

| Facade | Rainscreen cladding systems |



StoVentec Rainscreen Cladding Systems

It should be noted that the details, illustrations, general technical information, and drawings contained in this brochure are only general proposals and details which describe the functions. They are not dimensionally accurate. The applicator/customer is independently responsible for determining the suitability and completeness for the product in question. Neighbouring works are described only schematically. All specifications and information must be adjusted or agreed in the light of local conditions and do not constitute work, detail, or installation plans. The technical specifications and product information in the Technical Data Sheets and in system descriptions/certificates must be observed.

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Sogn og Fjordane Museum of Fine Art, NO-Førde CF Møller AS, NO-Oslo

Intelligent construction with design potential

The word "facade" stems from the Latin "facies", meaning face. In the past, it was used in architectural terms to describe the primary or front aspect of a building which generally overlooked public spaces. Today, however, "facade" refers to any side of a building, i.e. the exterior building envelope which has to fulfil all decorative, structural, and energetic requirements. The mutual impact of the facade and public space sets the stage for an exciting process where conscious design decisions are key and potential simply has to be explored.

Of all the multi-layered exterior wall systems available, rainscreen cladding facades (RSCs) in particular offer a wide range of individual design possibilities. With a structural design which separates thermal and weather protection, RSCs are energy-efficient, durable, and economical. What's more, the sub-construction makes this system a logical solution not only in new buildings, but also in refurbishments with substrates that have limited adhesive options or are uneven.

The concept of "rainscreen cladding systems" has stood the test of time for centuries. In regions with harsh weather conditions – for example, in the Alps – curtain walls made of wood shingles, bricks, or slate offer effective protection against moisture and frost and have been used to excellent effect for some time. As they say, the longer something lasts, the better it must be.

Benefits of RSC systems

Surface variety

The fact that the sub-construction is flexibly mounted, and that the facade surface is ventilated at the rear, makes for maximum design freedom: from glass panel facades and pointed facades with ceramics or glass mosaic right through to seamless rendered surfaces. A whole host of finishes can be achieved depending on the format, colour, surface appearance, joint formation, and fixing system in combination with various surfaces.

Shaping

Being able to vary the projection of the sub-construction means that it is possible to create layouts with amorphous shapes, as well as with folded and tilted surfaces. Using our StoVentec Carrier Board to create a surface opens up further additional options. This approach even means that sculptural shapes can be seamlessly incorporated (see page 8 f.).

Thermal protection

The combination of the insulation layer and rear ventilation provides optimal thermal protection all year round in existing developments and new buildings alike. Insulant thicknesses of up to 30 cm are possible thanks to the adjustable sub-construction of the RSC.

Moisture protection

The diffusion-open wall structure works in combination with the rear ventilation to protect against condensation build-up. This means that even old building fabric can dry out quicker, improving thermal protection for the external walls.

Weather protection

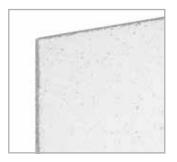
The intelligent system build-up protects the thermal insulation from weathering influences. If moisture enters systems with an open joint formation – for example, during driving rain – then the ventilation layer conducts this away effectively to ensure a rapid drying process. This not only preserves the construction, but also guarantees the functionality of the insulation layer.

Sound protection

Due to the facade surface being separated from the wall structure, and the way that open-pored insulation absorbs sound, rainscreen cladding systems improve the estimated sound attenuation R'_w in solid walls by around 10 dB. With this in mind, it's worth noting that a reduction in volume of 10 dB is perceived as a halving.

