



CLADDING WITH FIBRE CEMENT

PLANNING & INSTALLATION

Edition 2007



Basics / Approval

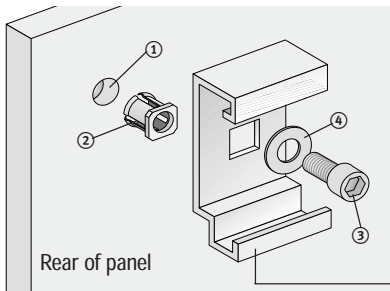
The Tergo system offers the highest technical and aesthetic for designing façades. No fasteners are visible on the surface. The following aspects can be varied as desired:

- free choice of layout grids up to full panel format in size, without visible fixing points
- Structura 3,100 x 1,500 mm
- Natura 3,100 x 1,250 mm
- open joints
- wide variety of coated aluminium profiles for attractive joint details.

The basis for specifying the size of individual cut panels consists of:

- the working drawings or
 - the measured survey of the building.
- Secret fixing with Eternit undercut anchors as part of the Eternit Tergo system is approved under general building regulations permit No. Z 21.9-1534.

Scope of Supply



- ① Individually cut façade panels, pre-drilled at the rear, 12 mm thick, with general building regulations approval: Structura (Z-31.1-34) or Natura (Z-31.1-34)
- ② Eternit undercut anchors

- ③ Socket cap screw M6 x 12 DIN 912, stainless steel
- ④ Washer 6.4 DIN 9021, stainless steel

Tergo façade panels are mounted using undercut anchors, screws and washers. The panel hanger or rail for mounting the panel belongs to a particular subconstruction and is not included in the scope of delivery.

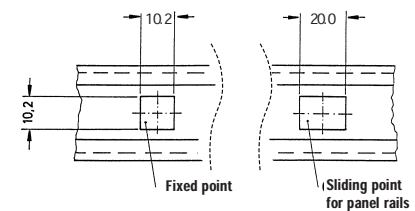
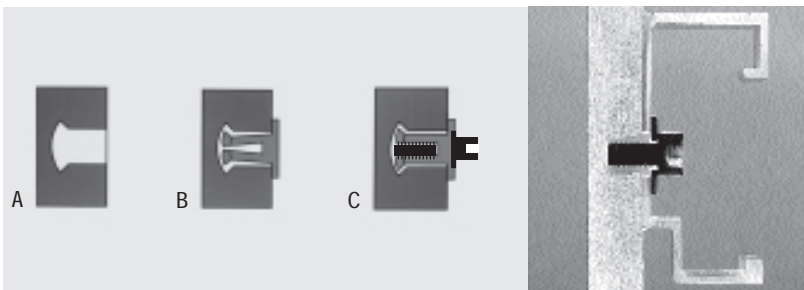
Not included within scope of delivery.

Undercut Anchor

The Eternit Tergo design solution includes special Eternit undercut anchors. After the anchor has been inserted into the pre-drilled undercut hole (A + B), its sleeve is splayed into the desired position by insertion of the screw (C).

This creates an interlocking anchorage for the façade panel. The anchor studs have square collars, which enables them to be fixed securely to any subconstruction. Depending on the type of fixing required, holes can be punched

in to parts of the subconstruction. The profile to receive the collar, either square in shape for fixed points or rectangular for sliding ones.



Structural Requirements

Each façade panel is to be fixed, by means of at least four plugs arranged rectangularly with individual hangers, to a suitable subconstruction

in such a way that it is technically free of displacement constraint. The number of separate hangers is to be limited to nine. If more

than nine fixing points are necessary, continuous panel rails, or 'hanger rails' must be specified.

Planning & Installation 2007 · Eternit Façades with Fibre Cement

Structural Design

Façades consisting of Structura or Natura fibre cement panels, Eternit undercut anchors and subconstruction should be dimensioned by a suitably qualified structural engineer.

In each individual case, the number of fasteners is to be calculated with regard to the panel size, the subconstruction, the substrate and the loading (dead load, wind load in accordance with e. g. DIN 1055-4 and in accordance with e. g. DIN 185 16-1 respectively).

For structural calculations using finite element analysis (FEA) programmes, element sizes of $0.75 \geq d$ (d = panel thickness) are to be chosen for grid generation.

