref 611 058
- Etanco C+ standard clip made of 6060 T5 aluminium thickness 3mm and length 50mm, ref 611 099.

The adjustable clips have an adjusting screw to ensure that the panel is horizontal, TH6*10 Stainless steel screw. The adjustable clips are also used at the fixed point, with a self-perforating screw made of A2 Ø5.5*25 stainless steel of Etanco PERFIX 3 TH8/A2 Ø5.5 x 25 Stainless Steel type.
Clips are positioned to match the inserts placed at the back of the panels. There is a minimum of one fixed point per panel.
The overall weight is borne by two clips situated near the upper edge.

**NB**: For undersides and applications on roofs, the maximum centre distance is limited to 400mm for technical reasons.

Some examples:

1. **Metal frame**
   
The frame profiles and attachment brackets along with their related attachments are directly procured by the assembler, in accordance with the instructions in this document. Fehr Architectural can also provide all these attachments on request. 
The vertical rails are attached to the main structure via bracket feet. 
The frame is to be braced with a maximum length of 3 m. 
It consists of vertical profiles made by extrusion of 6060T5 aluminium alloy, 2.5 mm thick for the T-shaped profiles and 3 mm thick for the L-shaped profiles, such as the T-shaped or corner profiles of the FACALU system from ETANCO Ltd. Bearing surface width provided by the L-shaped profiles is at least 50 mm and 80 mm for the T-shaped profiles. 
The centre distance of the bracket feet is calculated according to the mechanical characteristics of the profiles and the pressure (loss of pressure) as per the amended NV 65 regulations.

2. **Attachment feet**
   
The feet are made of aluminium alloy (6060 T5), minimum thickness 3 mm and height 150mm, such as the ISOLALU LR 150 brackets from Etanco Ltd. 
The vertical aluminium profiles are attached through the aluminium square by two self-perforating screws made of A2 Ø6*29 stainless steel of SFS Intec SX5-S(16)-5.5*33 type, with a characteristic tear resistant Pk of 2960N in an aluminium support 2.5 mm thick and 3870 N in an aluminium support of 3 mm. 
Other screws with identical dimensions and equal or superior mechanical characteristics may be used.
General assembly principles

Layout must be planned beforehand. There is no particular direction of assembly, the panels can be assembled either horizontally or vertically.
Assembly operations are done either from a scaffold, a rack-and-pillon platform, or a scissor lift.

For large panels the procurement and assembly are to be done by lifting beam with suction pad. Assembly is done from the bottom upwards in successive horizontal rows, starting either from the right or the left.
3. Assembly the metal frame

1. Layout

2. Tracing, marking and perforating the wall

3. Assembly of vertical framework on the wall using foot brackets

4. Assembling the insulation

5. Assembling the horizontal rails
4. Attaching FClad® cladding panel

The clips are attached to the panels using a Keil insert. Panels come cut out and pre-perforated. The Keil inserts and spacers are installed on-site.

The centre distance of the attachments is equal to 800 mm maximum and the distance between the panel edge and an attachment is 200 mm.

The assembly method is as follows:
- cleaning the insert using a blower or suction
- fitting the Keil insert in the pre-perforations
- fitting preslabs
- fitting the clip
- fitting the serrated washer
- screwing the bolt with a maximum torque of 3N/m

The panel must then be mounted using the clips on the horizontal bars.

5. Treatment of joints

The standard components are arranged so as to leave vertical and horizontal joints with a maximum width of 8 mm.
6. Ventilating the air space

An air space with a minimum thickness of 20 mm must be formed between the insulation and the panel. The ventilation of the air space must comply with the stipulations of the CSTB 3316 specifications and amendment 3422 of the CSTB 3194 specifications. Independently of the communication with the exterior at the joints between panels or intermediate aprons, ventilation of the air space is provided by openings at the base and the summit of structures formed for this purpose and of a large enough cross-section, namely one of at least:

- 50 cm²/m for a structure height of ≤ 3m
- 65 cm²/m for a structure height of 3m to 6m
- 80 cm²/m for a structure height of 6 m to 10 m
- 100 cm²/m for a structure height of 10m to 18m

Where the cladding starts, the opening is protected by a profile with a perforated core forming an anti-rodent barrier. In the upper part, the opening is protected by a protruding part (for example, a coping or acroterion) forming a drip.