Design possibilities

Material and surface



Render*

Seamless facade decoration – even for designs with individual shapes; organic and silicone resin renders, render with Lotus-Effect[®] Technology, mineral and silicate renders; smooth to very coarse surfaces as a result of various render types (scratch, rilled, and free-style textured render) with different grainings; surface can be customised with application techniques; matt appearance; individual colour shades possible; gloss and metallic appearance possible with additional paint coat

More on pages 10–11



Glass mosaic*

Highly reflective interplay between light and colour; gloss surface with depth effect; high lustre; extensive design freedom with colour and format combinations; various standard colour shades; appropriately tintable joint material; potential for individual motifs and corporate identity facades, curved shapes possible

More on pages 12–13



Ceramics*

Wide range of brick slips; ceramics can be requested; smooth to coarse and sculptural surfaces; matt to gloss appearance; free choice of colours; potential for individual motifs and corporate identity facades, curved shapes possible

More on pages 14–15



Natural stone*

Individual, high-quality, natural stone surfaces; large material selection, e.g. Kirchheim shell limestone, sandstone, dolomite; various surface finishing options, e.g. polished, finely ground, or sand-blasted; matt or gloss appearance depending on the surface processing; curved shapes possible

More on pages 16–17



*This material is particularly suitable for designs with independent shapes. See pages 8-9 for more information



Glass

Smooth, gloss surface with depth effect; tempered safety glass; variety of element shapes and sizes; suitable for use in a variety of applications; large colour shade variety; individual printing possible using a screen printing technique

More on pages 18–19



Photovoltaics

Smooth, gloss surface with depth effect; float glass with CIS cell layer on the rear side (efficient CIS thin-layer technology, level of efficiency \geq 12 %); standard colour shade of anthracite with grey pinstripes (highest level of efficiency); other colour shades possible; individual printing possible using a screen printing technique

More on pages 20-23

Design possibilities

Independent shapes

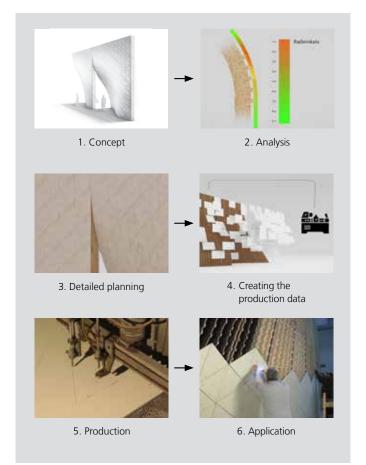


Infanta Doña Elena auditorium and congress centre, ES-Águilas; Architects: Barozzi / Veiga, ES-Barcelona; Photo: Mariela Apollonio

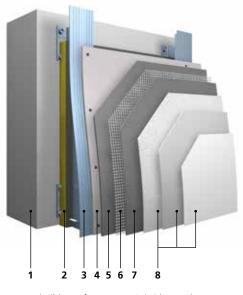
Auditorium and congress centre "Infanta Doña Elena"

Barozzi / Veiga, ES-Barcelona

Nestled in the middle of typical coastal housing development, this dynamic, white building comes as something of a surprise in the Spanish harbour town of Águilas. Yet despite its impressive structure, it does not impose. With its concave curve bending alongside the promenade and idiosyncratic cover, the concert and conference hall by the architects Barozzi Veiga is a truly eye-catching landmark.



Digital process chain (simplified representation)



1 Substrate 2 Insulation

5 Base coat6 Reinforcement7 Base coat

build-up

3 Sub-construction

8 Coating and cladding

4 Carrier board

System build-up of StoVentec R (with seamless rendered surface) and curved carrier board

The digital process chain



Sto relies on a comprehensive digital process chain in order to precisely implement unique designs with independent shapes. It covers all process steps ranging from the planner's initial designs, to analysing and dividing up the surface and statistical analyses, right up to data generation, CNC production, and installation at the project.

The biggest challenge that RSCs present is their scope for initiative with independent shapes.

As part of the RSC 2020 research project, the digital process chain was successfully tested and checked to establish the range of opportunities and possibilities the StoVentec systems offer.