The analysis of bending stress in the façade panels is to be carried out at a distance of 5 d from the anchor stud axis, or the calculated point of peak stress. For fibre cement, assume that Poisson's ratio $\nu = 0.25$.

The stiffness of the subconstruction profiles is to be taken into account in the calculations. The wall brackets belonging to the subconstruction should be assumed to be immovable at the anchoring points in the substrate.

Nominal Values for Anchor Plugs and Panels

The main parameters for dimensioning are given in the table below.

Anchor Plug Characteristics		Eternit Undercut Anchor Tergo	
Corner distance ²⁾	$a_e \geq$ [mm]	50	100
Edge distance	$a_r \geq$ [mm]	50	
pm. pull-out load per anchor ¹⁾	$F_{zul} =$ [kN]	0.3	0.4
pm. lateral load per anchor	$Q_{zul} =$ [kN]	0.8	
Centre spacing of anchors	$a \leq$ [mm]	750	
Punched hole in the panel hanger	$a \times b$ [mm ²]	10,2 x 10,2 (fixed point)	
Punched hole in the panel hanger	$a \times b$ [mm ²]	10,2 x 14,2 (sliding point)	

1) For anchor plugs subjected to an oblique tensile force, the permissible pull-out load is calculated according to the following formula:

$$F_{pm} = 0.4 \sqrt[1.5]{1 - \left(\frac{Q}{0.8}\right)^{1.5}}$$

Q can be taken as the figure for the lateral load acting on the anchors as a result of the dead load of the panels.

2) For corner distances of $50 \text{ mm} \leq a_e \leq 100 \text{ mm}$, the permissible pull-out load is to be calculated by interpolation. If the corner distances in both directions are unequal, the small figure is to be taken.

Positioning of the Fixing Holes

The positioning of the fixing holes depends upon:

- the format of the panels
- the type of subconstruction
- the structural stability analysis of the façade
- the edge distances for pre-drilled undercut holes.

Recommended edge distances for planning hole positions: 100 mm.

Edge distances horizontally (i.e. to vertical edges) must lie between 50 mm min. and 100 mm max. and vertically (i.e. to horizontal edges) between 70 mm min. and 100 mm max.

Edges distances in excess of 100 mm can have a negative effect on the appearance, especially at cross-joints, because it can no longer be

The maximum centre spacings for Eternit undercut anchors are as follows:

Height of Building	Standard Zone	Edge Zone
$\leq 8 \text{ m}$	750 mm	620 mm
$\leq 20 \text{ m}$	750 mm	500 mm
$\leq 100 \text{ m}$	680 mm	420 mm

These centre spacings are non-binding. The actual spacing must be ascertained by structural analysis. A joint width of 10 mm is recommended.

For Tergo façades with open joints, increased wind suction loads do not need to be assumed in the edge zone of the building.

guaranteed that the panel edges will lie evenly in the same plane.

The fixing distances given in the table can be used as a basis for the initial planning.

Additional Holes

The undercut holes in the rear of the panels are pre-drilled at the factory.

Additional holes may be drilled in workshop conditions on site using a mobile drill (KS-HV) and a special bit (F HM 8/10 12/0.5) manufac-

tured by KEIL, Im Auel 42, D-51766 Engelskirchen-Loope, Germany, Tel. +49 22 63 80 70, Fax +49 22 63 80 73 33. The drill dust must be removed completely from the hole.

The geometry of the additionally drilled holes

is to be checked with a gauge of 8/0.5. If a hole is badly drilled, the distance between it and any new hole must be at least twice the depth of the badly drilled hole.

