



Office building Herderstrasse, Hilden, D / pagelhenn architekttinnenarchitekt

## **Architect's Facade Manual**

Products and systems

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Architect's Facade Manual Products and systems, details, solutions



Office building Herderstrasse, Hilden, D / pagelhenn architekttinnenarchitekt

Architect's Facade Manual  
Products and systems  
Details  
Solutions

**General note**

The details, illustrations and general technical information contained in this manual are only general in character. The technical data sheets, system specifications and descriptions are to be observed in each instance with regard to specific application of the presented products. Referring to the above-stated documentation on the individual products with due regard to the details of the individual project concerned will ensure optimum use of the products.

# Facades with substance

Extensive functionality meets design variety

**Sto AG is committed to maintaining and enhancing the value of old and new buildings. On the basis of extensive research we develop and market innovative product systems and services aimed at maintaining and improving the substance and functions of walls, ceilings and floors and providing lasting protection from damage. In addition to these functional aspects, our facade products also offer virtually boundless scope for individual design. Almost any types of construction, countless surface structures and virtually any shade of colour can be realised.**

## Quality for the future

Sto AG has acquired worldwide renown with products offering outstanding quality. Products that provide architects with a reliable basis for planning purposes and building owners with a dependable cost base, as well as the assurance of having chosen a durable and sustainable solution. Sto supplies complete one-stop systems. We also actively pursue joint research and development with architects on new systems and application methods – a crucial contribution to good architecture.

## Refurbishment know-how

Few areas of architecture are as demanding as the refurbishment and preservation of existing buildings. Sto's partnership-based approach really comes into its own here. In addition to supplying the appropriate products for virtually all tasks relating to facade renovation, Sto also offers architects and building owners competent advice on points of detail. Our all-round service extends from the initial sketch to on-site completion, taking in all aspects of facade design, from building physics to colouring.



Municipal department of works in Bochum, D (Gatermann + Schossig Architekten: StoVerotec Glass ventilated rainscreen cladding system)

Haus Broll, Ludwigsburg, D (Fuchs, Wacker. Architekten BDA: StoTherm Classic facade insulation system, facade paint)

## Introduction



Südwestmetall in Reutlingen, D  
(Allmann Sattler Wappner Architekten:  
StoTherm Mineral external wall insulation system)

### Sto's facade programme:

- Complete, systems-tested facade range for all requirements
- Broad design scope and guaranteed system reliability
- Perfectly coordinated products and systems
- Premium raw materials for superior building materials
- High quality standards in terms of environmental and health requirements
- Tried and tested materials offering great potential for individual design ideas
- Advice on all design aspects
- Individual colour concepts
- Development of materials for new surface textures and colour options
- Development and updating of architectural CD concepts
- Comprehensive visualisation facilities for exteriors and interiors.

### Sto's service team is there to answer your questions

Every planning process gives rise to questions to which our staff of over 3,800 in more than 50 countries throughout the world will be happy to provide the answers. Please contact your nearest Sto representative. A list of Sto's agencies is to be found at: **[www.sto.com/international](http://www.sto.com/international)**

When reading the Architects' Manual Facade, please note that we reserve the right to modify product properties. Colours may vary from those depicted in illustrations. Errors and omissions excepted. The illustrations shown are not binding.



International School in Bonn, D  
(Rhode Kellermann Wawrowsky:  
special variant of the StoTherm Classic  
facade insulation system)

Renovation of city hall passage in Berlin, D  
(Ing. Büro Dr. Gaudig: StoVerotec  
ventilated rainscreen cladding system)

## Products and systems

Introduction · Textures and finishes from smooth to very coarse · Facade insulation systems  
Facade plasters · Facade paints · Surface design · Lacquers and stains  
Refurbishment projects and protection of historical buildings · Balcony coatings



## Sto references

Examples of architecture employing Sto products and systems

## Details

Detail solutions with external wall insulation systems from Sto

## StoColor System

Colour variety, according to the StoColor System and other colour systems  
The 3-level principle behind the StoColor System: The human colour perception area;  
the colour wheel with 24 basic tones; the five colour rows

## Specifications

Support in project planning

## Background information - Facade

Energy-efficient thermal insulation · Advantages and benefits of the Sto facade insulation systems  
Thermal insulation · Moisture protection · Sound protection · Fire protection · Wind loads  
Indoor climate/healthy home environment · Building physical data (U values) · Glossary

## Further information

Specific information and brochures from Sto

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# Effective insulation – attractive design

## The right system for the facade

**Facade design is the art of giving buildings their own distinctive appearance and character through the use of form, colour and texture. In addition to these aspects, functionality and durability are also crucial to the long-term value of a facade. Sto products and systems unify and meet the technical and aesthetic demands placed on the building envelope.**

The appeal and physical quality of a building's exterior finish are a measure of architectural accomplishment and craftsmanship. Careful planning, professional workmanship and outstanding products are the crucial ingredients for high-quality facades. Sto sets the standards in this field: With a unique range of system-proven solutions, tailored to the market's needs and backed up by comprehensive support, we cover the entire spectrum of products and services as a one-stop partner for high-quality facades. All the components of Sto's facade systems are perfectly coordinated to ensure reliable installation free of any unwelcome surprises.

### **Sto facade systems provide long-lasting reliability**

More than 50 years of experience and practical use demonstrate the first-class, lasting protection afforded by facade insulation systems from Sto. StoTherm Classic is one of the best and most effective insulation systems on the market.

### **Crucial added value**

A facade insulation system offers obvious advantages: Effective protection of the external structure, lower incidental costs, a comfortable indoor climate and, not least of all, more living space in comparison to



buildings with a monolithic wall structure. Facade insulation with systems from Sto additionally open huge design possibilities as a result of the ever-growing variety of finishes on offer.

This section aims to provide you with an initial overview as a general reference basis for your design and planning work. You will find a cross-section of our large range of surface finishes, information on external wall insulation systems, rainscreen cladding systems, facade coatings and renovation systems, and the appropriate system to meet virtually every type of requirement. Our local system consultants will be glad to help you at all times with any further queries: [www.sto.com/international](http://www.sto.com/international)

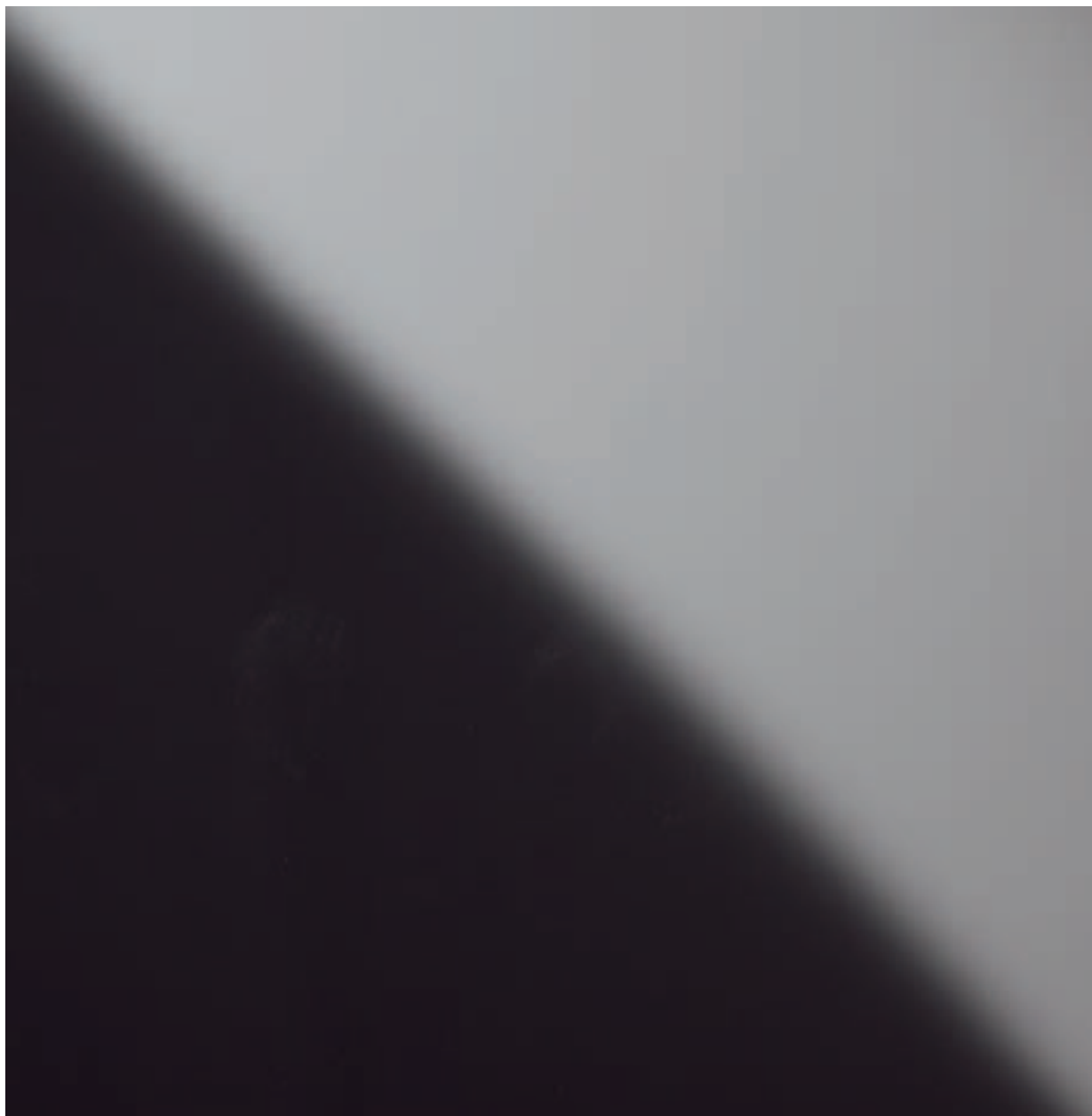


Steybe commercial building, Weinstadt-Endersbach, D (Fuchs, Wacker Architekten BDA, Stuttgart, D: StoTherm Classic L external wall insulation system)



## Opaque glass

### StoVerotec Glass

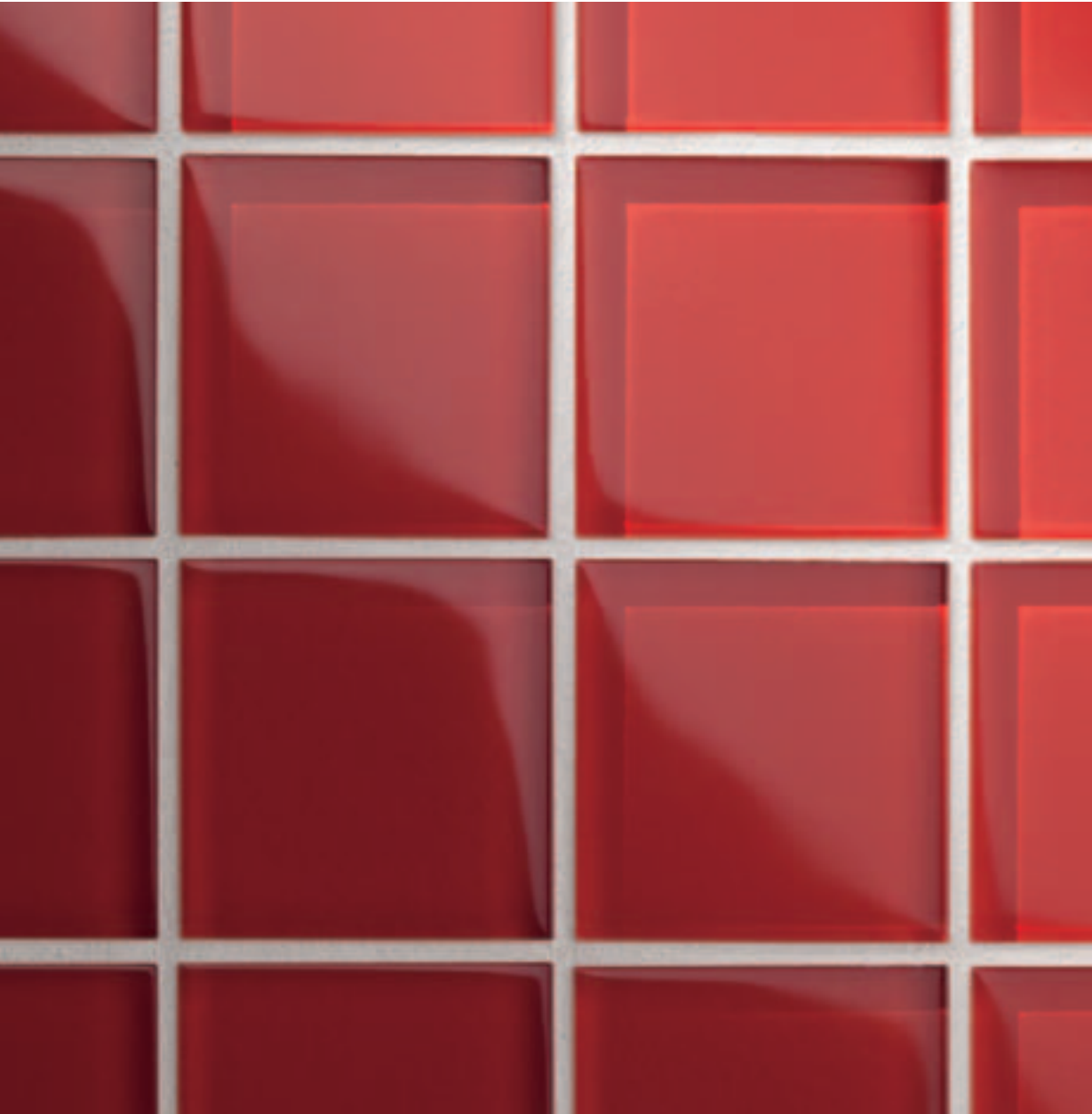


StoVerotec Glass panels are an interesting proposition if you are considering adding architectural highlights to the facade with high-quality reflective surfaces. The benefits are self-evident: The panels are robust, invisibly fixed, robust and the broad variety of colours means that they may be easily incorporated into any facade arrangement.

Applicable facade systems	Maximum size	Colour choice	Material properties/texture
<ul style="list-style-type: none"><li>Ventilated rainscreen cladding system: StoVerotec Facade</li></ul>	125 x 260 cm	Broad variety of colours, RAL colours, etc.	Glass Smooth, gloss

# Glass mosaic tiles

## StoVentec Glass Mosaic

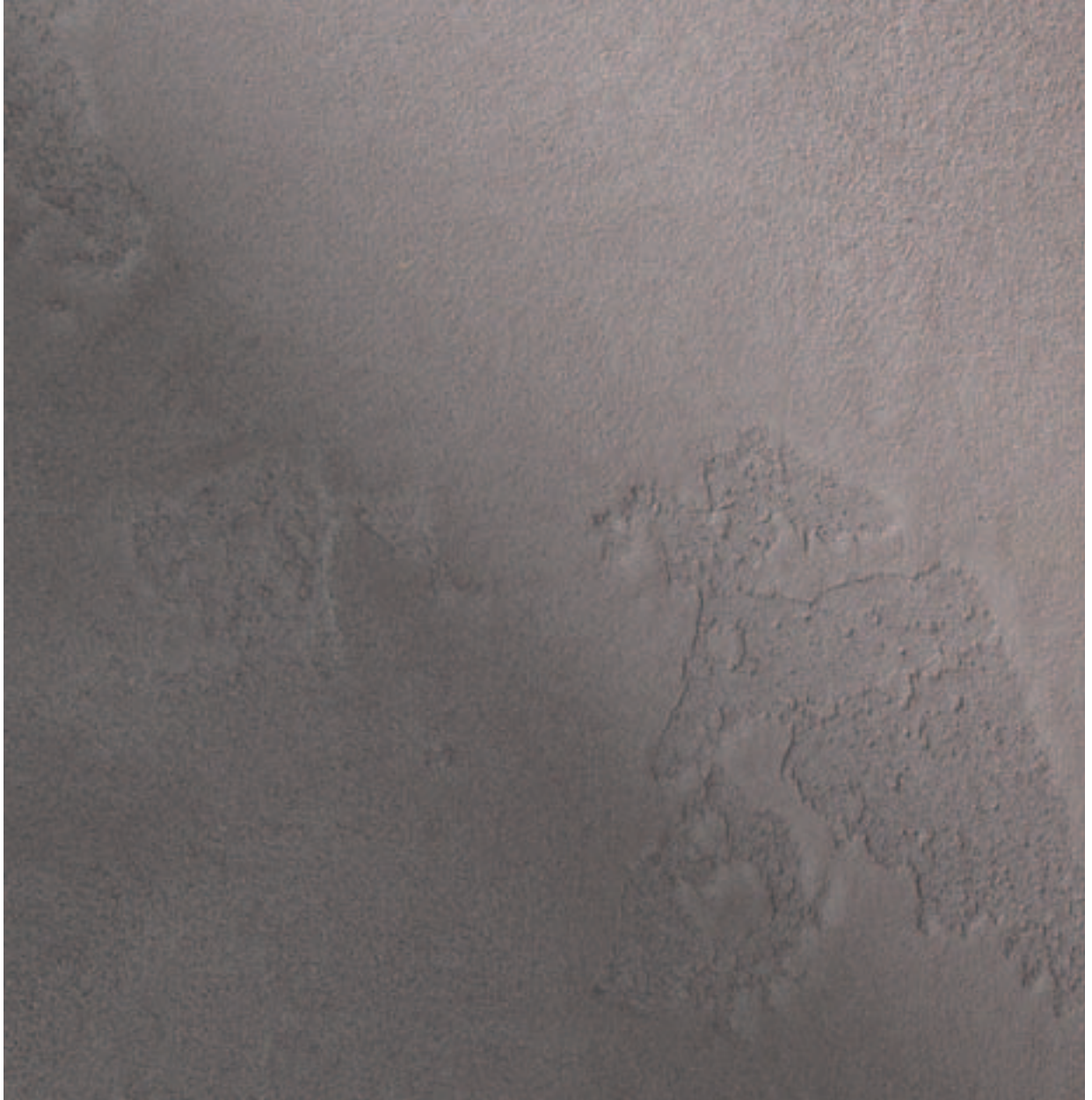


Glass mosaic tiles lend facades a distinctive character while at the same time meeting the given functional requirements. The small glass tiles combine captivating light reflections and give the facade covering depth. A broad range of brilliant colours and different sizes and thicknesses provide the basis for multi-faceted glass facades.