Properties of the carrier board

- Bending in two directions possible
- Bending radii from 4 m possible
- High-precision cutting to size with a CNC water jet cutter
- Seamless surface creation ready for the application of:
 - Render (StoVentec R system)
 - Glass mosaic (StoVentec M system)
 - Stone (StoVentec S system)
 - Ceramics (StoVentec C system)

Render StoVentec R



Uni/PH Building, CH-Lucerne; Architects: Enzmann Fischer AG, CH-Zurich; Photo: Uni PHZ photo gallery

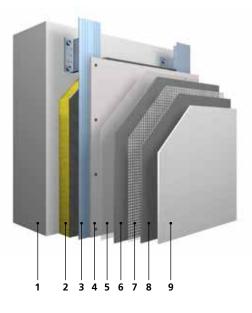
StoVentec R

Maximum range of design possibilities for seamless rendered facades

Is there really an older building hidden behind this fascinating, modern, sculptured facade? The answer is yes, as the Zurich-based architects Enzmann + Fischer planned their "city window" as a rainscreen cladding system with StoVentec R. The design is based around the stripped-back building shell of the former sorting office in Lucerne, which dates back to the 1980s. Even in existing buildings, the StoVentec Carrier-Board Facade offers a rapid and high-quality solution when it comes to creating seamless surfaces. What's more, varying the render texture and colour scheme offers numerous design possibilities. The multi-layer structure also improves sound protection in the building.



Smooth texture on a rounded surface, Hotel Lone, HR-Rovinj; Photo: Damir Fabijanic



- 1 Substrate
- 2 Insulation
- **3** Sub-construction
- 4 Carrier board
- 5 Substrate coating
- 6 Base coat
- 7 Reinforcement
- 8 Base coat
- 9 Finish

Material description

Appearance:

• Matt to gloss (depending on the coating build-up)

Texture:

• Smooth to very coarse

Design

Choice of colour shade/material:

- Scratch render, rilled render, and free-style textured render all available with different grainings and combinations; tintable in accordance with the StoColor System
- StoColor Metallic range with additional paint coat
- Individual colour shades possible (no limitation to the light reflectance value if using an organic build-up)

Shape:

- Seamless curves
- Seamless crystalline structures

System properties

Fixing:

• Screw the carrier board to the sub-construction then apply the finish to the reinforced base coat

Reaction to fire:

- Limited combustibility (B-S2, d0 in accordance with EN 13501-1)
- Non-combustible with StoVentec Carrier Board A and mineral coating build-up (A2-s1, d0 in accordance with EN 13501-1)
- Fire barriers required in accordance with national specifications



System solution particularly suitable for designs with independent shapes ► See pages 8–9 for more information

Glass mosaic StoVentec M



"Royal" residential and commercial building, DE-Frankfurt/Main; Architects: schneider + schumacher, DE-Frankfurt/Main; Photos: Ben Knabe

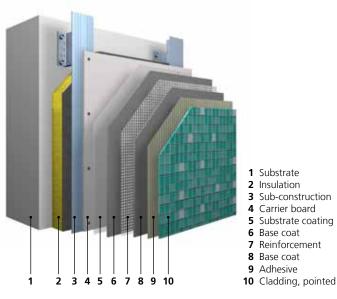
StoVentec M

Glass mosaic - a dazzling interplay of light and colour

The curved facade of the residential and commercial building in Frankfurt pays homage to the "Royal" cinema of 1957 which used to stand in its place. The small glass mosaic tiles map to the fluid surface and unify the entire facade into a single entity. With every change in light and weather conditions, the green-white colour shades of the mosaic tiles create a different impression. Glass mosaic tiles are characterised by their highly reflective interplay between light and colour, not to mention their unparalleled lustre. The StoVentec M rainscreen cladding system combines total creative freedom with colour, shape, and function. The wide variety in the colour shade, size, and thickness of glass mosaic tiles lends facades a truly distinct character.