**NB :**
An air space of at least 20mm must be provided between the external face of the insulation and the internal face on the framework plan in the case of an ETI.
7. Direction of assembly

**NB:**

- Correct direction
- Incorrect direction
8. Replacing a FClad® cladding panel (example)

Any board can be replaced independently of the boards next to it. Replacement with an identical part is not planned, but is possible with through attachments. Panels are attached with a screw. The visible heads of the attachments are thermolacquered according to the panel colouring.

The screws used are SX5-L12-S(16)-5.5*63 self-perforating screws from SES In-tec Ltd. with a characteristic tear strength Pk (obtained in accordance with the NE P 30-310 standard in an aluminium base 2.5 mm thick) of 2960 N.

Other screws with identical dimensions and equal or superior mechanical characteristics may be used.

The diameter of the pre-perforation is 8 mm for sliding points and 6 mm for fixed points. The attachments are fitted from the fixed point of the middle. The centre distance of the attachments is equal to 800 mm maximum. The attachments around the sheet perimeter are to be located 30 mm from the edges.

1. Lift the upper panel to the limit of the upper joint.
2. Remove the damaged panel by undoing staples if necessary.
3. Push the replacement panel to the joint between the staple and the rail, then lower the panel to the joint of the staple.
4. Unload the upper facade panel to its original position.
Accommodation - Paris
Architect: Dumont-Legrand
Photo for information purposes only
FCLAD® CLADDING PANEL

D Technical details
D - Technical details

These details are for information purposes and it is the responsibility of the assembling company to decide on the manner of implementation as per the standards and regulations of good building practice.

Figure 2a: Distance between centres depending on the size of the panels - Q1
Projects outside seismic areas
Figure 2c: position of fixed and adjustable fastenings

- small fixed staple
- adjustable staple bracket
- standard staple bracket
- double staple

If seismic areas then double staple

In seismic areas, as many accessible staples as possible must be fixed, and 3 have to be constrained.
Figure 3a: Fastening

**EXAMPLE ETANCO**

Adjustable staple / fixed  Standard staple  Rail  Keil Insert + spacer KH + screw Keil M6*19

Rail

Interlocking staple/rail
FClad® panel thickness 16 mm
Trowel undercut anchor KH AA 13mm
Staple
Trowel screw M6x16
Adjusting screw
Grab support profile «MDI»
Rivet
Supporting profiles
Substructure systems NFT - SL RAPID 850

large facade panels
rear mounting - "MIDI" grab support profile

Isometry
Substructure systems NFT - SL RAPID 850

large format facade panels
rear mounting - "MIDI" grab support profile

Isometry total

| 1 | Wall bracket RAPID-A, FP-A |
| 2 | Wall bracket RAPID-A, GP-A |
| 3 | Thermostop FP |
| 4 | Thermostop GP |
| 5 | Dowel with special screw |
| 6 | Self-tapping screw |
| 7 | L-Supporting profile |
| 8 | Grab support profile "MIDI" |
| 9 | Rivet |
| 10 | Adjustable staple or adjustable staple - and fixable |
| 11 | Adjusting screw |
| 12 | Self-drilling screw for fixing the plate. Only one fixation per plate! |
| 13 | Staple |
| 14 | On site: Facade panel |
| 15 | Staple decoupler (elastic intermediate layer), if necessary, on each staple! |
| 16 | Horizontal connectors "MIDI" |
Substructure systems NFT - SL RAPID 850

large format facade panels
rear mounting - “MIDI” grab support profile
vertical cut
FClad® cladding panel framing detail, for 16 mm panel
Subframe solution only
Detail of the assembly of the Etanco staple with FClad® cladding panel for 16 mm panel

Figure 4: Monobloc angle dimension
Assembling of the Etanco staple with FClad® cladding panel, for panel of 16 mm

Figure 5: Horizontal joint
Figure 6: Vertical joint (horizontal section)

Figure 7: Capping
Figure 8: Lateral stop

Figure 9: Expansion joint
Figure 10: External corner

Figure 11: Horizontal subdivision of air space
Figure 12: Vertical section on cladding starting point

Figure 13: Window support
Figure 14: Non-monobloc panel

Figure 15: Lintel
Figure 16: Monobloc external angle

Figure 17: Segmentation of the subframe, Aluminium frames ≤3m
Figure 18: Segmentation of the subframe, Aluminium uprights >3 m
Detail on timber frame construction

Figure 19: Cladding on start (horizontal section)

Figure 20: Typical horizontal section
Figure 21: Vertical cut and overlap of the waterproofing membrane every 6 m

Figure 22: Segmentation of the subframe at each floor level
FCLAD® CLADDING PANEL

Handling and maintenance
E - Handling and maintenance

Loading and unloading FClad® cladding panels

FClad® cladding panel, should be transported flat. The panels are strapped together and the edges are protected to guarantee security.