Applicable facade systems	Maximum size	Colour choice	Material properties/texture
<ul style="list-style-type: none"><li>Ventilated rainscreen cladding system: StoVentec Facade</li></ul>	50 x 50 mm, 50 x 25 mm or 25 x 25 mm (grid size) Thickness: 8 or 4 mm	40 colours	Glass mosaic Smooth, gloss

## Effect finish

### Stolit Milano with StoColor Metallic, glaze finish



The ultra-fine-grained finishing render Stolit Milano can be trowelled onto level surfaces in several layers to produce a very flat relief-type texture which lends the render a three-dimensional appearance. This technique enables a broad spectrum of finishes, from virtually smooth to coarse. The special appeal of the finish shown derives from its fine, elegant texture in conjunction with the glaze-like StoColor Metallic coating.

Applicable facade systems	Maximum size	Colour choice	Material properties/texture
<ul style="list-style-type: none"><li>External wall insulation systems: StoTherm Classic, StoTherm Vario</li></ul>	No restrictions to area of coverage	Tintability in accordance with the StoColor Metallic collection	Cement-free Ultra-fine render Individual texturing possible

# Free-style texture render

## Stolit MP, float-finished

(Alternatives: StoSilco MP, StoLotusan MP, with additional coating: StoMiral MP, StoNivellit (only float-finished) and StoMiral Nivell (only float-finished))



Stolit is a classic with a success story spanning over five decades, during which time it has continually served as a benchmark for technical developments in its field. The cement-free finishing render excels as a free-style texture render by virtue of its finely float-finished surface. Stolit MP offers a host of other texturing options for individual surface finishes.

Applicable facade systems	Maximum size	Colour choice	Material properties/texture
<ul style="list-style-type: none"><li>External wall insulation systems: StoTherm Classic, StoTherm Vario, StoTherm Wood</li><li>Ventilated rainscreen cladding system: StoVentec Facade</li></ul>	Depends on type of building and Stolit variation	Tintability in accordance with the StoColor System	Cement-free, fine-grained free-style texture render (here in floated finish), also available as stippled texture render and rilled render

## Facade embellishment – natural stone

Sto-Fossil SKL, honed finish



Architectural design employing natural stone panels is always unique and individual. Natural stone panels offer endless variety in terms of colours, textures and surface finishes. As its name suggests, natural stone is also a natural building material which scores top marks for environmental compatibility. With its elegant surface finish the honed natural stone Sto-Fossil SKL is always an eye-catcher. The technical specifications and information on the products which are to be found on the technical data sheets and approvals must be observed.

Applicable facade systems	Maximum size	Colour choice	Material properties/texture
<ul style="list-style-type: none"> <li>Ventilated rainscreen cladding systems: StoVerotec Stone Massive, StoVentec Stone</li> <li>External wall insulation systems: StoTherm Classic, StoTherm Mineral, StoTherm Vario</li> </ul>	<ul style="list-style-type: none"> <li>StoVerotec Stone Massive: Individual sizes on request</li> <li>StoVentec Stone: 90 x 60 cm</li> <li>As natural stone tiling on EWIS: 61 x 30.5 cm and 30.5 x 30.5 cm</li> </ul>	Brown – grey – blue (individual)	Limestone (shell limestone), honed

# Facade render

## Stolit Milano, fine spot-smoothing technique



The “fine trowelled and spot-smoothed finish” provides for discreetly elegant, yet interesting facade surfaces with this versatile fine textured render. The trowel application technique enables surface finishes to be produced which create surface textures ranging from smooth but uneven, through to rustic. This broad design spectrum and the variety of available colours enable the most diverse surface effects – according to the employed technique and material combination.

Applicable facade systems	Maximum size	Colour choice	Material properties/texture
<ul style="list-style-type: none"><li>External wall insulation systems: StoTherm Classic, StoTherm Mineral</li><li>Ventilated rainscreen cladding system: StoVentec Facade</li></ul>	No restrictions (may be dependent on type of building and technique used)	Tintability in accordance with the StoColor System	Cement-free Fine-grained free-style texture render, also available in stippled and rilled texture

# Stippled facade render

## StoLotusan K 2.0

(Alternatives: StoSilco K, Stolit K, StoSil K, with additional coating: StoMiral K)



Unusual technical solutions are often called for in the building sector – especially with regard to the facade finish. The StoLotusan finishing render enables the most diverse surface finishes, according to the grain size and texture used. It also offers an added technical benefit in the form of the Lotus-Effect®, which actively supports self-cleaning of the facade when exposed to rain. Dirt rolls off with the rain and the facade retains its attractive appearance. Outstanding building physics data underscore this effect.

Applicable facade systems	Maximum size	Colour choice	Material properties/texture
<ul style="list-style-type: none"> <li>External wall insulation systems: StoTherm Classic, StoTherm Vario and StoTherm Wood</li> <li>Ventilated rainscreen cladding system: StoVentec Facade</li> </ul>	No restrictions (may be dependent on type of building and technique used)	Limited tintability in accordance with the StoColor System	Render with Lotus-Effect® Stippled texture, also available as free-style texture render

# Facade render

## Stolit Milano, concrete character



This example shows just what an all-round design gem the cement-free finishing render Stolit Milano is: With the right material combination and application technique, surfaces can be created which are reminiscent of fair-faced concrete. With its numerous texturing options, application techniques and broad choice of colours, Stolit Milano offers a range of ways to lend facades a highly individual touch.

Applicable facade systems	Maximum size	Colour choice	Material properties/texture
<ul style="list-style-type: none"><li>External wall insulation systems: StoTherm Classic, StoTherm Vario</li><li>Ventilated rainscreen cladding system: StoVentec Facade</li></ul>	Depending on the type of building and the technique used, it may be advisable to divide up the surface area	Tintability in accordance with the StoColor System	Cement-free Very fine-grained free-style texture render

## Effect finish

### StoColor Metallic on stippled render



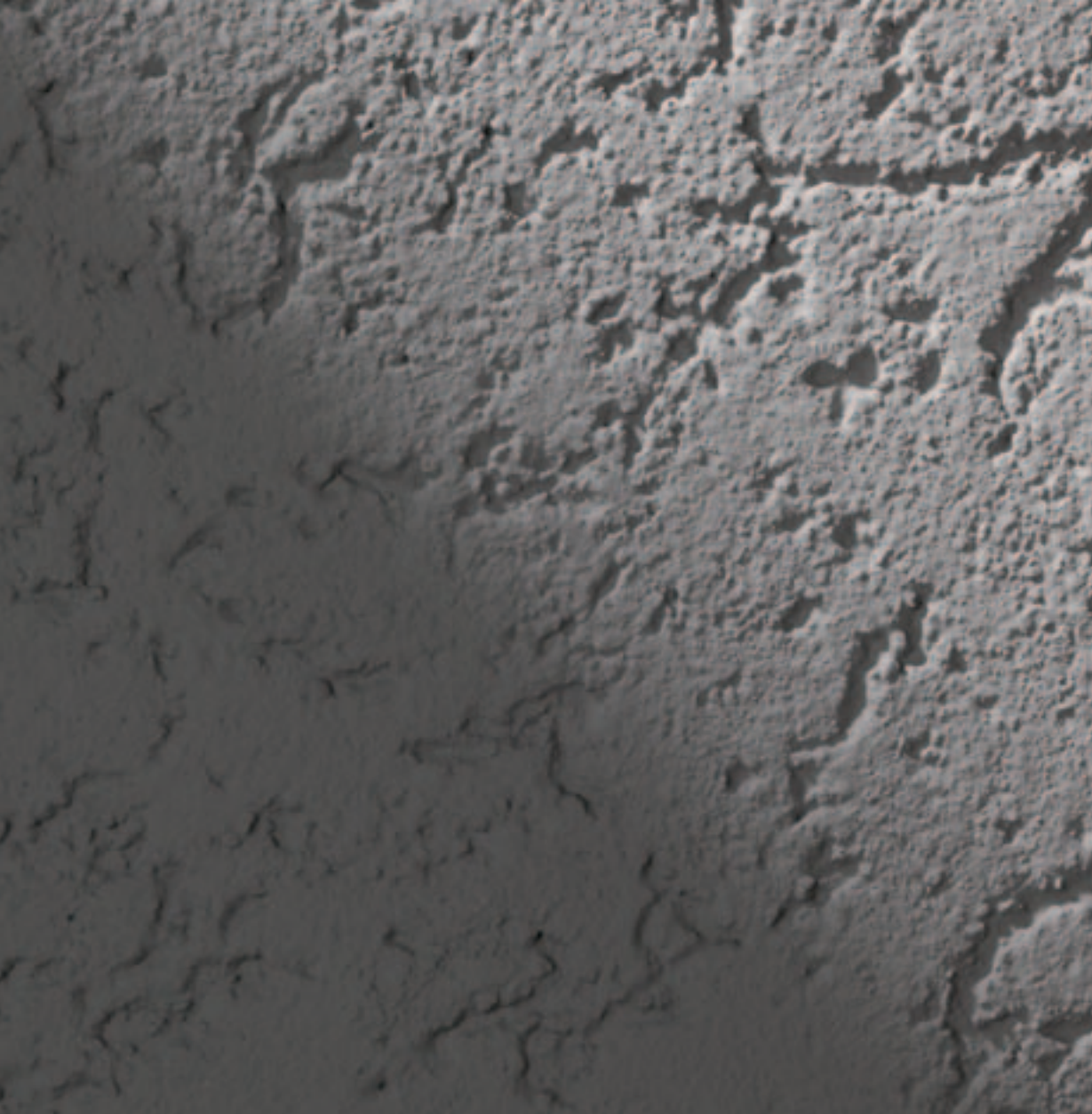
Very special visual effects are often attained by simple means. The StoColor Metallic facade coating, for example, creates a metallic surface effect and can be applied to any stippled texture render from Sto. The effect coating can be used both indoors and outdoors, is water-repellent and can be tinted in accordance with the StoColor Metallic collection, providing for even greater individuality in facade design.

Applicable facade systems	Maximum size	Colour choice	Material properties/texture
<ul style="list-style-type: none"> <li>External wall insulation systems: StoTherm Classic, StoTherm Vario</li> <li>Ventilated rainscreen cladding system: StoVentec Facade</li> </ul>	No restrictions (may be dependent on type of building and technique used)	Tintability in accordance with the StoColor Metallic collection	Synthetic Metallic-iridescent

# Rilled facade render

## StoMiral R 2.0

(Alternatives: StoSilco R, Stolit R, StoSil R)



It is the interplay of light and shade that lends some surfaces their own distinctive appeal, as illustrated here by the StoMiral mineral finishing render with a rilled texture. The contrast between light and shaded areas provides the attractive surface with an ever-changing appearance. Stippled and free-style textures open up numerous other design options.

Applicable facade systems	Maximum size	Colour choice	Material properties/texture
<ul style="list-style-type: none"><li>External wall insulation systems: StoTherm Mineral, StoTherm Vario</li><li>Ventilated rainscreen cladding systems: StoVentec Facade for wood construction, StoVentec Facade</li></ul>	No restrictions on area of coverage	Limited tintability in accordance with the StoColor System	Mineral Rilled render, also available as stippled texture render and free-style texture render

## Facade embellishment – natural stone

Sto-Fossil SKL, sandblasted and brushed



The diversity of natural stones is revealed in the vast design scope they offer in terms of colours, textures and surface finishes. Architects are able to draw on a rich spectrum ranging from smooth-ground through sandblasted to coarse bush-hammered finishes. The rougher surface of the sandblasted and brushed natural stone shown here brings out its natural quality.

Applicable facade systems	Maximum size	Colour choice	Material properties/texture
<ul style="list-style-type: none"> <li>Ventilated rainscreen cladding systems: StoVerotec Stone Massive, StoVentec Stone</li> <li>External wall insulation systems: StoTherm Classic, StoTherm Mineral, StoTherm Vario</li> </ul>	<ul style="list-style-type: none"> <li>StoVerotec Stone Massive: Individual sizes on request</li> <li>StoVentec Stone: 90 x 60 cm</li> <li>As natural stone tiling on EWIS: 61 x 30.5 cm and 30.5 x 30.5 cm</li> </ul>	Brown – grey – blue (individual)	Limestone (shell limestone), sandblasted and brushed

# Free-style texture facade render

## Stolit MP, special technique

(Alternatives: StoSilco MP, StoLotusan MP, StoSil MP, with additional coating: StoMiral MP)



Creating unusual surfaces that are far removed from the everyday, sometimes calls for unconventional means in facade design. As illustrated here with the free-style texture render Stolit MP. The texture's special effect is further reinforced by the play of light and shade. Stolit also offers excellent colour stability and a broad range of through-colours.

Applicable facade systems	Maximum size	Colour choice	Material properties/texture
<ul style="list-style-type: none"><li>External wall insulation systems: StoTherm Classic, StoTherm Vario, StoTherm Wood</li><li>Ventilated rainscreen cladding System: StoVentec Facade</li></ul>	Depending on the type of building and the technique used, it may be advisable to divide up the surface area	Tintability in accordance with the StoColor System	Cement-free Fine-grained free-style texture render – here in broom texture, also available in stippled and rilled texture

## Rilled facade render

### StoSilco R 3.0, vertically textured

(Alternatives: Stolit R, StoSil R, with additional coating: StoMiral R)



Render finishes open up broad design scope by virtue of their adaptability and versatility. The two examples opposite show surfaces featuring a rilled render texture. The depth of the grooves in the rendered surface varies according to grain size. Round, vertical or horizontal patterns can be produced. In this example the render has been textured vertically.

Applicable facade systems	Maximum size	Colour choice	Material properties/texture
<ul style="list-style-type: none"> <li>External wall insulation systems: StoTherm Classic, StoTherm Vario, StoTherm Wood</li> <li>Ventilated rainscreen cladding system: StoVentec Facade</li> </ul>	No restrictions on area of coverage	Limited tintability in accordance with the StoColor System	Silicone resin Rilled render texture (vertical orientation), also available in stippled and free-style render texture

# Rilled facade render

## StoSilco R 3.0, horizontally textured

(Alternatives: Stolit R, StoSil R, with additional coating: StoMiral R)



3D in a different perspective: This sample surface shows the silicone resin render StoSilco with a horizontal texture. StoSilco is also available as stippled and free-style texture render and is highly resistant to algae and fungi.

Applicable facade systems	Maximum size	Colour choice	Material properties/texture
<ul style="list-style-type: none"><li>External wall insulation systems: StoTherm Classic, StoTherm Vario, StoTherm Wood</li><li>Ventilated rainscreen cladding system: StoVentec Facade</li></ul>	No restrictions on area of coverage	Limited tintability in accordance with the StoColor System	Silicone resin Rilled render texture (horizontal orientation), also available in stippled and free-style render texture

## Facade render

### Stolit Effect, special technique

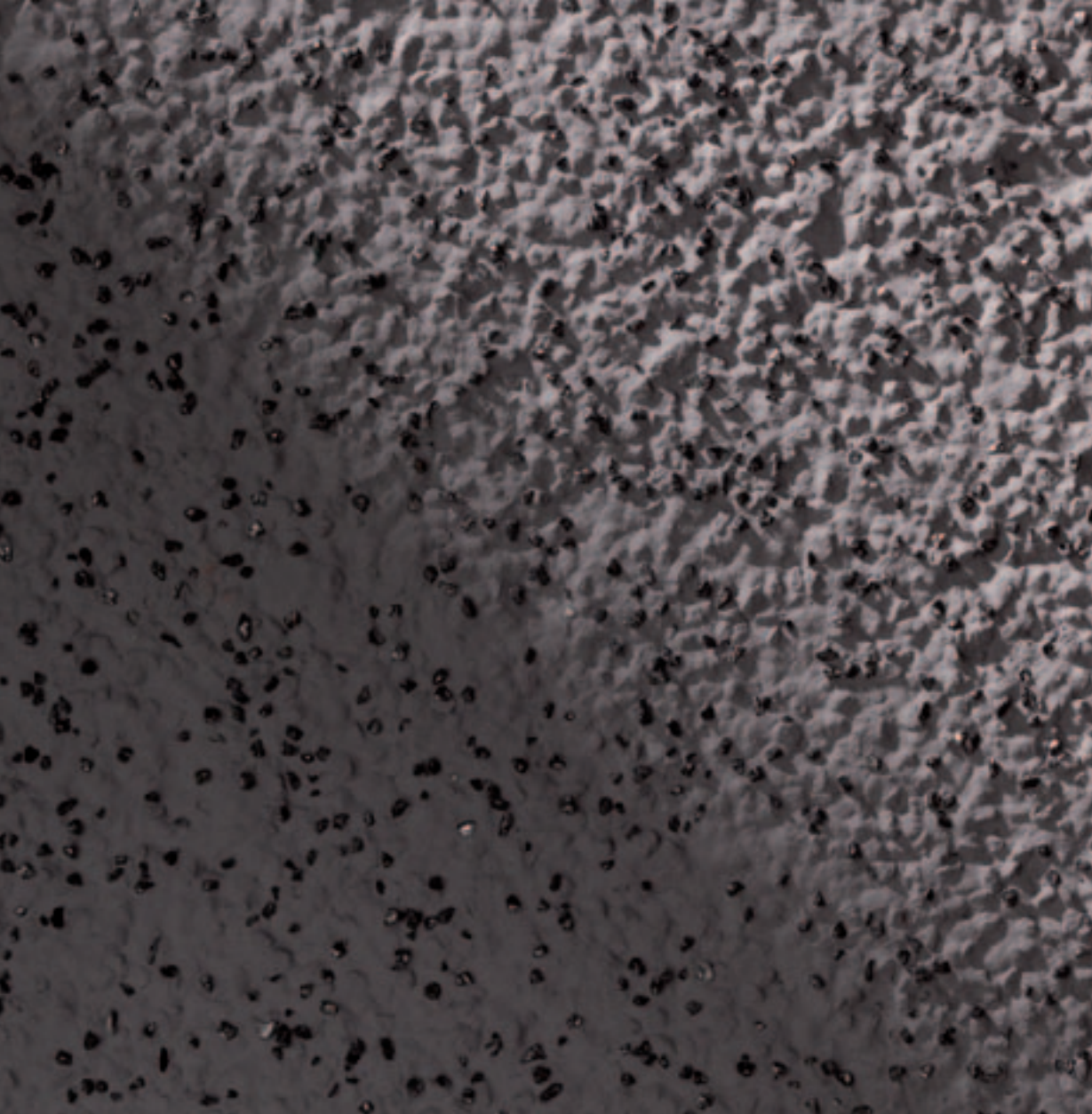


Individual design options for facades are more sought-after than ever among architects and building owners. Uniquely vivid surface finishes can be created with the cement-free coarse-grained free-style texture render Stolit Effect.

Applicable facade systems	Maximum size	Colour choice	Material properties/texture
<ul style="list-style-type: none"><li>• External wall insulation systems: StoTherm Classic, StoTherm Vario</li><li>• Ventilated rainscreen cladding system: StoVentec Facade</li></ul>	Depending on the type of building and the technique used, it may be advisable to divide up the surface area	Tintability in accordance with the StoColor System	Cement-free Coarse-grained free-style texture render, shown here in broom finish

# Effect coating

## Stolit K 3.0 with silicon carbide F14



This creative finishing using cement-free render is a very special eye-catcher that lends a sparkle to the facade. Silicon carbide chips are blown into the freshly textured render while it is still wet to produce a unique appearance featuring fascinating light reflections. The facade appears in different shades according to the time of day and the angle of the incident light.