Detail view of the curved facade strips with glass mosaic cladding



Material description

Appearance:

- Gloss
- Special depth effect thanks to colour coating applied to the rear side

Design

Choice of colour shade/material:

- 40 colour shades (no limitation to the light reflectance value)
- Designs which are low or rich in contrast thanks to tinted pointing mortar

Joints:

- Visible pointing
- Joint width 2.5 mm
- Delivery in prefabricated arches, manufacturing dimension 297.5 x 297.5 mm

Formats:

- 50 x 50 mm (manufacturing dimension 47.5 x 47.5 mm)
- 25 x 50 mm (manufacturing dimension 22.5 x 47.5 mm)
- 25 x 25 mm (manufacturing dimension 22.5 x 22.5 mm)
- Thickness either 4 mm or 8 mm
- Individual formats: side length max. 50 x 50 mm, thickness 4–10 mm

System properties

Fixing:

• Screw the carrier board to the sub-construction, then bond and point the glass mosaic tiles to the reinforced base coat

Reaction to fire:

- Limited combustibility (B1 in accordance with DIN 4102-1 [D])
- Non-combustible with StoVentec Carrier Board A and mineral coating build-up (A2-s1, d0 in accordance with EN 13501-1)
- Fire barriers required in accordance with national specifications



System solution particularly suitable for designs with independent shapes ► See pages 8–9 for more information

System build-up of StoVentec M

Ceramics StoVentec C



Townhouse in Zurlindenstraße, CH-Zurich; Architects: huggenbergerfries Architekten AG, CH-Zurich; Photos: Beat Bühler

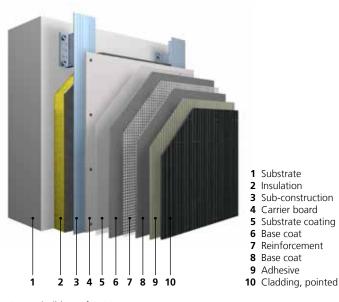
StoVentec C

Distinctive materiality with ceramics

A contemporary appearance set in period surroundings: This Zurich-based multiple dwelling takes classic clinker bricks and transforms them into a ceramic facade. The narrow, vertically profiled, and glazed ceramic tiles change colour from brownblack to silver depending on the lighting conditions. In terms of its materiality, the building looks right at home in its surroundings and proudly holds its own thanks to its truly unique appearance. The StoVentec rainscreen cladding system not only creates a modern appearance in a variety of colour combinations, but also offers outstanding thermal and sound protection thanks to its multi-layer structure.



Material transition from plinth and window to the ceramic facade



Material description

Appearance/texture:

Depends on the individually selected and tested ceramics

Design

Choice of colour shade/material:

- Standard range: wide range of brick slips in various formats and firings
- We can test requested ceramics for system conformity.
- No limitation to the light reflectance value
- Designs which are low or rich in contrast thanks to tinted pointing mortar

Joints:

- Visible pointing
- Joint width 5–12 mm depending on the type of pointing (trowel or slurry pointing)

Formats:

- Ceramic tiles: max. 0.54 m², thickness 4–15 mm, max. edge length 0.9 m
- Brick slips: max. 0.12 m², thickness dependent on type, max. 15 or 25 mm, max. edge length 0.4 m

System properties

Fixing:

• Screw the carrier board to the sub-construction, then bond and point the ceramics to the reinforced base coat

Reaction to fire:

- Limited combustibility (B1 in accordance with DIN 4102-1 [D])
- Non-combustible with StoVentec Carrier Board A and mineral coating build-up (A2-s1, d0 in accordance with EN 13501-1)
- Fire barriers required in accordance with national specifications



System solution particularly suitable for designs with independent shapes
▶ See pages 8–9 for more information