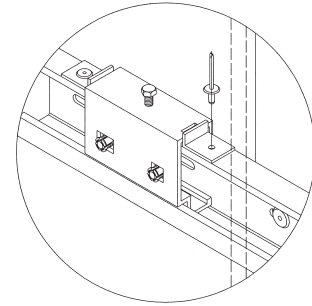
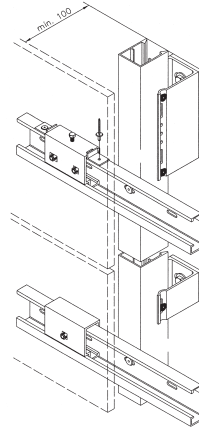
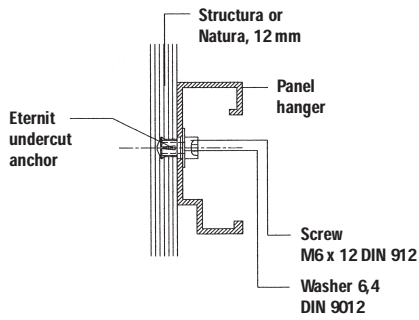
Subconstruction with Panel Hangers

Panel hangers suitable for the system are fixed to the rear of the panels with undercut anchors. After this has been done, the panels are hung on the horizontal supporting profiles of the subconstruction, adjusted and secured firmly and permanently against sideways slip-

page with screws and special angles. The horizontal profiles should be interrupted approximately every 4 m in order to avoid unwanted differences in the width of joints between the panels being caused by expansion of the aluminium.

The dead load is transferred via two adjustable fixings in all cases.

The minimum thickness of the construction, measured from the face of the façade panel (12 mm thick) to the surface of the supporting wall, is 100 mm.

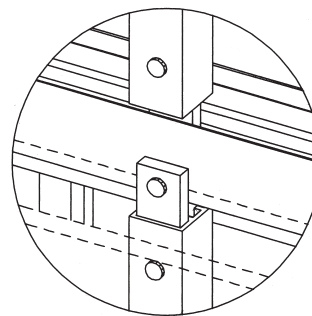
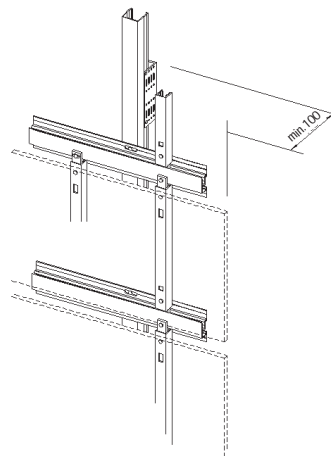
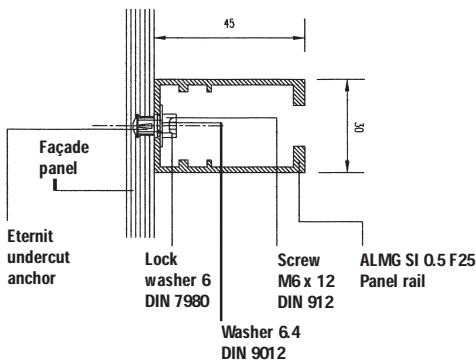


Subconstruction with Panel Rails

Panel rails are fixed to the rear of the panel without constraint, using Eternit undercut anchors. After the panels have been aligned, the resulting assembly is attached to the sup-

porting profiles of the subconstruction, accessed via the joints. The dead load is transferred via two fixings in all cases.

For subconstructions with panel rails, a lock washer (6 DIN 7980-A2) must be inserted between the undercut anchor and the washer at sliding points. The lock washers are included in the scope of delivery by the subconstruction suppliers.



Suppliers of Subconstruction Systems ➤

Panel hanger systems are supplied by the following German companies:

- BWM, Leinfelden-Echterdingen, ATK 103
- SYSTEA Fassaden- und Balkonsysteme,

Norderstedt, Typ UBE 25

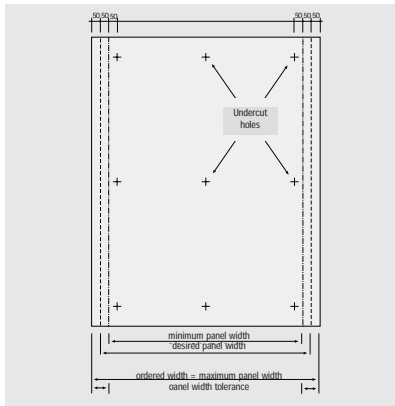
- NAUTH-Fassadentechnik GmbH, Gernsbach
- Montaflex, Braunschweig, Clickpress 2300
- WS Fassaden, Vechelde, AG4/Tergo

Panel rails are supplied by:

- SYSTEA, Typ UBEKA
- BWM, ATK 103V
- WS Fassaden, UP 24/Tergo

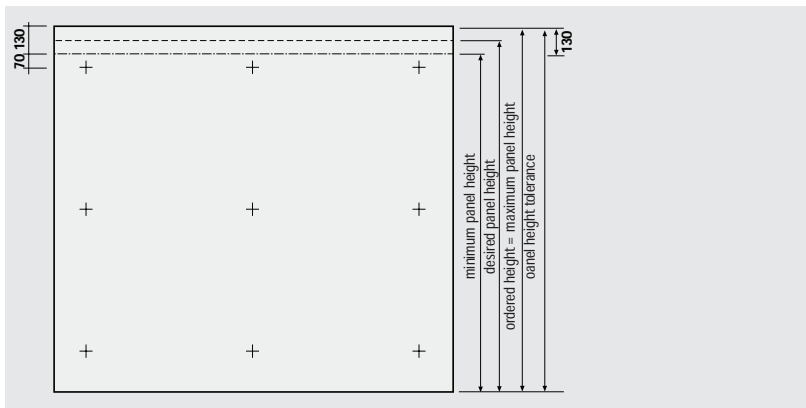
➤ For addresses of subconstruction suppliers, see p. 38

Cut-to-Fit Panels for Adjusting



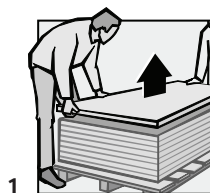
Deviations from the planned dimensions of the structural shell can be allowed for by using oversized panels cut to fit. If such deviations are expected, cut-to-fit panels should be ordered before beginning work. This helps to avoid delays in construction work and extra costs.

Each panel can cope with a **horizontal tolerance** of ± 100 mm in the building structure. Cut-to-fit panels should be ordered with a width 100 mm greater than the desired width. The distance of the undercut holes to the vertical panel edges normally measures 100 mm, but can lie between 50 and 150 mm. Cut-to-fit panels should be selected with an edge distance of 150 mm on both sides. Cutting the sides back by up to 100 mm each allows the width of a panel to be varied by up to 200 mm.

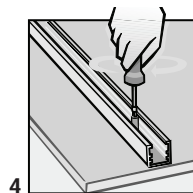


Each panel can cope with a **vertical tolerance** of ± 100 mm in the building. Cut-to-fit panels should be ordered with a height 100 mm greater than the desired height. The edge distance of the undercut holes from the top edge of the panel normally measures 100 mm, but can lie between 70 and 200 mm. Cut-to-fit panels should be selected with an edge distance of 200 mm at one of the two horizontal edges. When fitting at copings this is the upper edge, when fitting at plinths it is the bottom edge. The height of a panel can be varied by up to 130 mm simply by cutting the edge concerned back by up to 130 mm.

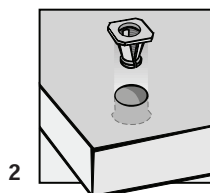
Notes on Installation



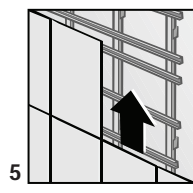
When using panels, lift them completely from the stack – do not slide them!
Please note: panels should be protected from moisture and direct sunlight.



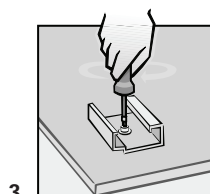
Fix panel rail to the rear of the panel using screws with washers and lock washers. A lock washer 6 (in accordance with e. g. DIN 7980-A2) must be inserted between the undercut anchor and the washer at sliding points.



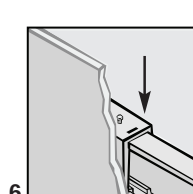
Insert the Eternit undercut anchor in the pre-drilled blind hole.



The panels are usually mounted from the bottom upwards.
Please note: once the panel hangers or panel rails are attached to them, panels should be stored in a vertical position with ample protection for the decorated face.



Fix panel hangers to the rear of the panel with screws and washers (recommended tightening torque 2.5 - 4.0 Nm) or:



When mounting with panel hangers: align the panels, then secure them firmly and permanently against sideways slippage or creep, as specified in the instructions of the subconstruction manufacturer.