Applicable facade systems	Maximum size	Colour choice	Material properties/texture
<ul style="list-style-type: none"><li>External wall insulation systems: StoTherm Classic, StoTherm Vario</li><li>Ventilated rainscreen cladding system: StoVentec Facade</li></ul>	Depending on the type of building and the technique used, it may be advisable to divide up the surface area	Limited tintability in accordance with the StoColor System, colour class C1-C2	Cement-free Stippled render texture with coarse blown-in SiC F14

## Effect coating

### Stolit Effect with Sto-Terrazzo Effect natur



This cement-free facade render is provided with an effect sand to produce a surface finish with a natural character. The fine natural gravel creates a variety of contrasting surface effects and makes Stolit Effect an interesting and striking design element on any facade.

Applicable facade systems	Maximum size	Colour choice	Material properties/texture
<ul style="list-style-type: none"> <li>External wall insulation systems: StoTherm Classic, StoTherm Vario</li> <li>Ventilated rainscreen cladding system: StoVentec Facade</li> </ul>	Depending on the type of building and the technique used, it may be advisable to divide up the surface area	Tintability in accordance with the StoColor System	Cement-free Coarse-grained free-style texture render with blown-in effect sand

# Facade embellishment – natural stone

## Sto-Fossil SKL, bush-hammered



Natural stone combines timeless elegance with sustainability. Natural stone possesses an inherent vitality which it has acquired over millions of years. Its actual production does not require any energy. Extraction and machining are the only energy-consuming activities. The bush-hammered limestone Sto-Fossil SKL lends the facade a timelessly natural character.

Applicable facade systems	Maximum size	Colour choice	Material properties/texture
<ul style="list-style-type: none"><li>Ventilated rainscreen cladding system: StoVerotec Stone Massive</li></ul>	<ul style="list-style-type: none"><li>StoVerotec Stone Massive: Individual sizes on request</li></ul>	Brown – grey – blue (individual)	Limestone (shell limestone), bush-hammered

## Effect finish

### Stolit Effect with Sto Glass Pearls



A uniquely attractive appearance is obtained by embedding transparent Effect Glass Pearls into Stolit Effect facade render. These pearls reflect and refract the light in a myriad of different ways. This provides facades with a remarkable surface finish which changes consistently according to the light conditions and the incident light angle.

Applicable facade systems	Maximum size	Colour choice	Material properties/texture
<ul style="list-style-type: none"> <li>External wall insulation systems: StoTherm Classic, StoTherm Vario</li> <li>Ventilated rainscreen cladding system: StoVentec Facade</li> </ul>	Depending on the type of building and the technique used, it may be advisable to divide up the surface area	Tintability in accordance with the StoColor System	Cement-free Coarse-grained free-style texture render with effect glass pearls

# Effect coating

## Stolit Effect, exposed aggregate concrete character



In this finish the cement-free facade render Stolit Effect is reminiscent of a concrete surface exposed to the weather, with coarse aggregates gradually coming to light. The overall fine texture interspersed with coarse details provides for a striking facade surface with patina character.

Applicable facade systems	Maximum size	Colour choice	Material properties/texture
<ul style="list-style-type: none"><li>External wall insulation systems: StoTherm Classic, StoTherm Vario</li><li>Ventilated rainscreen cladding system: StoVentec Facade</li></ul>	A restriction of the covered surface area to below 40 m² is advisable, depending on the type of building and the technique used	Tintability in accordance with the StoColor System	Cement-free Individual texturing possible, here in felted finish

## Facade embellishment – natural stone

Sto-Fossil SKL, sand-blasted



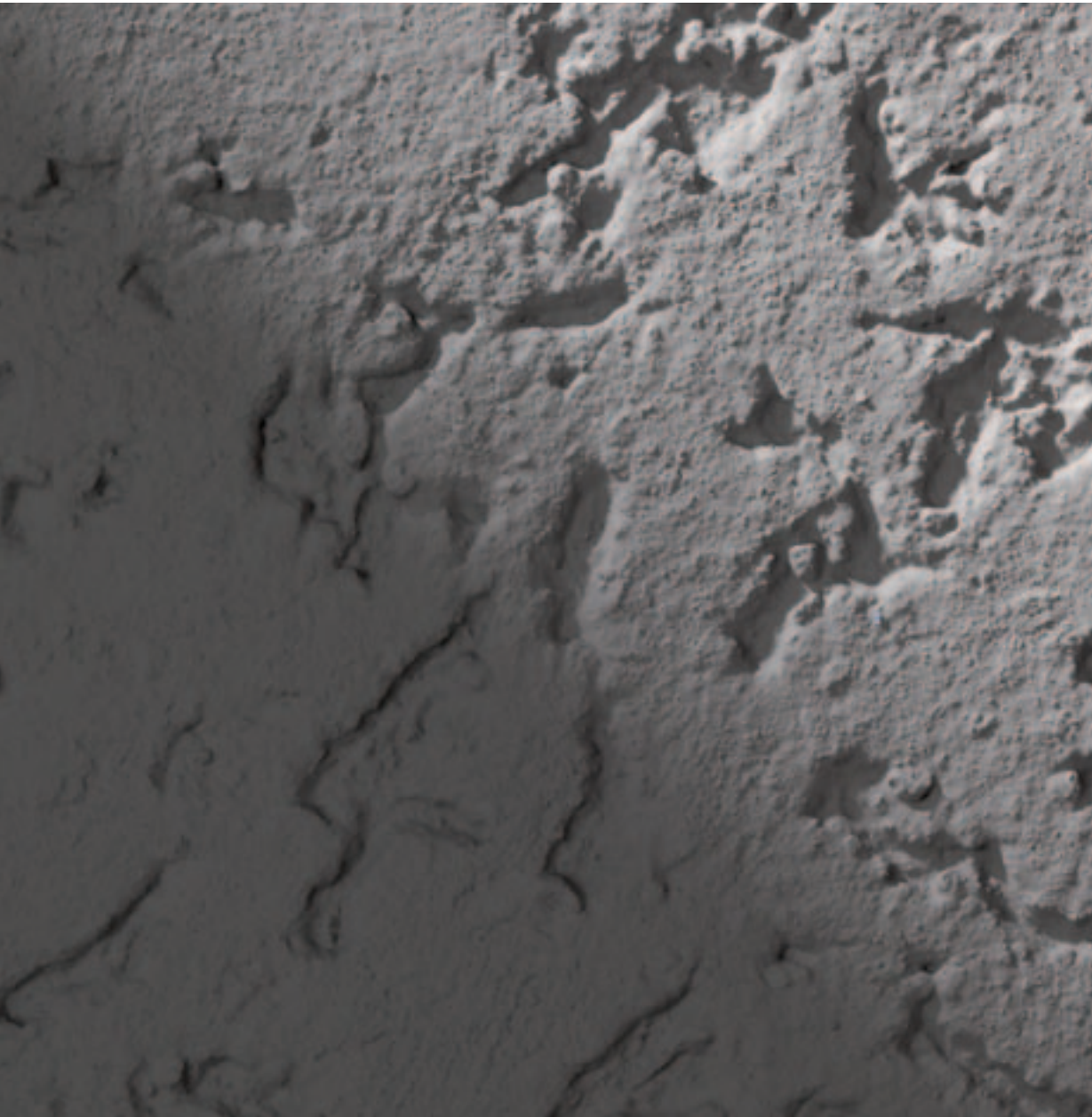
Shell deposits in the natural stone Sto-Fossil SKL; its extensive colour range from light grey through brown to blue, and the host of different surface finishes make every stone panel absolutely unique. The surface of the stone shown here has been sand-blasted to create a coarse, natural look.

Applicable facade systems	Maximum size	Colour choice	Material properties/texture
<ul style="list-style-type: none"> <li>External wall insulation systems: StoTherm Classic, StoTherm Mineral, StoTherm Vario</li> <li>Ventilated rainscreen cladding systems: StoVerotec Stone Massive, StoVentec Stone</li> </ul>	<ul style="list-style-type: none"> <li>StoVerotec Stone Massive: Individual sizes on request</li> <li>StoVentec Stone: 90 x 60 cm</li> <li>As natural stone tiling on EWIS: 61 x 30.5 cm and 30.5 x 30.5 cm</li> </ul>	Brown – grey – blue (individual)	Limestone (shell limestone), sand-blasted

# Rilled facade render

## StoMiral R 6.0

(Alternative: Stolit R)



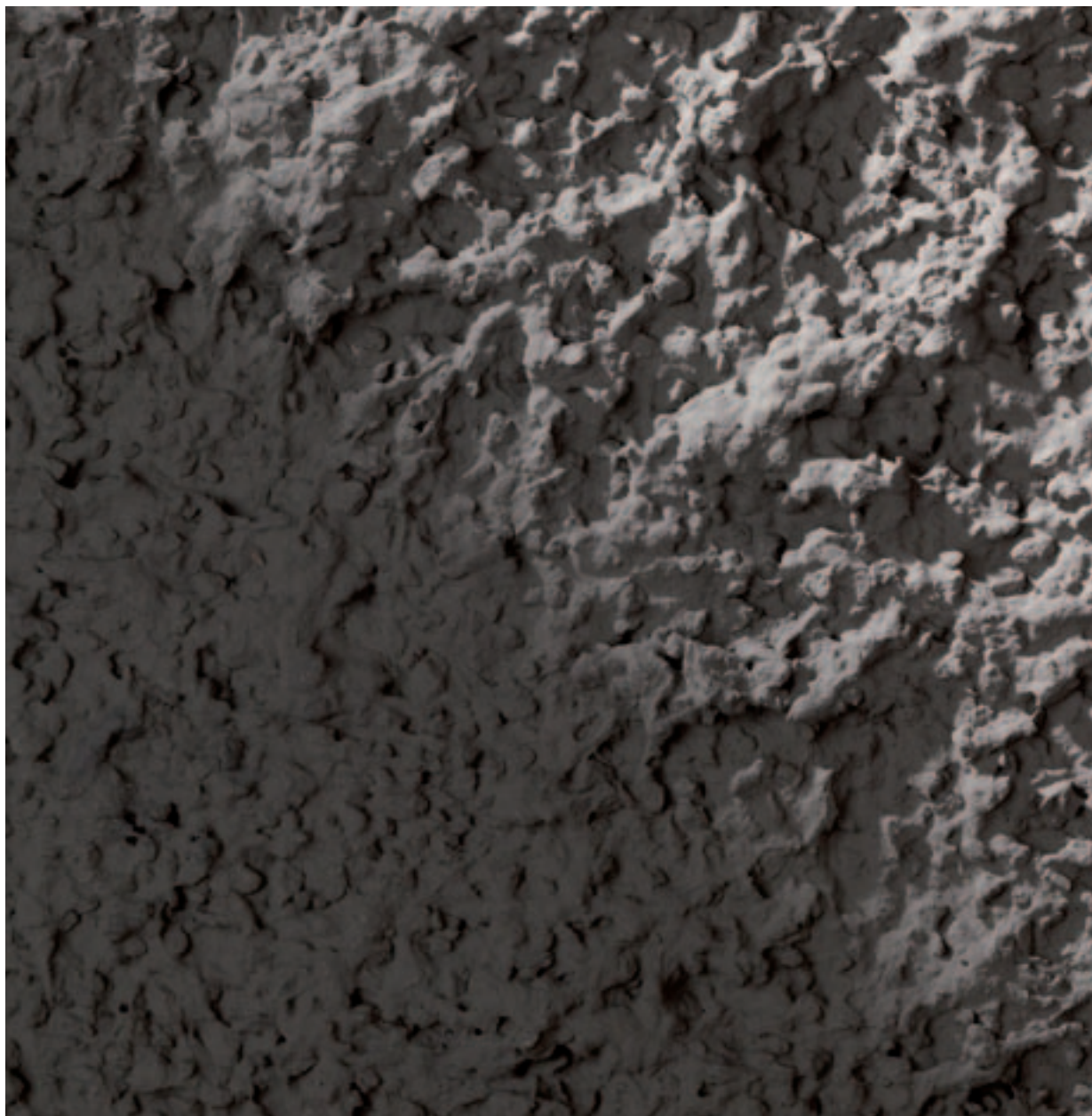
The mineral finishing render StoMiral provides an attractive, quality surface in a rilled texture. The interesting, very coarse surface changes in appearance according to the prevailing light and shade. The employed grain size results in highly pronounced rills which lend the surface a bold character.

Applicable facade systems	Maximum size	Colour choice	Material properties/texture
<ul style="list-style-type: none"><li>External wall insulation systems: StoTherm Mineral, StoTherm Vario</li><li>Ventilated rainscreen cladding systems: StoVentec Facade for wood construction, StoVentec Facade</li></ul>	No restrictions on area of coverage	Limited tintability in accordance with the StoColor System	Mineral Rilled render, also available as stippled texture render and free-style texture render

# Stippled facade render

## Stolit K 6.0, rolled texture

(Alternative: StoMiral K with additional coating)



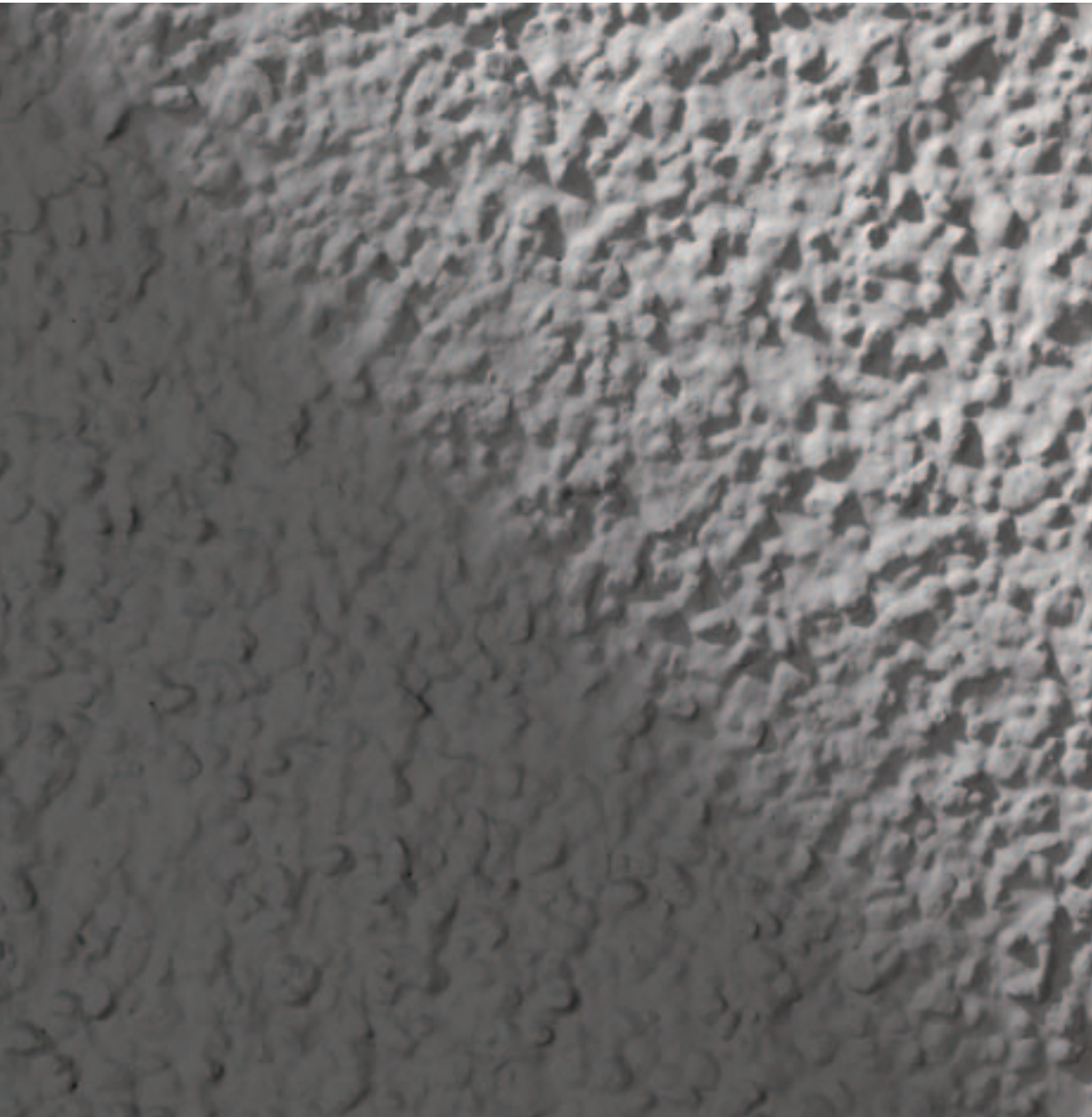
This special application technique produces a particularly attractive coarse surface with the versatile Stolit finishing render. The robust-looking, very coarsely structured surface provides a texture which is further enhanced by the play of light and shade.