System build-up of StoVentec C

Natural stone StoVentec S

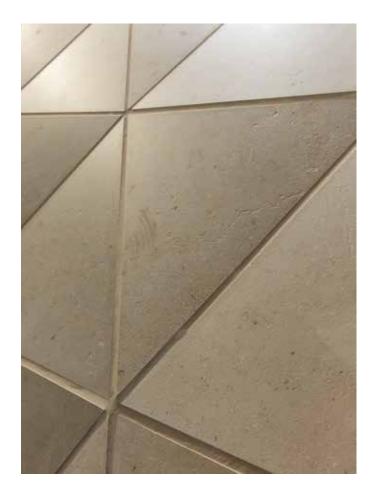


Sto booth at the BAU 2015 trade fair, DE-Munich; Architect: FAT LAB, DE-Stuttgart; Photos: Martin Baitinger

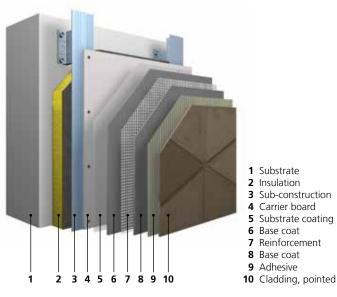
StoVentec S

Natural design variety with natural stone tiles

FAT LAB designed a moving "free-form wall" for the Sto booth at the BAU 2015 trade fair, which was free-standing, 6 x 10 m in size, and seamless. The surface of the wall facing the public was covered in yellow-gold Jura natural stone tiles which were 10 mm thick. The success of the virtually tolerance-free implementation came down to the cohesion of the digital design, planning, and production process. The natural stones in the StoVentec S system boast a naturally rich colour spectrum and a wide selection of surface textures to create facade surfaces which are both individual and high quality.



Detail view of natural stone tiles as perfectly cut-to-size cladding for individual shapes, tinted pointing mortar as an additional design element



Material description

Appearance (depending on the surface finishing):

- Polished = gloss
- Finely ground surface (C320), coarsely ground surface (C60), blasted and brushed, blasted = matt

Design

Choice of colour shade/material:

- Wide standard range comprising sandstone, limestone, granite, gneiss, and gabbro
- We can test regional stones/requested stones for system conformity.

Joints:

- Visible pointing
- Joint width 5–10 mm depending on the type of pointing (trowel or slurry pointing)

Format:

- Standard: 305 x 305 x 10 mm, 305 x 610 x 10 mm
- Modular: S2 = 524 x 79 x 10 mm, M2 = 524 x 168 x 10 mm, L2 = 524 x 257 x 10 mm
- Individual formats available on request: max. 0.54 m², thickness 4–15 mm, max. edge length 0.9 m

System properties

Fixing:

• Screw the carrier board to the sub-construction, then bond and point the natural stone slabs to the reinforced base coat

Reaction to fire:

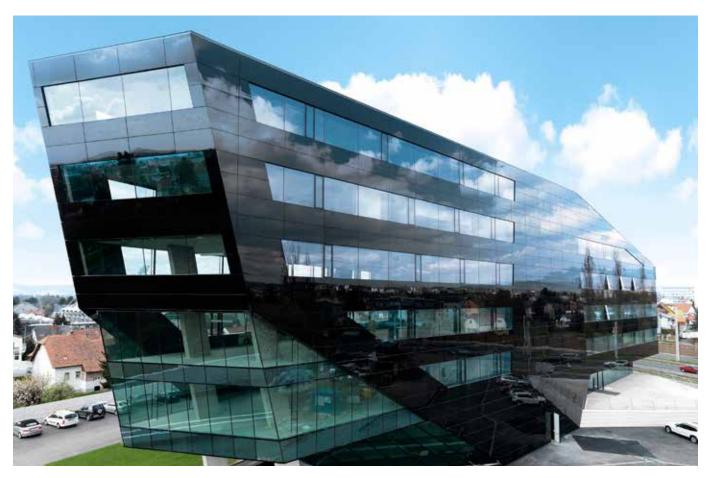
- Limited combustibility (B1 in accordance with DIN 4102-1 [D])
- Non-combustible with StoVentec Carrier Board A and mineral coating build-up (A2-s1, d0 in accordance with EN 13501-1)
- Fire barriers required in accordance with national specifications