The following rules must be respected during unloading:
- unloading using a fork-lift truck and/or crane
- forks must be at least 2,300 mm apart, 4 forks are required
- unloading cross beam for the crane
- respect the loading distances
- prevent the pallets from oscillating during handling
- take the pallets one by one
- do not place the pallets on top of each other

Storing the FClad® cladding panels

FClad® cladding panels should be stored flat in a dry area. Do not place the pallets on top of each other. The panels must not be placed on their edges or corners without suitable protection (firm polystyrene for example).

FClad® cladding panels must be stored in areas which are protected against adverse weather and UV, and covered with an appropriate tarpaulin which is to be removed just before assembly.

Handling the panels : appropriate equipment

The panels must be handled using clean gloves. The FClad® cladding panels are to be handled using suction pads (lifting beams with suction pads or manual suction pads).
Handling FClad® cladding panels

Lift the FClad® cladding panel and turn them over carefully. Do not pull them (they must not rub against one another).

Position them vertically on their edge ensuring that suitable protection has been provided (polystyrene or carpet).

Make sure that the corners are protected when rotating the panels.

In the case of manual transport, the panels should be handled vertically using clean gloves. Never handle the panels horizontally as they could split. Avoid bending and oscillation as this could cause the panels to break.

Cutting

FClad® cladding panels are delivered to the site pre-drilled and cut to the required shape. If the panels are to be cut, please follow the instructions below. The FEHR Architectural team remains at your disposal should you have any questions.

Preparation of the working environment

Work on a dry surface, at the correct height, protected from potential rain. Only mark out the sections on the areas to be cut.

Drilling:
Clean the panel carefully: use a vacuum cleaner to remove all dust and a compressor to blow away any residue.

Caution: the drilling dust must be completely removed immediately so that it does not damage the panel.
Cutting the FClad® panel

**Stationary cutting : damp**
Particularly suitable for complex cuts (oblique, rounded), water jet cutting is accurate and simple. Make sure that each panel is cleaned thoroughly with water after cutting and dried properly. The panels must never be piled on top of one another or kept in a damp place as this could damage their quality.

**Cutting on site : dry**
Use a circular saw with a guide rail (for example FEST-TOOL TS 55 EBQ-Plus-FS) and a splinter protection system. Make sure that the visible part of the panel is facing upwards. Use a diamond saw blade for a manual circular saw (e.g. Focus «Profi Turbo» or equivalent, Ø150 mm, perforation diameter 22.5 mm, compensating ring over 20 mm). Cutting data: speed of approximately 6,500 1/min for Ø150 mm, advancing approximately 2-3 m/min, cutting speed of approximately 50-60 m/s. Use a commercial jigsaw with a diamond plated saw blade for cuts.

NB: the drilling dust must be completely removed immediately so that it does not damage the panel.

Drilling

**Through-holes**
Use a stone bit, for example Bosch „Blue Granite“ Ø 8mm, l = 120 mm or equivalent) or a special bit (for example from Hufschmid Ltd) of Ø 8 mm. Never use a hammer drill.

NB: the visible part of the panel must be facing upwards. Before doing the marking, put adhesive tape on the drilling point and make the mark on the adhesive tape (in order to avoid any hard-to-remove marks on the panel).

Drilling for expansion anchoring
In the case of re-drilling on site: use equipment and items supplied by the company Keil (bits, templates, expansion plugs and screws). Respect the manufacturer’s instructions:
- Insertion depth: 10 mm.
- the panels must be turned so that the visible side is facing downwards
- make sure that a carpet or other wedge is used to protect the panel and the work table.