Applicable facade systems	Maximum size	Colour choice	Material properties/texture
<ul style="list-style-type: none"> <li>External wall insulation systems: StoTherm Classic, StoTherm Vario, StoTherm Wood</li> <li>Ventilated rainscreen cladding system: StoVentec Facade</li> </ul>	Depending on the type of building and the technique used, it may be advisable to divide up the surface area	Tintability in accordance with the StoColor System	Cement-free Rolled-on render in dashed look

# Stippled facade render

## Stolit K 6.0

(Alternative: StoMiral K with additional coating)

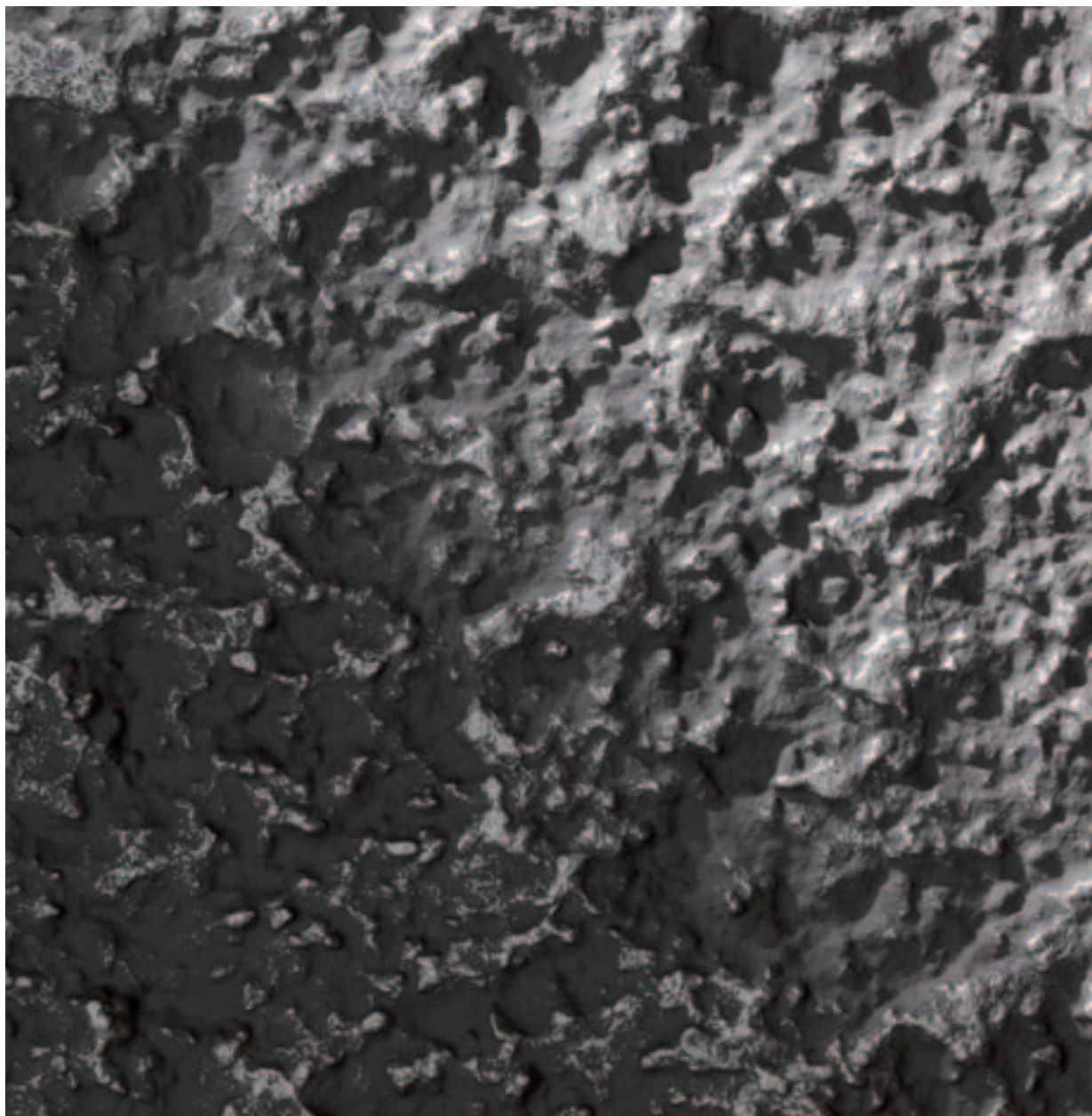


The special feature of this stippled render surface is the pronounced manner in which the grain shows through, providing a special texture. The Stolit cement-free finishing render which was used here offers broad design scope by way of stippled, rilled or free-style textures and different grain sizes.

Applicable facade systems	Maximum size	Colour choice	Material properties/texture
<ul style="list-style-type: none"><li>External wall insulation systems: StoTherm Classic, StoTherm Vario and StoTherm Wood</li><li>Ventilated rainscreen cladding system: StoVentec Facade</li></ul>	No restrictions on area of coverage	Tintability in accordance with the StoColor System	Cement-free Stippled texture render, also available as rilled and free-style texture render

## Facade render

Stolit K 6.0, rolled texture with metallic effect



While every type of surface finish has its own appeal, combining different products usually opens up quite different possibilities. The coarse-grained texture of the Stolit K 6.0 render is further enhanced by the iridescent metallic effect pigment of the StoColor Metallic cement-free facade paint. Partial application to the tips of the textured surface provide the finishing render with additional light reflections which lend the surface a special depth.

Applicable facade systems	Maximum size	Colour choice	Material properties/texture
<ul style="list-style-type: none"> <li>External wall insulation systems: StoTherm Classic, StoTherm Vario</li> <li>Ventilated rainscreen cladding system: StoVentec Facade</li> </ul>	Depending on the type of building and the technique used, it may be advisable to divide up the surface area	Tintability in accordance with the StoColor System and StoColor Metallic collection	Cement-free Rolled-on render in dashed look with metallic effect



# Facade insulation systems from Sto

## Reliable and appealing

### Suitability of facade insulation systems

		System properties					Type of building	
	System	Mechanical resistance	Crack resistance	Water vapour diffusion	Sound protection	Costs (StoTherm Classic = 100)	Buildings above high-rise level	Combustibility
External wall insulation system	StoTherm Classic	●●	●●	●	●	100	● <sup>1)</sup>	Limited combustibility
	StoTherm Vario	●	●	●	●	100	● <sup>1)</sup>	Limited combustibility
	StoTherm Mineral	●	●	●●	●	140	●●	Non-combustible
	StoTherm Wood	●	●	●●	●	150	● <sup>1)</sup>	Normal combustibility
Ventilated rainscreen cladding system	StoVentec Facade	●●	●●	●●	●●	220	● <sup>1)</sup>	Limited combustibility *)
	StoVerotec Facade	●●	●●	●●	●●	> 300	● <sup>1)</sup>	Limited combustibility *)

### System fixing selector by substrate












		Substrate condition				
	Fixing	Substrate capable of carrying bonded load	Substrate not capable of carrying bonded load	Substrate friable and unreliable	Surface tolerance	Curved substrate
External wall insulation systems	Adhesive fix	●●			< 1 cm	●●
	Adhesive fix and dowelling	●●	●●		< 2 cm	●●
	Mechanical fix	●●	●●	●●	< 3 cm	●
Ventilated rainscreen cladding systems	Sub-construction	●●	●●	●●	unlimited	●●

●● excellent ● good ● limited suitability

<sup>1)</sup> or non-combustible <sup>1)</sup> in acc. with permit from competent authority

## Overview of facade insulation systems

## Design of facade insulation systems

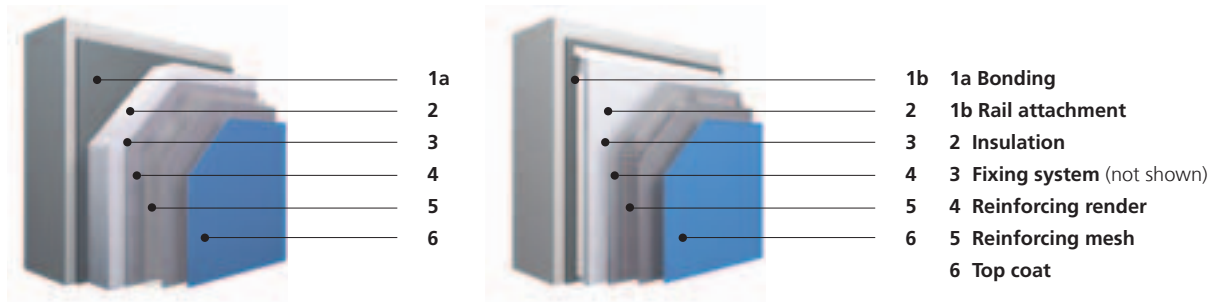
						
	System	Dark finishing layer <sup>1)</sup>	Architectural elements StoDeco Profiles	Brick slips	Rustic facade	Natural stone
External wall insulation system	StoTherm Classic	●●	●●	●●	●●	●
	StoTherm Vario		●●	●	●●	●●
	StoTherm Mineral		●●	●	●●	●●
	StoTherm Wood		●	●	●	
Ventilated rain-screen cladding system	StoVentec Facade	●●	●	●●	●●	●●
	StoVerotec Facade	●●	●	●		●●
Render systems			●	●	●	●●
						
System	Ceramic coverings	Glass	Glass mosaic	Curved facades	Prefabricated elements	Seamless rendered surface
StoTherm Classic	●		● <sup>2)</sup>	●		●
StoTherm Vario	●●		●● <sup>2)</sup>	●		●
StoTherm Mineral	●●		●● <sup>2)</sup>	●●		●
StoTherm Wood						●
StoVentec Facade	●●	●	●●	●●		●
StoVerotec Facade	●●	●●	● <sup>2)</sup>	●	●	
Render systems	●●		●	●●		●

●● excellent ● good ● limited suitability

<sup>1)</sup> Render and paint lightness value < 15 % (1 % = black, 100 % = white)<sup>2)</sup> Requires approval

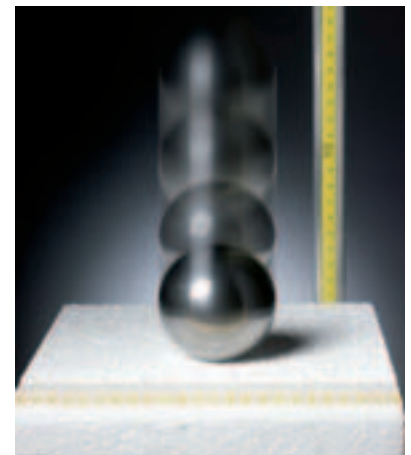
# StoTherm Classic - external wall insulation system

Cement-free, with maximum crack and shock-proof resistance



## System components

Bonding resp. rail attachment	<p>a) <b>Sto-Turbofix</b> – PU foam-based bonding method Alternative: <b>Sto Dispersion Adhesive</b> – cement-free adhesive compound Alternative: Sto ADH-B – mineral adhesive mortar</p> <p>b) <b>Rail attachment</b></p>
Insulation	<b>Sto EPS Board</b> – Insulation board made of expanded polystyrene foam
Fixing	Not shown. In accordance with the requirements of the competent authority (bonding, bonding and dowelling, or rail attachment).
Reinforcing	<p>Reinforcing render: <b>StoLevell Classic</b> – cement-free reinforcing render Alternative: <b>StoArmat Classic</b> – cement-free reinforcing render</p> <p><b>Reinforcing mesh:</b> Sto Glass Fibre Mesh, alternative: Sto Shield Mesh AES</p>
Possible top coats	<ul style="list-style-type: none"> <li>Organic and silicone resin finishing render, finishing renders with Lotus Effect®, tintability or limited tintability in accordance with the StoColor System</li> <li>Facade paints on silicone resin base or with Lotus-Effect®, limited tintability in accordance with the StoColor System</li> <li>Lightness values of &lt; 15 % possible on request (render systems)</li> <li>Sto Natural Stone Tiles, ceramic tiles/ slabs in the plinth area (up to 4m)</li> <li>Architectural elements: StoDeco Profile, rustications and slabs</li> <li>Sto Brick Slips, glazed brick slips</li> </ul>



The hard body impact test proves that StoTherm Classic has a load-bearing capacity of up to 15 joule. When combined with a highly shock-resistant construction it is resistant to an impact of more than 60 joule.

## Planning advice

Fire protection barrier	Mineral fibre board horizontal or vertical according to national regulations
Fixing	Quantity and spacing depend on load-bearing capacity of the substrate and on the wind load conditions

**StoTherm Classic has been setting international standards for over four decades now. The external wall insulation system was designed for maximum reliability and durability from the very outset, since when it has undergone continual enhancement. This technical superiority and almost 100 million square metres installed to date inspire confidence in the system.**

Maximum shock-proof and impact resistance – ten times higher than that of mineral systems – and broad design variety are the definitive strengths of StoThermClassic. The top coat may take the form of water vapour permeable facade renders and paints or decorative cladding. Integrated components to provide protection from algae and fungi round off the safety package.

## Concise facts and figures

### Area of application

- Existing and new buildings up to high-rise level
- Wall structures: blockwork (concrete, sand-lime block, brick, porous concrete), fair-faced masonry and slab construction (three-layered panels)
- Onto external timber walls
- Unevenness of up to 3 cm (on solid constructions)
- Insulant thickness up to 400 mm

### Properties

- Maximum shock-proof and impact resistance
- Highly resistant to microorganisms (algae and fungi)
- Very high crack resistance
- Highly resistant to mechanical stress
- Highly effective thermal insulant, weather-resistant
- Permeable to CO<sub>2</sub> and water vapour
- Limited combustibility
- Certified for „Passivhaus“ standard

### Approvals

The relevant technical European approvals and/ or national application documents apply

# StoTherm Classic for the “Passivhaus”

## A worthwhile investment

The “Passivhaus” standard continues to gain ground – and not only for detached houses. Owners, planners, architects and investors have also discovered the advantages which this sustainable construction method offers for multi-storey residential buildings, office complexes and industrial buildings: Minimal energy costs coupled with maximised quality of life – and the extra costs are minimal.

The key criterion for a “Passivhaus” is the annual heating requirement, which must be below 15 kWh per square metre. By way of comparison, the average annual energy consumption for heating buildings dating from before 1980 stands at more than 220 kWh per m<sup>2</sup>. A major advantage of any “Passivhaus” is the low energy and running costs. The costs of building such a house are declining, and currently stand at around 5 to 8 per cent above those for a low-energy house.

The elementary prerequisites for a “Passivhaus” include insulation of the building's entire exterior finish for maximum energy efficiency. Another crucial requirement is an air-tight exterior finish with an active ventilation system. A heat transmission coefficient (U value) of 0.15 W/m<sup>2</sup>K is specified as the standard value for facade and roof, floor slab and the external walls of a “Passivhaus” which have contact with the soil. Such exterior finishes are relatively simple to produce today – always assuming an appropriate quality of planning and execution. A particularly interesting and economical option is the solid construction type, such as lime sandstone masonry in combination with the StoTherm Classic external wall insulation system. While the masonry serves as



a heat buffer for the interior of the building, the insulation system with its EPS boards of between 20 and 40 centimetres in thickness prevents heat loss. StoTherm Classic has been optimised to meet the special requirements pertaining to a “Passivhaus” and has received due certification from the “Passivhaus” Institut. The tried and tested detail solutions from this system can be applied to rule out thermal bridges at junctions between different parts of the building, reveals, corners, projections and recesses from the outset.

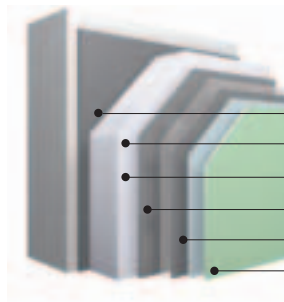


“Passivhaus” Krause, Klagenfurt, A  
(active-SUNCUBE, Dieter Tscharg,  
Klagenfurt, A)

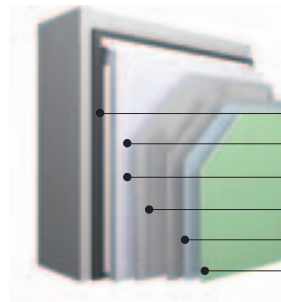
The small proportion of window space was ideal for the purposes of converting this former post office into a “Passivhaus”.  
Former post office in Bozen, I, Michael Tribus  
Architecture, Bozen, I.

# StoTherm Vario - external wall insulation system

A cost-effective alternative with polystyrene insulation and mineral base coat render



1a  
2  
3  
4  
5  
6



1a Bonding  
1b Rail attachment  
2 Insulation  
3 Fixing system (not shown)  
4 Reinforcement  
5 Intermediate coating  
6 Top coat

## System components

Bonding resp. rail attachment	a) StoLevell Uni or Sto ADH-B – mineral adhesive mortar b) Rail attachment
Insulation	Sto EPS Board – Insulation board made of expanded polystyrene foam
Fixing	Not shown. In accordance with the requirements of the competent authority (bonding, bonding and dowelling, or rail attachment).
Reinforcement	Reinforcing render: StoLevell Uni/StoLevell Duo plus – mineral reinforcing render Reinforcing mesh: Sto Glass Fibre Mesh Alternative: Sto Shield Mesh AES
Intermediate coating	StoPrep Miral – filled, pigmented, silicate priming coat
Possible top coats	<ul style="list-style-type: none"> <li>Mineral, organic, silicate and silicone resin finishing renders with Lotus-Effect® tintability or limited tintability in accordance with the StoColor System</li> <li>Optionally: cement-free, silicone-resin facade paints or facade paints with Lotus-Effect®, tintability/ limited tintability in accordance with the StoColor System</li> <li>Lightness values of finishing renders of &gt; 20 %</li> <li>Sto Natural Stone Tiles, ceramic tiles/slabs</li> <li>Architectural elements: StoDeco Profiles and rustications</li> <li>Glazed brick slips</li> </ul>



Raiffeisenbank, Schruns, Vorarlberg (A)  
(Lang & Vonier Architekten, Göfis, Vorarlberg, A)

## Planning advice

Fire protection barrier	Mineral fibre board horizontal or vertical according to national regulations
Fixing	Quantity and spacing depend on load-bearing capacity of the substrate and on the wind load conditions

**StoTherm Vario is the ideal choice for those seeking to combine the advantages of a light, organic insulant with a more economical mineral base coat render (reinforcement).**

“Vario” stands for variety, particularly with regard to the finishing layers. The StoTherm Vario external wall insulation system allows virtually any form of finishing layer, from mineral or silicone resin finishing renders to natural stone or ceramic tiles.

## Concise facts and figures

### Area of application

- Existing and new buildings up to high-rise level
- Wall structures: masonry (concrete, sand-lime block, brick, porous concrete), fair-faced masonry, panel-type constructions (three-layered panelling and wood construction)
- Onto external timber walls
- Unevenness of up to 3 cm
- Insulant thickness of up to 400 mm / up to 200 mm for ceramics

### Properties

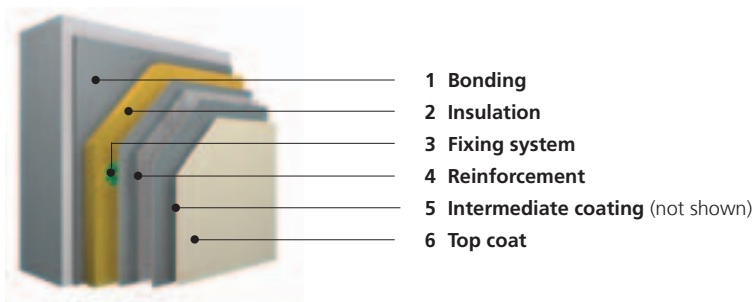
- Resistant to microorganisms (algae, fungi) with double protective coating
- High crack resistance
- Resistant to mechanical stress
- Highly effective thermal insulant
- Highly weather-resistant
- Highly permeable to CO<sub>2</sub> and water vapour
- Limited combustibility

### Approvals

The relevant technical European approvals and/ or national application documents apply

# StoTherm Mineral - external wall insulation system

Non-combustible, ideal for high-rise and public buildings



- 1 Bonding
- 2 Insulation
- 3 Fixing system
- 4 Reinforcement
- 5 Intermediate coating (not shown)
- 6 Top coat

## System components

Bonding	<b>StoLevell Uni</b> – mineral adhesive mortar
Insulation	<b>Sto-Mineral Fibre Board/Speed Lamella</b> Mineral-fibre insulation board
Fixing	In accordance with the requirements of the competent authority (bonding, bonding and dowelling, or rail attachment)
Reinforcement	Reinforcing render: <b>StoLevell Uni</b> – mineral reinforcing render Reinforcing mesh: <b>Sto Glass Fibre Mesh</b> Alternative: <b>Sto Glass Fibre Mesh F</b> Alternative: <b>Sto Shield Mesh AES</b>
Intermediate coating	<b>StoPrep Miral</b> – filled, pigmented, silicate priming coat
Possible top coats	<ul style="list-style-type: none"> <li>Mineral finishing render <b>StoMiral K/R</b>, limited tintability in accordance with the StoColor System</li> <li>Optionally: Organic, silicone-resin or facade paints with Lotus-Effect®, tintability/ limited tintability in accordance with the StoColor System</li> <li>Lightness values of finishing renders of &gt; 20 %</li> <li>Sto Natural Stone Tiles, ceramic tiles/slabs</li> <li>Architectural elements: StoDeco Profiles and rustications</li> <li>Glazed brick slips</li> </ul>

## Planning advice

Fixing	Quantity and spacing depend on load-bearing capacity of the substrate and on the wind load conditions
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**StoTherm Mineral is the ideal system for all projects requiring non-combustibility, e.g. for buildings above high-rise level. The reliable representative of the non-combustible systems consists of purely mineral components and is suitable for virtually any type of substrate.**

StoTherm Mineral cannot only be used together with mineral finishing renders and facade paints with high resistance to algae and fungi, but also in combination with ceramic facade cladding, glazed brick slips, StoDeco Profiles etc.