System solution particularly suitable for designs with independent shapes▶ See pages 8–9 for more information

System build-up of StoVentec S

Glass StoVentec Glass



MP09 commercial and office building, AT-Graz; Architects: GSarchitects ZT GmbH, AT-Graz; Photos: Gerald Liebminger

StoVentec Glass

Highlighted joints for exclusive glass facades

The ultimate example of how the successful interplay between architecture and the facade can perfectly reflect the philosophy of a company. The headquarters of the eyewear company Uniopt Pachleitner Group in Graz is known as the "black panther", due to the 1800 black, non-visibly fixed glass elements that cover the facade with an open joint pattern and intensify the exceptional dynamics, excitement, and aesthetic appeal of this sculptural design. The rainscreen cladding system is available with high-quality glass elements in varying shapes and sizes. These are suitable for use in a whole host of interior or exterior applications in new buildings and refurbishments alike. For a continuous material flow from the exterior to the interior.



Transition from the black, non-visibly fixed glass elements with open joint pattern to the reveals



- 1 Substrate
- 2 Insulation
- 3 Sub-construction
- **4** Agraffe profile
- **5** Carrier profile
- 6 Sandwich panel

Material description

Appearance:

- Gloss
- Special depth effect thanks to colour coating applied to the rear side
- Sandwich panel edges coated black all the way around

Design

Choice of colour shade/material:

- Various RAL colour shades
- Very dark colour shades possible (no limitation to the light reflectance value)
- Individual printing possible using a screen printing technique

Joints:

- Open joint pattern
- Joint width 5–12 mm

Formats:

 Individual formats up to approx. 6 m², e.g. 4500 x 1250 mm, 3750 x 1500 mm or 2600 x 2500 mm

System properties

Fixing:

• Non-visible fixing thanks to agraffe profiles attached to the rear side

Reaction to fire:

- Limited combustibility (B1 in accordance with DIN 4102-1)
- Fire barriers required in accordance with national specifications

Special features:

- Installation possible in all weathers
- Possibility of replacing individual elements if damaged
- Resistant to earthquakes

System build-up of StoVentec Glass

Photovoltaics StoVentec ARTline Invisible



St. Trinitatis provost church, DE-Leipzig; Architects: Schulz & Schulz Architekten GmbH, DE-Leipzig; Photos: Christian Günther

StoVentec ARTline Invisible

Power behind the glass facade

Sustainability is at the heart of this architectural concept and design. The new provost church building in Leipzig is powered almost exclusively by its own photovoltaic area of around 700 m² on the south side of the steeple and on the roof. The StoVentec ARTline Invisible rainscreen cladding system combines innovative energy generation with distinctive aesthetic appeal in a multi-functional building envelope which generates power using solar energy.



Detail view of the transition between the non-visibly fixed photovoltaic panels and the natural stone facade

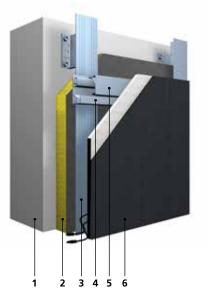
1 Substrate

2 Insulation

3 Sub-construction

4 Agraffe profile5 Carrier profile

6 Sandwich panel



System build-up of StoVentec ARTline Invisible

Material description

Appearance:

- Gloss
- Pinstripe appearance with depth effect due to cell layer applied to the rear side

Design

Choice of colour shade/material:

- Anthracite as a standard colour shade (highest level of efficiency)
- Other colour shades possible
- Individual printing possible using a screen printing technique

Joints:

- Open joint pattern
- Joint width 5-12 mm

Formats:

- Standard format 600 x 1200 mm (suitable for use in vertical and horizontal format)
- Special size 300 x 1200 mm

System properties

Fixing:

• Non-visible fixing thanks to agraffe profiles attached to the rear side

Reaction to fire:

- Limited combustibility (C-s2, d0 in accordance with EN 13501-1)
- Fire barriers required in accordance with national specifications