NB: the drilling dust must be completely removed immediately so that it does not damage the panel. Use a compressor to clean the panel around the hole and to blow away any remaining cutting and drilling dust.
Attachment with expansion anchoring

Recommendations:
It is recommended to use a special expansion anchor drill to redrill holes on site, with expansion anchor Hs = 8.5 mm, screw (length depending on the clip anchor, template to check the hole, compressor, torque wrench).
All the parts and equipment must be part of the same system and must be compatible (Keil brand, www.keil.eu).
The screw should be tightened with a torque of 2.50 to 4.00 Nm.

NB: excessively long screws would extend beyond the hole towards the front of the panel. If necessary, place a soft rubber wedge between the panels and the clip, following the frame, and adjust the panels with adjustment screws.
Attach one clip per panel on the supporting rail to create a fixed point.

Remedial of possible aesthetic defects on site
The majority of the possible aesthetic defects can be corrected on site (Colour coating defects, aesthetic cracks, inserts position...).

Cleaning the FClad® cladding panels
Depending on the location of the building and constraints relating to pollution and dirt in particular, the panels should be cleaned every 2 to 5 years by a specialised firm. A damaged panel may be replaced.
Several surface treatments may be applied using protective products which are compatible with the material:

• Hydrophobic treatment: protection against efflorescence and dirt.
• Anti-graffiti: areas accessible to the public.
• Colour coating: customisation of the colour and shine.

Do not use chemicals
The panels must be cleaned with water using a microfibre cloth.

Do not use high-pressure cleaners
Panels should never be stacked or stored wet, as this may affect their quality.
Residential project Rue Marchal - Paris
Contracting authority: SA d'HLM Erilia
Architect: Philippon-Kalt
non-contractual photo
FCLAD® CLADDING PANEL

Ordering procedure
A clear order to guarantee maximum satisfaction
Make sure that you provide us with all the information below so that we can establish the most relevant proposal for you:

Details:
- Company name and address
- Billing address
- Full name and address of the project
- Delivery address for the panels
- Full contact details of the architect

The project:
- Type of construction (new build - renovation)
- Type of project (residential, school, offices, etc.)
- Total quantity of panels in m²
- Chosen colour and texture
- Size of panels
- Chosen treatment/protective coating
- Required delivery date

An optimised proposal
Upon receipt of the items listed above and the project plans, our sales department will send you an optimised proposal with a provisional delivery date.

Ordering
As soon as the order is put through, we will confirm an exact supply date.

Panel production
The panels will be produced as soon as we are informed of all cuts and all specific details (panel hardening time: 28 days.)

Dimensions and joints
We must be provided with the production dimensions 6 weeks before delivery, and we must have all dimensions and all cutting and drilling details (holes, drilling dimensions, specific cutting, mitre joints, etc.)

NB: if this information is not sent within the allotted time, a delay of the production date will be incurred, and therefore the delivery date. In addition, if the submission date for the dimensions is not complied with, extra processing costs may be billed for any reorganisation of the production cycle.

Final order confirmation
On receipt of all the section dimensions and specific details, you will receive an updated order confirmation with the final dimensions.

Panel manufacturing

Panel delivery
The panels are delivered to the address that you have stated on the order.

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**Ordering procedure**

<table>
<thead>
<tr>
<th>Order with site survey plans</th>
<th>Manufacturing drawings approval</th>
<th>Delivery of first components</th>
</tr>
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<tbody>
<tr>
<td>+ 2 weeks</td>
<td>+ 6 weeks</td>
<td>8 weeks</td>
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</tbody>
</table>
Our customer commitment

Product quality:
We are committed to delivering a high-quality product in line with your order within an optimal deadline.

Service quality:
Our integrated research department undertakes to supervise your project from the design to the delivery phase.

On-site assistance:
Fehr Architectural gives technical support, whether during the detailed design stage or at the start on site.
Customer satisfaction is a priority. Depending on your needs, our experts can train your team on site or take care of product installation themselves.

Support for the company in charge of the installation
On request, we can offer you training in the assembly of the FClad<sup>®</sup> cladding panels.

Provision of a Fehr Architectural crew for the installation
On request, we can provide you with our crew of assemblers of FClad<sup>®</sup> cladding panels.

Do not hesitate to contact our marketing department for further information:
arhitectural@fehrgroup.com

Certified ISO9001 14001 18001.