The fibres of the Sto-Speed Lamella, which are aligned perpendicular to the wall, make this insulation board perfectly suitable for round structures.



Star City, Birmingham, GB  
(Mark Swindells, Birmingham, GB)

## Concise facts and figures

### Area of application

- Existing and new buildings up to a height of 100 m
- Wall structures: masonry (concrete, sand-lime block, brick, porous concrete), fair-faced masonry, panel-type constructions (three-layered panelling and timber skeleton construction)
- Unevenness of up to 3 cm (see technical approval)

### Properties

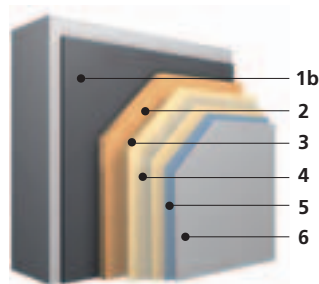
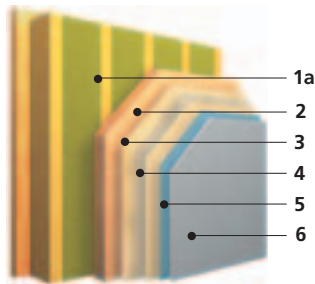
- Resistant to microorganisms (algae, fungi) with double protective coating
- High level of sound protection
- High crack resistance
- Resistant to mechanical stress
- Highly effective thermal insulant
- Highly weather-resistant
- Highly permeable to CO<sub>2</sub> and water vapour
- Non-combustible
- Anti-electrosmog optional

### Approvals

The relevant technical European approvals and/ or national application documents apply

# StoTherm Wood - external wall insulation system

Ecological, with natureplus®-certified wooden soft fibre insulation



- 1 Wall structure
- 2 Insulation
- 3 Fixing system (not shown)
- 4 Reinforcement
- 5 Intermediate coating (as necessary)
- 6 Top coat

## System components

Wall structure	<p>a) Installation directly on the load-bearing wood structure, alternatively on standardised/approved board materials and solid timber formwork and on solid wood elements and stacked board elements</p> <p>b) On solid substrates (masonry, concrete/with or without render)</p>
Insulation	<b>Sto soft fibre board M</b> – monolithic wood fibre insulation board
Fixing	Dowels or wide-crown staples
Reinforcement	<p>Reinforcing render: <b>StoLevell Uni</b> – mineral reinforcing render</p> <p>Reinforcing mesh: <b>Sto Glass Fibre Mesh</b></p> <p>Alternative: <b>Sto Shield Mesh AES</b></p>
Intermediate coating (if necessary)	<b>StoPrep Miral</b> – filled, pigmented, silicate priming coat
Possible top coats	<ul style="list-style-type: none"> <li>Mineral, silicone resin-bound and cement-free finishing renders or finishing renders with Lotus-Effect®, tintable in the StoColor System</li> <li>Silicone resin facade paints or facade paints with Lotus-Effect®, limited tintability in accordance with the StoColor System</li> <li>Lightness values of finishing renders of &gt; 20 %</li> <li>Sto Brick Slips</li> </ul>



The monolithic wood fibre insulation board carries the natureplus seal of quality. It embodies health-awareness, environmentally-friendly production, the protection of our limited resources and their suitability of application.

## Planning advice

Fire protection barrier	Mineral fibre board horizontal or vertical according to national regulations
Fixing	Quantity and spacing depend on load-bearing capacity of the substrate and on the wind load conditions

**Ecology, energy conservation and sustainability are central topics for the 21st century. Against this background, sustainable and ecological building products offering excellent functionality are acquiring ever greater importance. The StoTherm Wood external wall insulation system meets these environmental requirements in an exemplary manner.**

The system components of StoTherm Wood are perfectly coordinated from the substrate through to the finishing render, and are technically approved for wood and solid constructions. The monolithic soft wood fibre board is natureplus®-certified, confirming its sustainability credentials. The render texture and colour can additionally be varied to ensure that buildings insulated with this ecological insulant also meet the very highest aesthetic standards.

## Concise facts and figures

### Area of application

- Existing and new buildings up to high-rise level
- Onto external timber walls
- Direct installation onto wooden, load-bearing structure
- Onto standardised or approved board materials and solid wood formwork
- Onto solid wood and stacked board elements
- Onto solid substrates (masonry, concrete)

### Properties

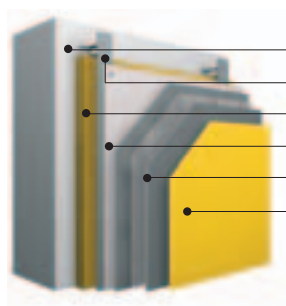
- Very high crack resistance
- Good shock-proof and impact resistance
- Resistant to mechanical stress
- Highly weather-resistant and highly effective thermal insulant
- Highly permeable to CO<sub>2</sub> and water vapour
- Normal / limited combustibility
- Good sound protection properties
- Optimum thermal insulation in summer

### Approvals

The relevant technical European approvals and/ or national application documents apply

# StoVentec Facade - ventilated rainscreen cladding system

Seamless, for unlimited colour and surface design possibilities



- 1 Anchorage substrate
- 2 Sub-construction
- 3 Insulation
- 4 Carrier board
- 5 Reinforcement
- 6 Top coat

## System components

Sub-construction	Sub-construction consisting of Sto wall holders and aluminium profiles to fix the carrier boards in place
Insulation	<b>Sto VHF Mineral Fibre Board</b> – insulation board consisting of mineral wool (alternatively glass wool), non-combustible
Carrier board	<b>StoVentec carrier board</b> – for facades of limited combustibility or <b>StoVentec carrier board A</b> – for non-combustible facades
Reinforcement	Reinforcing render: <b>Sto RFP</b> or <b>StoArmat Classic</b> – cement-free reinforcing render Reinforcing mesh: <b>Sto Glass Fibre Mesh</b> – alkali-resistant reinforcing mesh Alternative: <b>Sto-Shield Mesh AES</b> – for protection from electrosmog.
Possible top coats	<ul style="list-style-type: none"> <li>• Cement-free and silicone resin renders or renders with Lotus-Effect®, tintability in accordance with the StoColor System</li> <li>• No restrictions to the lightness value, dark colour shades feasible</li> <li>• Natural stone</li> <li>• Glass mosaic</li> <li>• Ceramic coverings</li> <li>• Architectural elements: StoDeco Profiles and rustications</li> <li>• Sto Brick Slips</li> </ul>



KLPD police headquarters, Waddinxveen, NL  
(Emiel Lamers, Den Haag, NL)

## Planning advice

Fixing	Quantity and spacing depend on load-bearing capacity of the substrate and on the wind load conditions
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**The StoVentec ventilated facade system with integrated insulation keeps all design options open – including particularly dark, curved render surfaces (e.g. black) and particularly hard, impermeable finishing layers (such as glass mosaic).**

It also makes renovation feasible even in apparently hopeless cases, without having to forego the aesthetic merits of a seamless surface finish. Unstable, cracked substrates or even serious cases of moisture penetration can be

renovated in in a sustainable manner. The flexible sub-construction means that StoVentec is able to compensate any degree of unevenness. As a result of the system's ventilated design, moisture from the wall is discharged with the rising air. This offers permanent protection for the masonry and insulation, keeping them dry and in good working order. The multiple-layered structure is also conducive to enhanced sound protection.

## Concise facts and figures

### Area of application

- Onto all solid anchorage substrates of appropriate load-bearing capacity
- Onto external timber walls

### Properties

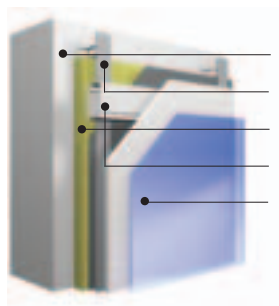
- Resistant to microorganisms (algae and fungi)
- Levels unevenness by means of a flexible sub-construction
- Very high crack resistance
- Improvement of up to 10 dB in the airborne sound insulation index
- Resistant to mechanical stress
- Highly effective thermal insulant
- Highly weather-resistant
- Limited combustibility / non-combustibility
- Frost-resistant
- Diffusion-open system structure

### Approvals

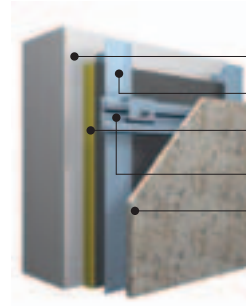
The relevant technical European approvals and/ or national application documents apply

# StoVerotec Facade - ventilated rainscreen cladding system

Panel facade with highlighted joints for exclusive solutions



- 1 Anchorage substrate
- 2 Sub-construction
- 3 Insulation with fleece
- 4 Agraffe profiles
- 5 Decorative finish  
StoVerotec Glass



- 1 Anchorage substrate
- 2 Sub-construction
- 3 Insulation with fleece
- 4 Agraffe profiles
- 5 Decorative finish  
Natural stone panel

## System components

Sub-construction	Stainless steel/aluminium sub-construction Sto wall holders and aluminium T-profiles or agraffe profiles
Insulation	<b>Sto VHF Mineral Fibre Board</b> – fleece-laminated insulation board consisting of mineral wool (alternatively glass wool)
Possible decorative finishes	<p>StoVerotec Glass system</p> <ul style="list-style-type: none"> <li>• Prestressed glass surface</li> <li>• No visible fixing</li> <li>• Panel facade – joint as a design element</li> <li>• Rounded panels also available on request</li> <li>• Broad colour variety – RAL colours, screen printing, logos, etc.</li> <li>• No restrictions to the lightness value, dark colour shades feasible</li> </ul> <p>StoVerotec Creativ system</p> <ul style="list-style-type: none"> <li>• Cement-free and mineral renders</li> <li>• No visible fixing</li> <li>• Panel facade – joint as a design element</li> <li>• Tintability in accordance with the StoColor System</li> <li>• No restrictions to the lightness value, dark colour shades feasible</li> <li>• Overhead glazing approved</li> </ul> <p>StoVerotec Stone Massive system</p> <ul style="list-style-type: none"> <li>• Solid natural stone panels</li> <li>• No visible fixing</li> <li>• Exclusive shell limestone, sandstones and many other options available on request</li> <li>• Honed, sand-blasted, bush-hammered surfaces – many other options on request</li> </ul>



Exclusive solutions: With the StoVerotec ventilated rainscreen cladding system featuring highlighted joints even the combination of stone and glass is possible on a facade.

## Planning advice

Fixing	Quantity and spacing depend on load-bearing capacity of the substrate and on the wind load conditions
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**The facade of the ventilated rainscreen cladding system with concealed fixing and exposed joint pattern can be surfaced with glass, natural stone or a creative render in variable element sizes.**

The optimised stainless steel-aluminium sub-construction enables stable installation on virtually every substrate. On existing and new buildings alike, the broad scope of options for finishing layers ensures individual facades, even featuring combinations of materials or 3-dimensional effects.

## Concise facts and figures

### Area of application

- Onto all solid anchorage substrates of appropriate load-bearing capacity: blockwork (concrete, sand-lime block, brick, porous concrete), panel-type constructions (three-layered panelling)
- Levels unevenness by means of a flexible sub-construction

### Properties

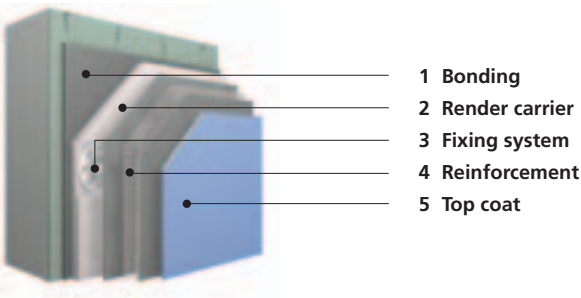
- Highly effective thermal insulant
- Highly weather-resistant
- Limited combustibility

### Approvals

The relevant technical European approvals and/ or national application documents apply

# StoReno

Renovation system for external wall insulation systems and render facades



System components	
Bonding	StoLevell Uni or StoLevell Coll – mineral bonding and reinforcing mortar
Render carrier	StoReno Plan Carrier board made of recycled glass with dowel recesses
Fixing	StoReno Dowel Head and Sto Screw Dowel S LZ 8 or UEZ 8
Reinforcement	Reinforcing render: StoLevell Classic or StoArmat Classic – cement-free reinforcing render Reinforcing mesh: Sto Glass Fibre Mesh – alkali-resistant reinforcing mesh
Possible top coats	<ul style="list-style-type: none"><li>• Cement-free and silicone resin finishing renders, tintability in accordance with the StoColor System</li><li>• Lightness value of &lt; 20 % possible</li></ul>



Verseidag building, Krefeld, D  
(Mies v. der Rohe, Karl-Heinrich Eick, Krefeld, D)

The StoReno renovation system comes up trumps when damaged render facades or external wall insulation systems in need of renovation require to be restored without large-scale demolition measures. This system ensures the sustained reliability of facades, even on problematic substrates. The relatively thin overall coating means that existing elements such as window sills or covers can usually be left in place.

The functional core of the StoReno renovation system is the StoReno Plan carrier board, which consists of 96% recycled material. It is laminated on both sides with glass fibre mesh and

incorporates a dowel fitting strip. Ready-to-use cement-free or silicone resin renders serve as top coats.



HERMA company, Stuttgart, D

Concise facts and figures

Area of application

- Onto all solid anchorage substrates of appropriate load-bearing capacity: blockwork (concrete, sand-lime block, brick, porous concrete), panel-type constructions (three-layered panelling)
- Levels unevenness by means of a flexible sub-construction

Properties

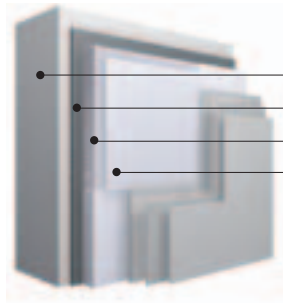
- Highly effective thermal insulant
- Highly weather-resistant
- Limited combustibility

Approvals

The relevant technical European approvals and/ or national application documents apply

## StoSolar

### Solar wall heating integrated in the external wall insulation system



- 1 Masonry
- 2 Bonding agent
- 3 StoSolar panel
- 4 Glass render

#### System components

Bonding agent	Sto ADH-B – mineral adhesive mortar
Solar panel	<b>StoSolar panel</b> consisting of a translucent capillary panel with a transparent glass render finish
Glass render	Translucent glass render <ul style="list-style-type: none"> <li>• Special formats in the range of 2 m x 1.20 m</li> <li>• Closed, seamless glass render surface</li> </ul>



Malerbetrieb Federlechner, Karlsruhe, D  
(Winkler + Bahm Architekten, Karlsruhe, D)

**Saving heating costs, protecting the environment, preserving natural resources, using renewable forms of energy – these are the 21st century needs to be addressed by building owners, architects and planners during the development and construction phase for a building. The innovation award-winning Sto-Solar panel is a boon as it converts solar energy into heat.**

Sunlight falls onto the translucent glass render finish on the surface. The capillary tubes underneath guide the sunlight inwards and onto a black absorber layer which converts the solar energy into thermal energy with an efficiency level of around 95%. The masonry stores this heat and releases it into the building as pleasant radiant heat, in a similar manner onto a wall heating system. In contrast to solar collectors on the roof, StoSolar is most effective in the

winter. Due to the low position of the sun, sunlight falls on the panel virtually head-on in the winter. This enables optimum use of the available solar energy via conversion into heating energy. In the summer, the high position of the sun results in a correspondingly flat angle of incidence. The sunlight is consequently reflected by the glass render finish, preventing the interior walls from heating up.



#### Concise facts and figures

##### Mode of functioning

Solar wall heating system integrated in external wall insulation systems which absorbs sunlight on the facade, converts it into thermal energy and releases it into the building.

##### Area of application

- Solid masonry with apparent density of at least 1,200 kg/m<sup>3</sup>
- Concrete walls

##### Properties

- 5 different standard formats available (200 x 120 cm, 200 x 60 cm, 100 x 120 cm, 100 x 60 cm, 50 x 120 cm)
- Available in board thicknesses of 12 cm/16 cm

##### Benefits and advantages

- Reduced energy consumption means lower heating costs
- Pleasant radiant heat provides for a more comfortable home environment
- StoSolar elements are seamlessly integrated into the facade
- Diverse range of formats ensures broad scope for individual facade design

Volksbank Hochrhein, St. Blasien, D

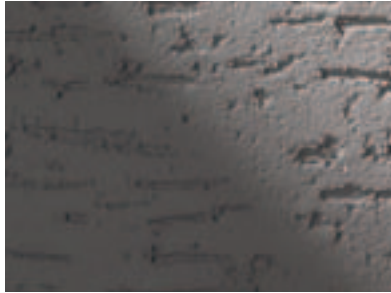


# Facade renders

## Creative facades

Renders are crucial to facade design. They are versatile and adaptable while offering perfect protection from climatic influences such as rain, heat, cold and airborne pollutants. They also provide broad scope for individual design solutions. Sto's range of renders covers every need and virtually every type of substrate.





Facade renders from Sto run the whole gamut, from classic stippled and rilled render, through free-style textured render containing differ-

ently-sized grains and available in a wide range of colours, to particularly robust natural stone renders. From naturally tinted to strikingly pigmented coatings – even the most unusual plans can be realised. Thanks to decades of continuous research and development work and outstanding technical standards, Sto is able to provide optimum product quality worldwide when it comes to cement-free, mineral and silicone resin-bound renders. The best-known example of this innova-

tive development work modelled on nature is the patented Lotus Effect®, which architects and planners throughout the world have been applying successfully for 10 years. The StoLotusan K/MP render, possessing a self-cleaning effect in conjunction with rainwater, has a dirt-repellent, microtextured surface comparable to that of a lotus leaf.