Special features:

- Generation of electrical energy using efficient CIS thin-layer technology, modules available in various output classes from 80 Wp
- Output per square metre: up to 75 kWh per year
- Installation possible in all weathers

Photovoltaics StoVentec ARTline Inlay



Speicher7 former warehouse, DE-Mannheim; Architect: Schmucker und Partner, DE-Mannheim; Photos: Johannes Vogt

StoVentec ARTline Inlay

For walls that generate energy

An exciting love affair between historical building fabric and regenerative solar technology integrated into the facade: the former emergency granary "Speicher7" on the banks of the Rhine in Mannheim is now home to offices, a hotel, and even restaurants. Photovoltaic panels are mounted on sections of the extensive 3000 m² steel casing. These generate power for Speicher7 building, which is used for the heat pumps for the heating and cooling systems in the walls and floors. The water needed is drawn from two wells and then routed back into the Rhine through the former gauging station. The StoVentec ART-line Inlay rainscreen cladding system was used to implement this sustainable concept. "Inlay" refers here to the framed, black, photovoltaic panels, which are simply inserted into the special mounting rails.



Detail view of the framed photovoltaic facade elements



1 Substrate

- 2 Insulation
- **3** Sub-construction
- 4 Mounting rail
- **5** Framed module

System build-up of StoVentec ARTline Inlay

Material description

Appearance:

- Gloss
- Pinstripe appearance with depth effect due to cell layer applied to the rear side

Design

Choice of colour shade/material:

- Anthracite as a standard colour shade (highest level of efficiency)
- Individual printing possible using a screen printing technique

Joints:

- Horizontal: closed joint pattern using black anodised mounting rails
 - Vertical: open joint pattern, joint width \ge 5 mm

Format:

605 x 1205 mm (suitable for use in vertical and horizontal format)

System properties

Fixing:

• Visible fixing of the framed modules using mounting rails

Reaction to fire:

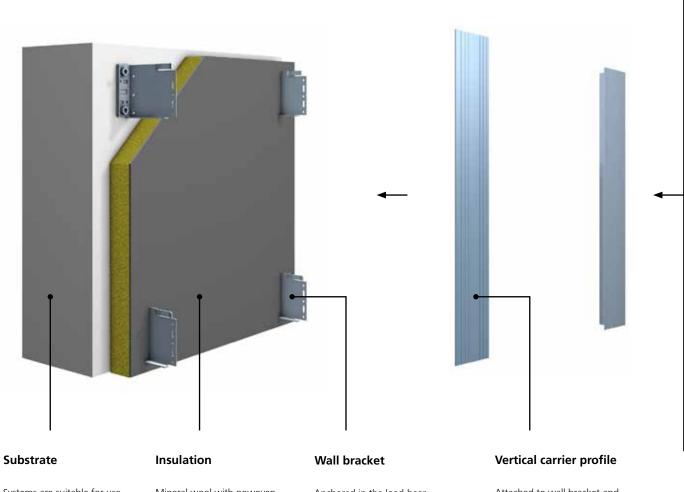
- Limited combustibility (B1 in accordance with DIN 4102-1 [D])
- Fire barriers required in accordance with national specifications

Special features:

- Generation of electric energy using efficient CIS thin-layer technology, modules available in various output classes from 75 Wp
- Output per square metre: up to 75 kWh per year
- Installation possible in all weathers

System

Substrate + sub-construction



Systems are suitable for use in new buildings and refurbishments

Mineral wool with nowoven fabric facing (insulant thickness up to 30 cm possible) Anchored in the load-bearing substrate Attached to wall bracket and screwed in without torsional stress

System Build-up + cladding

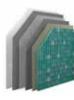


* System solution particularly suitable for designs with independent shapes
> See pages 8–9 for more information





Coating build-up (see page 10)



StoVentec M*

Cladding build-up (see page 12)