## Overview of facade renders

Product name	Product properties					Object	Design (surface)	
	Binder	Water vapour permeability	CO <sub>2</sub> -permeability	Water-repellent effect	Resistance to algae / fungi	Substrate	Colour choice	Texture/grain size
<b>StoLotusan K/MP</b>	Lotus-Effect®	●●	●	●●	●●	Organic, mineral	Limited tintability	Stippled texture render, free-style texture render
<b>StoSilco K/R/MP</b>	Silicone resin	●	●	●●	●●	Organic, mineral	Limited tintability	Stippled texture render, rilled render, free-style texture render
<b>Stolit K/R/MP</b>	Cement-free	●	●	●●	●●	Organic, mineral	Complete SCS <sup>2)</sup>	Stippled texture render, rilled render, free-style texture render
<b>StoSil K/R/MP</b>	Silicate	●●	●	●	●	Mineral	Limited tintability	Stippled texture render, rilled render, free-style texture render
<b>Stolit Effect</b>	Cement-free	●	●	●●	●●	Organic, mineral	Complete SCS <sup>2)</sup>	Individually texturable
<b>Stolit Milano</b>	Cement-free	●	●	●●	●●	Organic, mineral	Complete SCS <sup>2)</sup>	Individually texturable fine textured render
<b>StoNivellit <sup>1)</sup></b>	Cement-free	●	●	●	●	Organic, mineral	Limited tintability	Fine textured render
<b>StoSuperlit</b>	Cement-free	●	●	●	●	Organic, mineral	In acc. with collection	
<b>StoMiral K/R/MP</b>	Mineral	●●	●●	●	●	Mineral	Limited tintability	Stippled texture render, rilled render, free-style texture render
<b>StoMiral Nivell <sup>1)</sup></b>	Mineral	●●	●●	●	●	Mineral	Cement grey	Fine textured render

●● excellent ● good ● limited suitability

<sup>1)</sup> overpainted <sup>2)</sup> SCS = StoColor System

## Facade paints

### Aesthetic protection for facades

Today, personal taste and individuality are expressed not only through appealing architecture, but also through the choice of colour design for the facade. Sto's range of paints combines the necessary aesthetic merits with high quality, economy and ecology.





BBS Dach GmbH, Genshagen, D  
StoSilco Color



Villa K., Graz, A (Atelier Pucher, Graz, A)  
StoColor Metallic

**Colour and architecture are inseparably linked, as it is colour which lends buildings a direct emotional appeal. Recent years have seen building owners and architects adopt a bolder approach to the use of colour. While there's no accounting for taste, it is important to choose the colouring for facades judiciously, as it is likely to remain on display for a number of years. In addition to being a design element, the facade paint also performs important protective functions.**

Sto has developed precisely co-ordinated, environmentally friendly products for virtually every type of substrate. They provide the facade with reliable protection from wet, dirt and pollutants, and also perform a

design role. The comprehensive palette of the StoColor System comprises several hundred different colours. For thermal reasons, only colours with a lightness value higher than 20 % should be used for external wall insulation systems. In this way, crack formation can be prevented from the outset. StoVentec Facade, the seamless, ventilated render facade, is suitable for use with absolutely all types of paints. The great diversity of the product range offers solutions for various problematic areas, too. In addition to cement-free, silicate and silicone resin-based paints, self-cleaning facade paints are also available. The Lotusan facade paints featuring Sto's patented Lotus-Effect® are the key to facades that stay clean and attractive for longer.

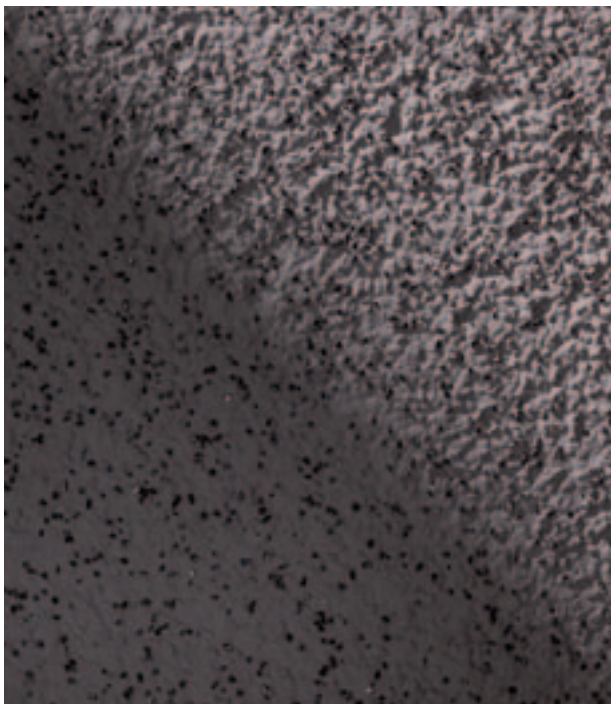
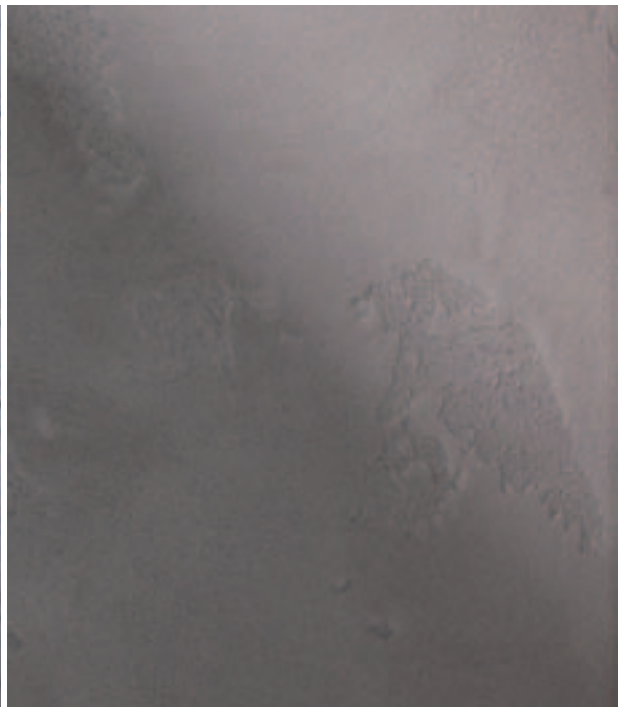
With StoLotusan Color G dirt simply runs off with the rain!  
Social housing, Utrecht, NL  
(Jaco D. de Visser, Vreeswijk, NL)



## Surface design: Effect finishes

### Imaginative facade design

An unmistakeable trend towards greater individuality and individual design has emerged in architecture in recent years. The design scope offered by facade renders can be further broadened by means of different application techniques and by incorporating materials such as natural sand mixtures, glass pearls or silicon carbide chips to create special visual effects.



## Surface design

**Creative effect finishes are a highly popular choice at present not only for interiors but also in facade design. Sto's diverse range of effect finishes have evolved in line with the wishes of building owners, planners and architects and offers virtually boundless scope for individual design. They meet the high technical standards pertaining to quality finishes while bringing facades to life through a vivid interplay of colour, light and texture.**

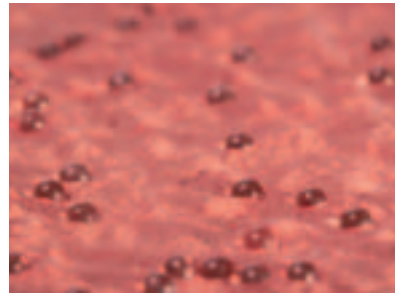
Combining different products generally opens up unimagined possibilities. A coat of StoColor Metallic on textured finishing renders provides for diverse glossy reflections which are further enhanced by changing outdoor light situations, for example.

### Stolit Milano

This cement-free fine textured render features a velvety surface quality and offers broad scope for individual design and colour schemes. Depending on the selected technique for the top coat, smooth (but not even!), textured or multi-coloured surfaces can be produced. Stolit Milano combines timeless elegance with traditional craftsmanship.



Very special visual effects and light reflections can be obtained by embedding so-called "ballotinis" into the Stolit Effect finishing render.



### Stolit Effect

This finishing render with a natural character features a lively texture and can be applied with or without the Sto Terrazzo Effect special effect sand. The effect sand mix teases touches of brilliance out of Stolit Effect particularly under glancing light, thereby underscoring its raw, distinct charm. A diverse array of other contrast effects can be obtained by embedding transparent glass pearls or blowing in silicon carbide, thus creating totally new surfaces. The character and colouring of the finishing render changes continually in sunlight and in combination with the various effects, creating a facade full of vitality.



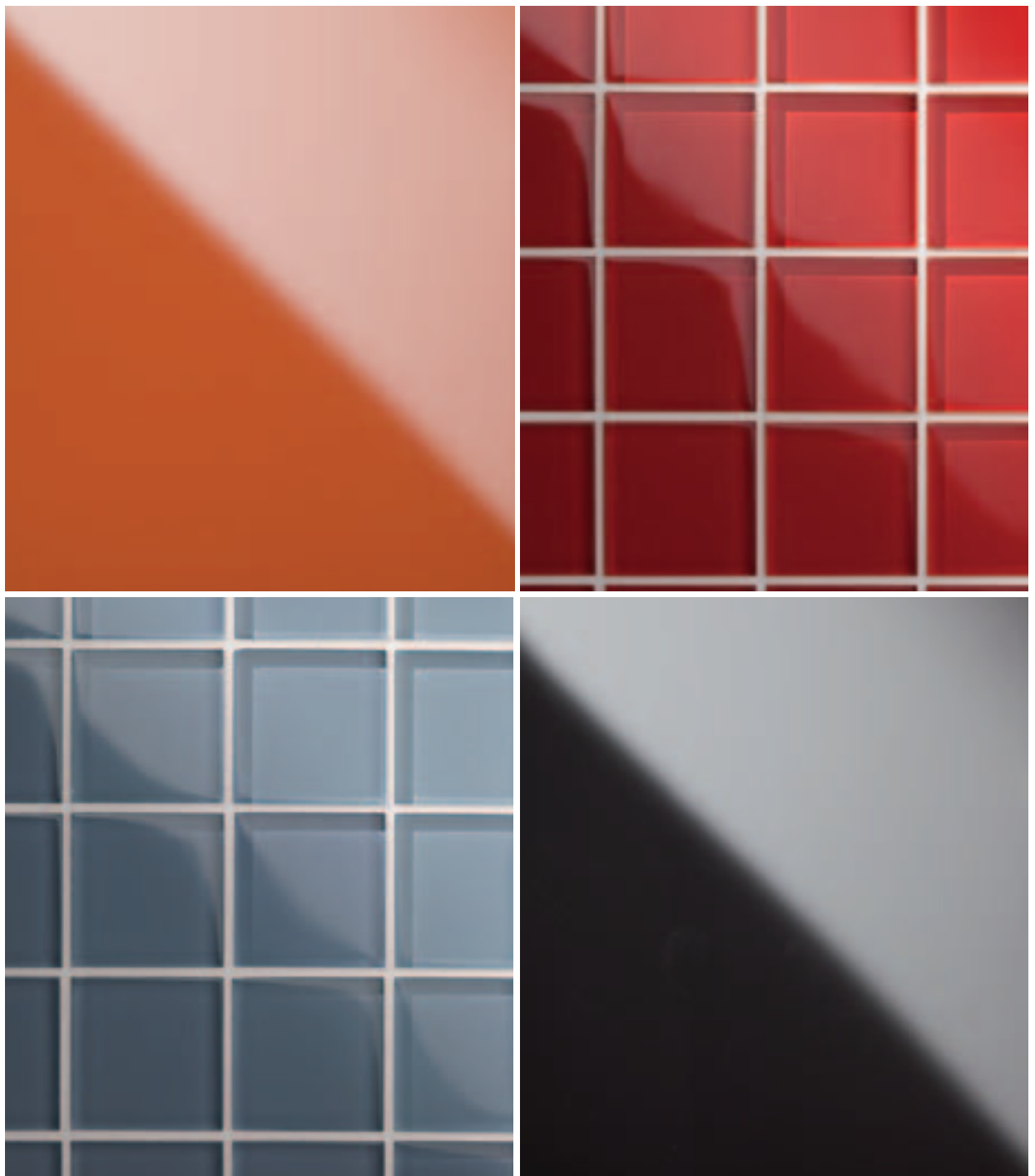
Stolit Milano with StoColor Metallic as an accentuating design feature on the facade of a residential house in Graz, A

Stolit Effect with Sto Terrazzo Effect (fine-grained river sand mixture and silicon carbide crystals) lends the facade a refined finish and produces a lively interplay of light and texture (wine growers' organisation, Sommerach, D).

## Surface design: Glass and glass mosaic

Brilliant facades with depth effect

Individual shaping, distinctive design and the highest possible functionality – these are the attributes sought by architects and owners wishing to set their building apart. In addition to its broad range of renders and paints for use as top coats, Sto also offers facade systems with glass or glass mosaic surfaces that enable multi-faceted glass facades and open up scope for individual design.



Munich-based architects Allmann Sattler Wappner have realised unusual mirror effects on the award-winning facade which adorns the service centre of GEWOGE, LUWOGÉ BASF GmbH in Ludwigshafen, D.



**There is a growing desire among architects and investors to lend their buildings special aesthetic appeal through unique design, featuring the perfect integration of colour, form and function. The exceptional properties of the carrier boards make the StoVerotec and StoVentec Facade systems ideal as a basis for glass panels (StoVerotec Glass) or glass mosaic surfaces (StoVentec Glass Mosaic), opening up totally new perspectives for facade design.**

#### **StoVerotec Glass**

StoVerotec Glass is the one-stop solution for all design visions – as a contrasting or as a homogeneous element, on the facade or inside buildings, in colourful or discreet dark finish, with mirror effect, printed with motifs or curving around corners. The individual panels are factory-produced for simple attachment to the sub-

construction on site. Carrier board and glass are joined to produce an inseparable sandwich panel. This rules out any risk of panels dropping from the facade, even in the event of glass fracturing. As a result, StoVerotec Glass is even approved for overhead glazing.

#### **StoVentec Glass Mosaic**

Glass mosaics are brought to life by their incomparable brilliance and their play of light and colour. This symbiosis of StoVentec Facade as a functional carrier system and fascinating glass mosaic tiles allows for countless compositions from a choice of 40 different colours. The small glass tiles lend facades a distinctive character while also ensuring the required durability.

Arcus sports clinic, Pforzheim, D (architects group Eggert & Partner, Stuttgart, D)

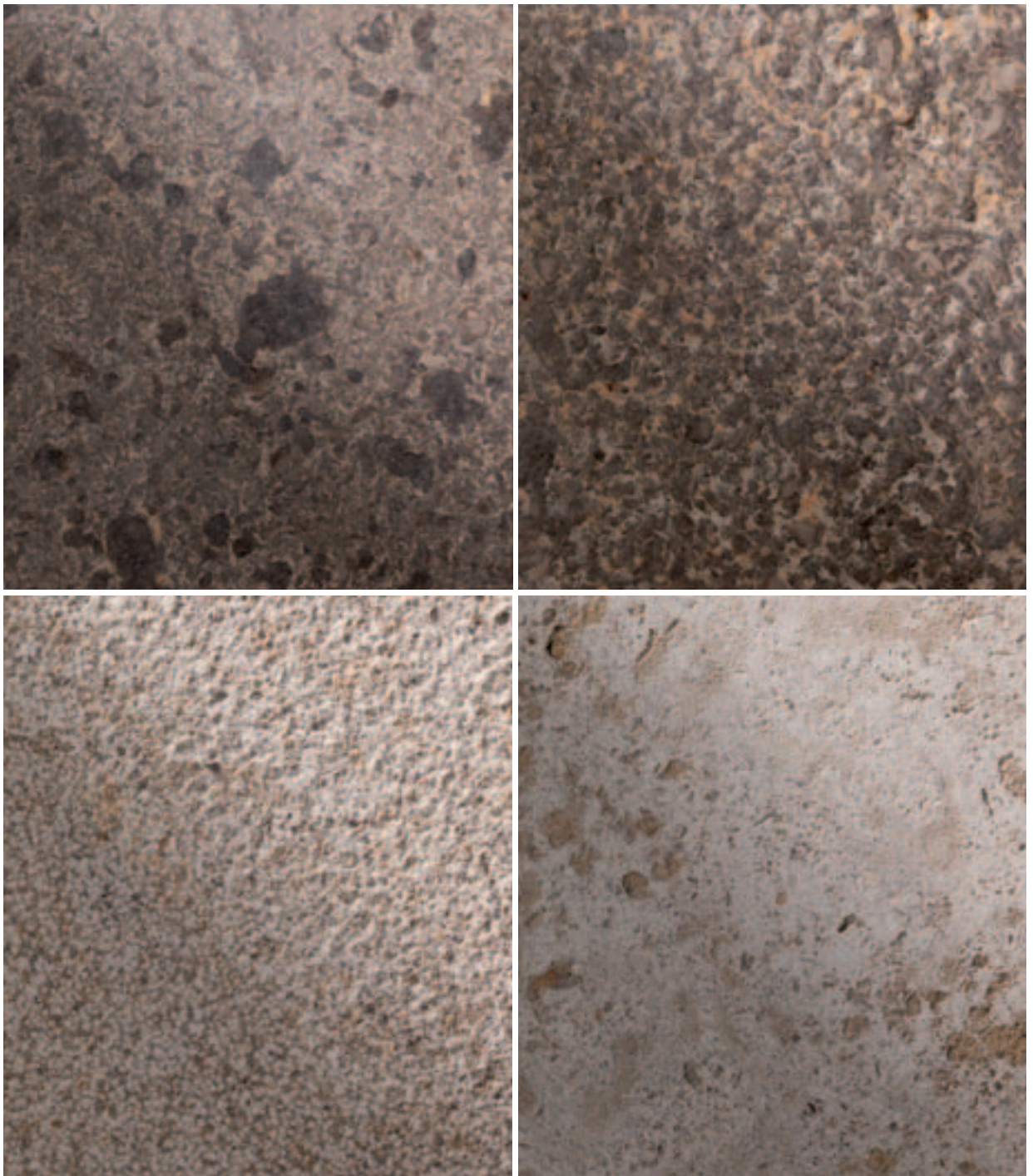


Health and social services building, Le Mans, F (AiA Atelier de la rize nantes, Saint Herblain ced, F)

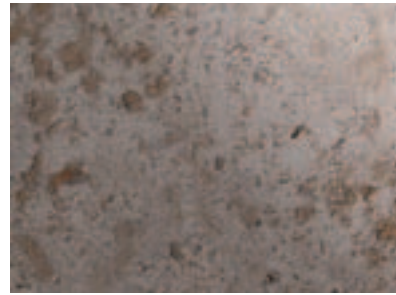
## Surface design: Natural stone panel

In harmony with nature

Natural stone panels possess a broad spectrum of different shades of colour and surface textures that artificial stones can never attain. In addition to their aesthetic effects, natural stone facades also shrug off weather influences and have a particularly long service life. The economical and ecological merits of natural stone provide for sustainability – a crucial factor in choosing building materials.



## Surface design



The diversity of natural stone is revealed in the vast design scope it offers in terms of colours, textures and surface finishes which can be crafted by hand or machine (Sto-Fossil SKL, sand-blasted).

**The facade is the “face” of a building. The design options for facade systems today go well beyond the mere choice of different renders and colours. Natural stones are an integral element of contemporary architecture, creating distinctive facades as finishing layers in the form of solid natural stone panels on the ventilated rainscreen cladding systems from Sto and natural stone tiles on Sto external wall insulation systems.**

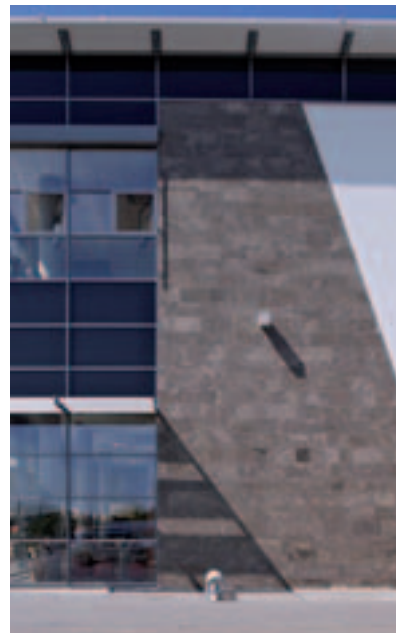
Natural stone was already in use back in ancient times – as demonstrated by the Egyptian pyramids and classical Greek architecture. Natural stone was employed as facing masonry to protect the core masonry from the weather and to enhance buildings' aesthetic appeal. Today, the stylish character of natural stone has become a symbol of lasting value. Natural stones always provide a special touch – as a refined facade on office buildings or on residential houses. However, in addition to good design and high-quality workmanship, ecological and economical requirements also play a central role. Natural building materials, such as natural stones, are emerging as a particularly important option in the face of the climate change scenario resulting from increased CO<sub>2</sub> emissions. Natural stone comes up trumps here in terms of sustainability and energy conservation. Natural stone as a building material reduces CO<sub>2</sub>



Living at the Botanical Gardens, Braunschweig, D (Wolfgang Koch, Braunschweig, D). Sto sandstone Neubrunn

emissions substantially. The manufacturing process for artificial building materials commonly requires a high energy input. Not so with natural stone, which is available as a ready-to-use building material in its natural form, following a “production” process extending over millions of years. Extraction at the quarry is gentle on the environment and does not entail major levels of energy consumption.

Edeka Neukauf Maier, Rottweil, D (Müller & Huber, Oberkirch-Zusenhofen, D). Sto-Fossil SKL, ground



### Info

Sto's natural stone range comprises shell limestones and sandstones, with other stones also available on request. The surface finishes range from honed through sand-blasted to bush-hammered. Other finishes are feasible on request. A complete overview of our natural stone panels is to be found in the “Natural stone” product portfolio. You can order this catalogue by sending an e-mail to [infoservice.export@sto.eu](mailto:infoservice.export@sto.eu) or download it at [www.sto.com/international](http://www.sto.com/international).

## Surface design: StoDeco Profiles

### Giving facades the right profile

**New buildings in modern or classic style, buildings that are due for renovation or properties of historical value – StoDeco facade profiles serve to add aesthetic highlights and realise the individual visions of architects, planners and house owners.**



Diverse scope is available for forming and shaping StoDeco Profiles: Three-dimensional decorative elements, company logos or lettering are produced on modern CNC milling machines according to the customer's individual wishes. From arches through rustications to plinth or plane elements, the StoDeco Profile system allows design freedom to ensure authentic refurbishment. A permanent bond is produced between the coating – smooth, rough or textured – and the substrate.

GAP 15 office building, Duesseldorf, D  
(J.S.K. Architekten, Duesseldorf, D)

Preserving the style and aesthetics of times past and creating modern architecture with future viability – the weather-resistant StoDeco facade elements enable architects, planners and craftsmen to lend a new lease of life to works of timeless elegance or to realise modern design visions on new buildings.

From classical to modern, from Art Deco to Bauhaus – reliability in application and lasting quality for the investment involved are the prime requirements in all large-scale facade renovation projects or new construction projects employing facade elements. This calls for a first-class material to meet these needs: Verofill. This material, consisting of a combination

Judicial Palace in Luxembourg, L  
(Rob Krier u. Christoph Kohl, Berlin, D)

of lightweight mineral material and binders, offers all the properties crucial to durable facade elements. It is resistant to environmental influences, particularly break-proof, impact-resistant, and easy to repair in case of damage. It also relieves the strain on the load-bearing facades of existing buildings, with its low weight of only 550 kg/m<sup>3</sup>. Its minimal linear extension virtually rules out surface cracking, and its low water absorption means there is no risk of frost damage. The excellent surface of the profiles, free of any water-soluble components, ensures reliable coating at all times.





# Surface design: StoDeco Rustications

## Classic style

**Rustic facades are a design element integral to classical architecture. They also come into their own in contemporary architecture, particularly when used to lend large facades a distinctive character.**



The StoDeco design elements offer diverse scope for three-dimensional facade design – particularly in the plinth and corner areas.  
Ecole Internationale, Geneva, CH  
(CCHE Architecture, CH)



Apartment house, Paderborn, D  
(Rieping + Rieping GmbH)

Two types of rustic facades can be realised with Sto products: cladding with StoDeco Rustications and with Sto Rustication Boards. Both variants are ideal for refurbishing and reconstructing period and stucco facades – and for adapting facades on new buildings to the given urban setting. In contrast to the StoDeco Rustications, the Sto Rustication Boards are directly integrated into the system as thermal insulation elements. Insulation and design are thus accomplished in a single operation. All StoDeco Rustications are produced to order for the specific project concerned, making simple work of even the most extravagant designs.

### Info

In addition to the various joint design options, a variety of surface structures and the comprehensive colour range of the StoColor System are also available for both systems. All in all, this means the best possible basis for perfectly coordinated facade design.



## Surface design: Glazed brick slips and tiles

Great variety

**StoTherm systems with ceramic cladding are a logical development of the tried and tested StoTherm external wall insulation systems in combination with attractive surface designs. There is a choice of two different cladding variants – glazed brick slips or tiles.**



Apartment house, Hamburg-Harburg, D  
(Renner Hainke Wirth)

Glazed brick slips offer diverse scope for individual design. They can be combined with StoTherm external wall insulation systems to reconcile regional traditions regarding the design of clinker brick facades with the needs of effective thermal insulation. This type of wall construction also enables a more slender construction and reduced wall thicknesses mean more space inside the building. The firing process lends the glazed brick slips hardness and frost resistance and produces a relief-type surface which highlights the natural character of this material.

Ceramic tiles from Sto offer a new type of surface finish on the basis of a StoTherm external wall insulation system. The diverse colours, patterns and motifs of the ceramic tiles afford architects and building owners virtually unlimited design scope.

Cladding with glazed brick slips offers thermal insulation and a brick character in one.



### Info

StoTherm systems with ceramic cladding offer a winning combination of finely matched system components and great product variety. This broad variety enables you to tailor your choice of products to your client's personal needs, right from the insulating materials: You can opt for either the Sto-Mineral Fibre Board, non-combustible and made from natural basalt rock; or the Sto EPS Board, of limited combustibility and made from natural raw materials.



## Surface design: Sto Brick Slips

### Natural brick character

**The clinker brick facade is a familiar part of the typical townscape in northern Germany. Thermal insulation does not necessarily have to detract from this look. The facades of old brick houses can also be adapted to the requirements of the energy conservation ordinance without losing their charm – simply by using Sto Brick Slips.**

Elligerserg/Krüßweg housing estate,  
Hamburg, D

Sto Brick Slips in combination with StoTherm Classic embody an accomplished blend of tradition and progress. They offer an attractive alternative to fair-faced masonry and enable the authentic reconstruction of clinker facades on both existing and new buildings.

The cement-free brick slips are carefully hand-crafted, retaining their natural brick look. Tried and tested in practice for 15 years now, they come in six typical, light-fast clinker colours. Sto also produces customised Brick Slips in terms of colour and texture. These enable architects to adapt their designs perfectly to the character of existing facades and, in particular, grant extensive freedom in implementing individual design ideas. In order to ensure a harmonious appearance, Sto Adhesive and Joint Mortar are also produced in six different colour shades.



#### Info

Clinker facades offer diverse scope for individual design. Numerous colours and surface textures lend every building an individual character and provide for variable highlights on insulated facades.



# Restoration and refurbishment

## Lasting protection for the facade

**Refurbishment is a task that concerns every one of us, with billions of square metres of facade space due for renovation worldwide. The symptoms of damage vary, ranging from cracks in simple render facades to damage to external wall insulation systems. Sto AG is a competent partner in the field of refurbishment.**

### Prior diagnosis is crucial to correct refurbishment

Refurbishment may become necessary for a broad variety of different reasons. Structural damage to buildings is the most common cause. In the relevant literature, the term 'structural damage' is generally applied to all negative changes to the properties of a building element or part of a structure, irrespective of whether they result from errors in planning or execution, material defects, ageing processes, inadequate maintenance or actions by third parties. In practice, structural damage is revealed in physical effects – crack formation, fracturing or degradation of building blocks and mortar, settlement and movements of parts of the structure, etc. Structural damage is further distinguished according to physical and chemical causes. When a building is also to undergo energy efficiency measures, a detailed analysis of the individual building elements and their thermal losses needs to be carried out. A systematic procedure based on a specific concept is always crucial for the purpose of ascertaining a case of damage, its causes and the energy-efficiency characteristics of a building element, as only then can a restoration solution be designed which is tailored to the building concerned.

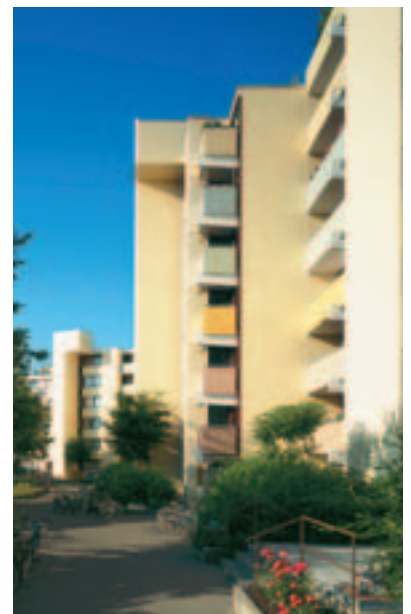
### Facade restoration options with Sto render facades:

The most common causes of damage to render are moisture and problematic substrates. Environmental influences or simple ageing processes can also lead to conspicuous surface damage.



Refurbishment of Haus der Architekten, Stuttgart, D – rerendering (Michael Pauls, Stuttgart, D)

In some cases, such a render facade can be restored by simple means, such as applying a fresh top coat or repairing the renderwork. Cracks, however, are anything but harmless cosmetic flaws. They must be repaired swiftly and reliably, in order to avoid more serious consequential damage. As cracks may originate from the substrate or even the building structure, it often proves impossible to trace them to a specific building element. A thorough analysis of the given damage is thus crucial to good restoration with lasting results.



Refurbishment of Prof. Angermair Ring apartment building Garching, D – StoTherm Reno (Karl, Garching, D)



Listed buildings

Today, many old buildings are subject to the strict conditions which apply to the preservation of historical monuments. Renovation with external wall insulation or rainscreen cladding systems is generally ruled out for aesthetic reasons. Sto is a dependable partner in such cases, offering a broad range of products for renovating paintwork and renderwork. The StoDeco Profiles additionally enable intricate stucco work to be renovated such that the refurbished surface is indistinguishable from the original, but substantially more durable.

Refurbishment of an external wall insulation system

External wall insulation systems also require refurbishing at some point in time – be it on grounds of energy efficiency or on account of mechanical effects. Minor damage can be repaired simply by touching up the

top coat. When extensive damage of the top coat is involved, a new reinforcing coat in combination with a new top coat is usually the only option. Many external wall insulation systems which were designed according to previous thermal insulation ordinances no longer meet today's standards. Doubling-up is generally the only viable option. The StoReno renovation system offers ideal support when refurbishing render facades and external wall insulation systems. The relatively low overall coating thickness

Refurbishment of the Versheidag building, Krefeld, D – StoReno, StoTherm Classic (Mies van der Rohe, refurbishment: Karl-Heinrich Eick, Krefeld, D)

of 15 mm means that existing elements such as window sills or covers can usually be left in place.

Refurbishment of external wall insulation systems			
Coating-based renovation	New reinforcement and new top coat	Renovation system with carrier board (StoReno system, approved by the building inspectorate)	Doubling-up (technical approval granted)

# Balcony coatings

## Stepping out in style

**Balconies are among the most sensitive parts of a building. Their exposed location makes them particularly susceptible to weather influences such as heat, water, frost and ultraviolet radiation. The situation is compounded by numerous other sources of stress resulting from daily use. StoCretec offers a broad scope of protective measures to safeguard the substance of this part of the building and the quality of its surfaces on a lasting basis.**

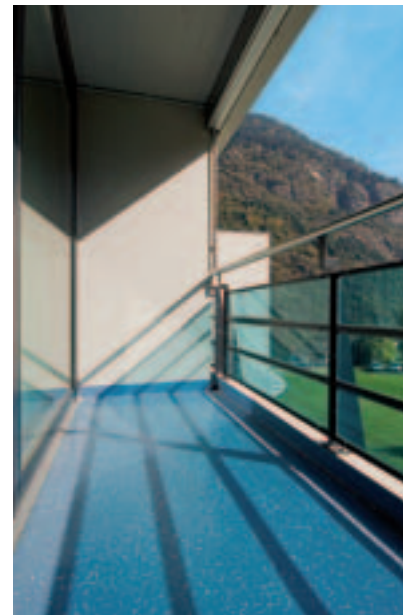
### Special properties

Weather influences are the greatest risk factor when applying balcony coatings. Firstly, this work has to be scheduled with due consideration not only to the time of year, but also to the prevailing weather situation. Secondly, swift changes in the weather often make it difficult to plan the work. StoCretec has developed its special "quick-action" floor coating systems to tackle these problems. The short curing time means that the coating is more swiftly rain-proof and ready for use. StoCretec's one-day balcony coatings enable priming and final coating to be carried out with only very short waits, that is within one day. High-quality coating systems keep balconies attractive and in good working order on a lasting basis. StoCretec offers thin- or thick-layer systems and sealing by means of water lacquer or acrylate dispersions, according to the given requirements. All these systems combine high product quality with functional versatility.

### Elastic balcony coatings

In the majority of cases, structural damage is caused by water. Exposure to moisture in the form of rain, snow, ice and hail entails natural processes which we are forced to live with. By choosing appropriate protective measures, there are many ways in which the substance of a building can be safeguarded, however. Mechanical resistance in the heat of the summer

– high crack bridging capacity in the winter. These conflicting requirements were long considered technically irreconcilable. For the first time a coating has now been developed which combines these two functions in an effective manner: StoPur EB 200. Cold elasticity and high temperature resistance are otherwise only achieved separately, using special polymers designed for the respective tasks. StoPur EB 200 combines these properties in a single multi-phase polymer matrix – or, to put it more simply: cold-elastic and temperature-resistant polymers are combined in StoPur EB 200.



Casa per anziani Senior citizens' home,  
Acquarossa, CH  
(Imperatori & Giamboni SA, Corzonesco, CH)



Senior citizens' nursing home, Forchheim, D  
(Amtmann Eismann Partnerschaft, Forchheim, D)



Lentersweg apartment building, Hamburg, D (Streb + Partner, Hamburg, D)

### **Slip resistance**

Not only water, leaves and petals, but also the type of floor coating and its surface texture can turn a balcony into a slippery affair and cause accidents. Equally, the right choice of flooring can prevent accidents, when it offers the appropriate slip-resistant properties. In choosing a balcony coating, the appropriate slip resistance must be considered with regard to the form of use, weather influences and the surrounding area. StoPur EB 200 offers an innovative option. The crack-bridging thick-layer system is gritted liberally with 1 mm StoChips. A transparent seal is then applied to this gritted surface. The

resultant highly decorative surface combines easy care with a high level of walking comfort.

### **Colours and decorative features**

In addition to functional requirements, aesthetic design also poses a major challenge. This is particularly true of such a conspicuous facade element as the balcony. With this in mind, virtually all balcony coating products from StoCretec are tintable in RAL colours and in accordance with the StoColor System. The basic colours, the system components and the mixing series break down as follows: 24 basic tones, mixed into light and dark intermediate tones, plus 28 grey scales, result in a total

of 800 possible colours. This choice equally applies to the balcony floor, balcony parapets and facades, of course. The way in which all the parts of a building interact establishes a visual link between individual trades, contributing to the building's overall harmony. Texturing offers another means for designing attractive surfaces.

## Products and systems

Introduction · Textures and finishes from smooth to very coarse · Facade insulation systems  
Facade plasters · Facade paints · Surface design · Lacquers and stains  
Refurbishment projects and protection of historical buildings · Balcony coatings



## Sto references

Examples of architecture employing Sto products and systems



## Details

Detail solutions with external wall insulation systems from Sto

## StoColor System

Colour variety, according to the StoColor System and other colour systems  
The 3-level principle behind the StoColor System: The human colour perception area;  
the colour wheel with 24 basic tones; the five colour rows

## Specifications

Support in project planning

## Background information - Facade

Energy-efficient thermal insulation · Advantages and benefits of the Sto facade insulation systems  
Thermal insulation · Moisture protection · Sound protection · Fire protection · Wind loads  
Indoor climate/healthy home environment · Building physical data (U values) · Glossary

## Further information

Specific information and brochures from Sto

## Office and industrial building, Hilden, D

pagelhenn architektinnenarchitekt

Windows set back from one storey to the next and finely graduated colour fields structure the stringently cubic office building designed by Pagelhenn architects on an industrial estate in Hilden. The StoTherm Vario external wall insulation system was used on this building, combining polystyrene foam insulation with a mineral finish render.



## 2. Sto references

### Office and industrial building, Hilden, D



Six shades of colour derived from two basic tones enliven the facade of the office cube.