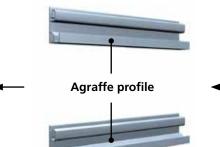
StoVentec C*

Cladding build-up (see page 14)



StoVentec S*

Cladding build-up (see page 16)





StoVentec Glass

Carrier profile for inserting elements is fixed to the rear side (see page 22)



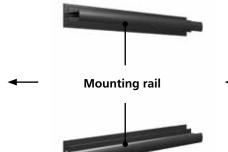
VeroStone Massive

Carrier profile for inserting elements is fixed to the rear side with undercut anchor (see page 18)



StoVentec ARTline Invisible

Carrier profile for inserting elements is fixed to the rear side (see page 24)





StoVentec ARTline Inlay

Framed module for inserting elements (see page 26)

Sub-construction

Stainless steel/aluminium sub-construction



StoVentec system build-up with stainless steel/aluminium sub-construction

Energy efficiency thanks to stainless steel

Whether it's a new building or a refurbishment: sustainability and energy efficiency are fundamental elements of any construction. When it comes to rainscreen cladding facades, we make a groundbreaking contribution in this regard. Our passive house (PH) sub-construction with special wall brackets made of stainless steel and thermal separating elements reduce thermal bridges to a minimum. In terms of its ease of installation, the PH sub-construction is virtually identical to the standard stainless-steel/aluminium sub-construction. However, it has been certified as a component which is "free from thermal bridges" by the Passive House Institute in Darmstadt. Even the standard sub-construction achieves the rating of "low thermal bridging" if a thermal separating element is used.

This is made possible by using stainless steel wall brackets, as stainless steel has a significantly lower thermal conductivity than aluminium. This ultimately means lower insulant thicknesses and shorter wall bracket projections while achieving the same U-value. A comparison of the wall brackets shows just how easy it is to install the PH version of the sub-construction. The image on the left shows the fixed point wall bracket which is certified by the Passive House Institute in Darmstadt as being free from thermal bridges; the image on the right shows the standard design. T-profile is inserted in each case.

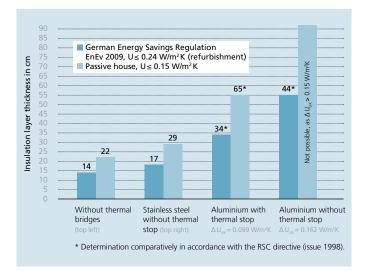






- Thermal blocking element PH
 Fixing
- 3 Fixed point wall bracket
- 4 Thermal sliding element PH
- 5 T-profile

The insulation layer thickness necessary for specific U-values taking into account the thermal bridges caused by metallic sub-constructions



Approximation procedure in accordance with DIN EN ISO 6946. Base: concrete 25 cm; U-value = $2.1 W/(m^2K)$; thermal insulation with thermal conductivity group 035; 2.5 wall brackets per m²

The flexibility afforded by the projection of the wall bracket opens up a whole host of possibilities

- Formation of independent shapes in the facade surface as a result of different projections
- Levelling unevenness in the substrate, particularly in the case of refurbishments
- Insulant thicknesses > 300 mm

Sto builds on stainless steel wall brackets

- Stainless steel has a significantly lower thermal conductivity than aluminium (11 to 13 times lower). This means that the specified U-values can be achieved with significantly lower insulant thicknesses.
- The improved material stiffness allows custom variants to be produced.

All components of the StoVentec system are available from a single source. We are your contact for the entire facade system. Our project managers and the Technical Support Centre are on hand to support you from the initial concept to the finished facade.

Our services at a glance:

- Planner and applicator consultation, particularly for custom solutions
- On-site visits and support
- Mediation of project-based structural analyses
- Determination of wind loads (simplified procedure)
- Estimation of quantities
- Layout drawings
- Preliminary dimensioning of rods and dowels

Technical Support hotline: +49 (0)9072 990-127 E-mail: unterkonstruktion@sto.com

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