Established housing developments on one side and industrial premises on the other provide the setting for this office and industrial building by pagelhenn architects in Hilden, Germany. As this is a rental property with changing users, the compact cube provides for a simple and flexible ground plan solution. Up to four mutually independent units are grouped around a central, naturally illuminated access zone. The building's supporting framework consists of a reinforced concrete structure, with prefabricated floors and facade elements. Storey-high, 1.35 metre wide wall and window elements alternate, whereby the solution for the corners entails setting back each successive storey by one wall thickness. Interior windows indicate the wall thickness, thereby emphasizing the elementary character of the insulated and rendered wall panels.

Only two colour shades have been used for the facades, each in two white-tinted variations. All neighbouring wall elements feature different colours, lending the strict



geometry of the cube a lively, almost upbeat air. Continuous grey horizontal render strips and a set-back parapet form the building into a homogeneous whole.

The building's solid structure is apparent on all sides: Insulated, load-bearing wall panels alternate with storey-high windows.

#### Owner:

D. & R. Bleßing GbR, Solingen, D

#### Architect:

pagelhenn architekttinnenarchitekt, Hilden, D

#### Location:

Herderstraße 18, Hilden, D

#### Sto products:

External wall insulation system (StoTherm Vario)

#### Applicator:

Treffert Bautenschutz GmbH, Niederlassung NRW, Leverkusen, D

Photographs: Olaf Faustmann, Wuppertal, D



Layout plan

# Sparkasse Mainfranken, Würzburg, D

Kuntz + Manz Architekten

Facade renovation in a historical setting is always an exacting task. Kuntz + Manz Architects have developed a facade for the Sparkasse Mainfranken savings bank in Würzburg with a ventilated natural stone cladding that serves as both a traditional exterior finish and a translucent screen for added privacy and solar protection.



## 2. Sto references

### Sparkasse Mainfranken, Würzburg, D



The shell limestone which is typical of the region and integrates the bank's head office into its historical surroundings.

One of the most demanding tasks relating to the general renovation of the Sparkasse Mainfranken savings bank's head office fell to Kuntz + Manz Architects, who were commissioned to design a new facade for the building. The building's central location in the city centre between the cathedral and the Residenz called for a prestigious appearance to be tempered by the restraint which is always appropriate in a historical setting. The corner of the original building dating from the 1960s was virtually entirely closed off by an escape stairwell and set back from the street. The architects built over this "negative space" to create a fitting entrance scenario. The greatest challenge in designing the new facade was finding a window format which provided an adequate response to the surrounding buildings with their perforated facades. At the corner of the building, vertical natural stone pilaster strips conceal the large glazed openings of the conference rooms and integrate these rooms into the complex as a whole. The new concrete binding joists which bear the natural stone ventilated rainscreen cladding also enable the building to project over the corner without



requiring any supporting columns and present the gallery area of the new main entrance to the outside environment. The facade design features a new interpretation of the shell limestone which is typical of the region. While retaining its function as a cladding element, the limestone is also used as a design element in the pilaster strips, which lend a degree of privacy to the building's interior and serve as a means of solar protection. The shell limestone on the wall panels

**Narrow, vertical pilaster strips provide for added privacy and solar protection and lend the facade a fine, graceful structure.**

and intermediate floors features a finish in various polishes, thus emphasizing the facade's storey-based structure.

#### Owner:

Sparkasse Mainfranken, Würzburg, D

#### Architects:

Architekturbüro Appel, Würzburg, D (interior),  
Kuntz + Manz Architekten, Würzburg, D (facade)

#### Location:

Hofstraße 7, Würzburg, D

#### Products:

Ventilated rainscreen cladding system  
(StoVerotec Stone)

Photographs: Gerhard Hagen, Bamberg, D



Ground plan of 1st floor

# Crescent House, Compton Bassett, GB

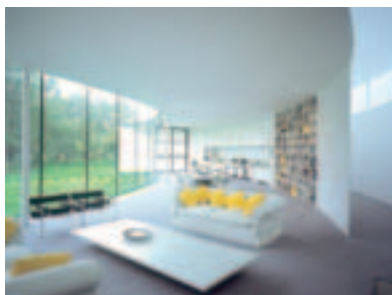
Ken Shuttleworth

Circular forms dominate the grassland site in the English county of Wiltshire on which Ken Shuttleworth has built a new home for himself and his family. This predominant form is taken up both by the new landscaped garden and the ground plan of the building in the form of two merging crescents. The extensive glazing on the garden side contrasts with the closed facade in a white render finish on the side facing towards the nearby country road.



## 2. Sto references

### Crescent House, Compton Basset, GB



The living room opens onto the landscaped garden with a building-high, 36 metre long glass facade.

Ken Shuttleworth's terms of reference for the home he envisaged for himself and his family of four were entirely pragmatic. It was to cost no more than £ 345,000, it was to be environmentally friendly, largely free of barriers and easy to maintain, and was to intrude as little as possible on the two hectare plot of grassland in the county of Wiltshire, in southern England. Shuttleworth thus positioned the house at the extreme north-western corner of the site, directly next to the road, and landscaped the remainder of the plot, planting over 1,000 trees in the process. A ring of maple trees of a hundred metres in diameter conjures up associations with the spectacular circular phenomena in southern England, such as Stonehenge or the Bronze Age hill fortress Old Sarum. The remnants of the residential house which formerly stood on the site have been piled up to create a hill which is now covered in grass. The new building deliberately turns its back on the road and the concrete works opposite and looks onto the landscape. The ground plan is composed of two merging crescents. The outer crescent, which is closed on the side facing the road, accommodates the bedrooms and



sanitary rooms; the inner crescent consists of a single, 36 metre long and 3.4 metre high garden room whose building-high glass windows face towards the morning sun.

The bedrooms and the access zone between the two halves of the house are illuminated solely by skylights. All the closed wall surfaces consist of in-situ concrete, which has been provided with a 100 millimetre layer of thermal insulation on the outside and finished in white render. Ken

High, white rendered walls screen the Crescent House from the road and the driveway.

Shuttleworth has deliberately avoided any lavish details: "I thought the budget would be better invested in the quality of the house's interior, rather than in designer taps."

#### Owner:

Seana and Ken Shuttleworth, Compton Basset, GB

#### Architect:

Ken Shuttleworth, formerly of Foster and Partners, London, GB; now of MAKE Architects

#### Location:

Compton Basset, Wiltshire, GB

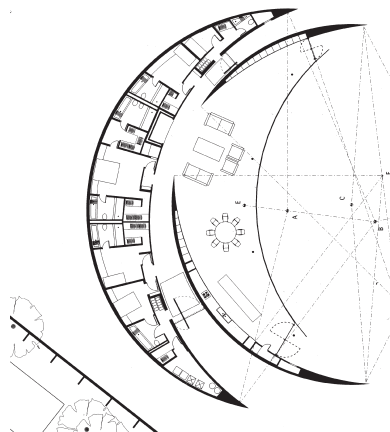
#### Sto products:

External wall insulation system (StoTherm Mineral with mineral lamella board), facade render (Stolit QS), facade paint (StoSilco Color), StoDeco Profile

#### Applicator:

Connaught Southern, Taunton, GB

Photographer: Nigel Young, GB



Ground plan

## The "Greenhouse" near Bad Berleburg, D

Gloria Friedmann, Paris, F

An unusual shelter awaits tired walkers between Bad Berleburg and Schallenberg in the Sauerland region of Westphalia in Germany: The "Greenhouse" by Parisian artist Gloria Friedmann is part of a regional sculpture trail. Initially planned in concrete, the building was eventually erected as a lightweight construction with a brilliant green rendered surface finish.



## 2. Sto references

### The "Greenhouse" near Bad Berleburg, D

The "Greenhouse" by Parisian artist Gloria Friedmann – half sculpture, half practical amenity, forms part of an ambitious project which is being undertaken by the Wittgensteiner Academy: Eleven large-scale sculptures are to be installed along the 17.5 kilometre forest sculpture trail in the Sauerland region. Gloria Friedmann interprets the forest as a "green cathedral" in which she has placed her sculpture like a chapel. The structure's form, colour and location and the fact that three 90 year-old spruces have been integrated into the sculpture aim to bring the visitor more closely in touch with the forest while at the same time alluding to the dangers it faces. The location originally planned for the shelter had to be changed, as the spruces there had already been earmarked for felling by the forest authority. Originally planned in concrete, the Greenhouse was eventually erected as a lightweight construction. Its bearing structure consists of steel girders fitted with trapezoidal sheeting on which carrier boards have been mounted. These boards provide a homogeneous substrate for the brilliant green render.



**Exemplary use of tree resources:** Three spruces of around 90 years in age have been integrated into the building.

**The rear side of the house is completely enclosed. Its supporting framework is made of steel. Roof and walls are provided with a render finish.**

#### **Owner:**

Wittgensteiner Akademie, Bad Berleburg, D

#### **Design:**

Gloria Friedmann, Paris, F

#### **Detailed planning:**

Hans-Georg Seifert, Erndtebrück, D

#### **Location:**

Forest sculpture trail near Bad Berleburg, D

#### **Sto products:**

Carrier board, organic reinforcing render with glass fibre mesh, facade paint

#### **Applicator:**

Christian Hengst, Bad Laasphe, D

Photographs: Guido Erbring, Cologne, D

# Renovation of the Verseidag building, Krefeld, D

Design: Ludwig Mies van der Rohe

Renovation: Karl-Heinrich Eick

At the beginning of the 1930s, Ludwig Mies van der Rohe designed the warehouse and service buildings of the Vereinigte Seidenwebereien weaving mill, the present-day Verseidag Technologies in Krefeld. The entire ensemble has been listed as a protected historical building since 1999. Karl-Heinrich Eick and the interior designers from raumkontor Düsseldorf have displayed great tact and sensitivity in restoring the building.



## 2. Sto references

### Renovation of the Verseidag building, Krefeld, D



Columns and visible joists emphasize the building's structural axes.

The HE building has been provided with new facade render and internal insulation.

In 1930/31, shortly before he was appointed Bauhaus director, Mies van der Rohe was commissioned by textile manufacturers Hermann Lange and Josef Esters to design the building for gentlemen's linings (known as the "HE building") on the grounds of the Verseidag company in Krefeld. Mies initially designed a two-storey production and administrative building for the company, to which he added two more storeys a few years later. The first five sheds of the dyeing plant and the neighbouring Verseidag clock tower (1933/34) are also based on his designs. The HE building suffered severe damage in the Second World War and was not restored until the 1970s, when it was put to use as an administrative building. The open-plan interior concept which was typical of Mies was abandoned completely however. Not until the building was finally listed by Krefeld's municipal authorities in 1999 was the stage set for refurbishment of the building as a historical monument, essentially restoring the original interior structure.

In refurbishing the building, its owners aimed first and foremost to improve its thermal insulation. As an external facade insulation system would have manifestly distorted the



HE building's proportions however, they opted for a drywall internal insulation system. The exterior render was first of all repaired and the entire surface overworked with a facade renovation system in order to obtain the most homogeneous facade surface possible. Cement-free renders were used here, as they had already demonstrated their crack resistance and suitability for the protection of historical buildings in the renovation of the Weißenhofsiedlung (Weißenhof Estate) in Stuttgart. The windows

The pivoted partitions enable the lounge on the third floor to be opened up or closed off.

from the 1970s, with profiles are only minimally wider than the delicate originals, were preserved. A few isolated original windows can still be found on the ground floor and in the sanitary areas.

#### Owner:

Grundstücksgesellschaft Girmesgath, Krefeld, D

#### Architect:

Ludwig Mies van der Rohe (design); Karl-Heinrich Eick, Krefeld, D (renovation); raumkontor, Düsseldorf, D (interior design)

#### Location:

Girmesgath 5, 47803 Krefeld, D

#### Sto products:

Organic crack-bridging reinforcement fibre render and finishing render; StoReno renovation system, StoTherm Classic external wall insulation system

#### Applicator:

Malerbetrieb Hans Noldus, Krefeld, D; Hans Gronsfeld, Krefeld, D

Photographs: Baubild, Falk, Berlin, D



Layout plan

# Imperial War Museum, Manchester, GB

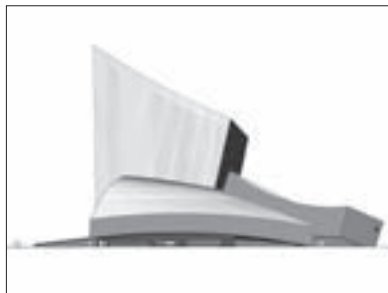
## Studio Daniel Libeskind / Leach Rhodes Walker

Daniel Libeskind displays a predilection for metaphors in his architecture. His design for the Imperial War Museum in Manchester is a case in point. The three aluminium-lined parts of this building symbolise the three classic forms of warfare – on land, on the water and in the air. A uniformly black rendered building plinth establishes the connection with the ground.



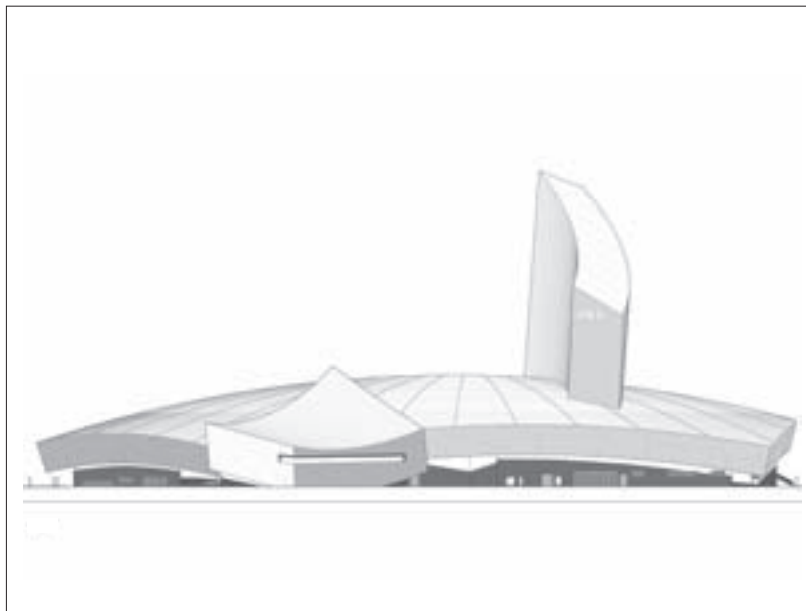
## 2. Sto references

### Imperial War Museum, Manchester, GB



East view

The Imperial War Museum, situated in an inhospitable area surrounded by faceless office buildings, silos and wasteland alongside the disused Manchester Ship Canal, is interpreted by Libeskind as a globe broken into three fragments. The fragments are intended to symbolise the three classic forms of warfare – on land, on the water and in the air. The central eye-catching element of the new building is the 55 metre high “air fragment”, which serves as the structural support holding the ensemble together and defines the entrance scenario. The massive-looking “earth fragment” lies at its feet. The convex curvature of the roof on this fragment is evocative of a globe and is interrupted by the third part of the building, the “water fragment”, which cuts into the roof from the direction of the canal. The unifying architectural element for the three fragments is their aluminium roof and facade embellishment. The main elements of the building appear to rest on a dark, monolithic pedestal. They are actually supported by a steel construction. The external walls of this footing have been produced for the most part in concrete masonry units. In some areas, the steel frame has had to be lined with trapezoidal sheet metal due to weight considera-



View from the canal

tions, however. The different areas of the pedestal walling have been unified by a black render layer which provides a homogeneous finish on the different facade systems. While the masonry has been provided with an eight millimetre thick layer of levelling render followed by StoLevell Reno, the StoVentec ventilated rainscreen cladding system has been installed on the trapezoidal sheet metal, again followed by a coating of StoLevell Reno.

#### Owner:

The Trustees of the Imperial War Museum, London, GB

#### Architect:

Studio Daniel Libeskind, Berlin, with Leach Rhodes Walker, Manchester, GB

#### Location:

Trafford Wharf Road, Manchester, GB

#### Sto products:

Ventilated rainscreen cladding system (StoVentec), facade renders (StoLevell Reno, Stolit K 3.0)

#### Applicator:

Sir Robert McAlpine, Ltd., Manchester, GB



Ground floor plan

## School, Fürth, D

Stefan Harlé

The John F. Kennedy School, originally built for the American forces which were stationed here, has passed into "civilian" usage in recent years. For its gymnasium, artist Elke Haarer teamed up with architect Stefan Harlé to develop a design concept involving facade renders in seven colours which have been "blurred" into one another using machine application.



## 2. Sto references

### School, Fürth, D



The old and new parts of the building have been unified by a facade with renders in seven colours.

The gymnasium of the John F. Kennedy School was built in the 1970s, and formed part of the barracks in Fürth's Südstadt district until the US forces' withdrawal. A process of change has been in evidence in the district for some years now. A new park has sprung up, and the old barracks buildings have been preserved for the most part and converted into apartments. The gymnasium has also remained largely as it was, but a new changing section with storerooms and sanitary facilities has been added, together with a colourful facade which is visible from afar. The new ancillary rooms adjoin the gymnasium to form an L-shape and are accessible from both sides: On the south side a generously glazed entrance area which is used above all by clubs leads into the building from the road; the smaller entrance on the north side of the gymnasium is used primarily by pupils. A continuous row of windows extending up to the height of the parapet provides the changing area with daylight. The north side is largely closed. In order to lend the existing building and the new extension a unified appearance, the architects developed a facade concept together with artist Elke Haarer. It has been realised with a total of seven integrally coloured



renders which have been blurred into one another by means of machine-rubbing. The concept was initially developed on the basis of a model and then presented in a photomontage. Prior to applying the concept to the building, a test wall was set up at Sto AG to try out the application and "blurring" of the various types of render. Execution of the concept was supervised throughout by the architects and the artist.

A small forecourt separates the gymnasium from the road. At the front is the lowered fitness room, which is illuminated by a window strip at ground level.

#### Owner:

Fürth municipal authorities, D

#### Architect:

Stefan Harlé, Fürth, D

#### Location:

John-F.-Kennedy-Str., Fürth, D

#### Sto products:

External wall insulation system (StoTherm Classic), ventilated rainscreen cladding system (StoVentec) for shock protection, facade render (Stolit)

#### Applicator:

Erhard, Rannungen, D

Photographs: Sto AG



Ground plan

## House in Zurlindestrasse, Zurich, CH

huggen berger fries Architekten AG ETH SIA

How can a building be designed so as to fit harmoniously into a historical setting shaped by houses from the turn of the 19th century while at the same time retaining a contemporary character? The practice huggen berger fries sought answers to this question in their design for an apartment house in Zurich-Wiedikon. The new building presents a surprising new interpretation of the classical building style with a black ceramic rainscreen cladding system.



## 2. Sto references

### House in Zurlindestrasse, Zurich, CH



The ceramic cladding incorporating vertical structure causes the facade to shimmer in varying colours from brown-black to silver, according to the angle of the incident light.

The new apartment house designed by huguen berger fries closed the last major gap in the townscape in the Zurich district of Wiedikon, which is characterised by buildings from the period of promoterism at the end of the 19th century. The front of the building facing onto Zurlindestrasse is aligned with the eaves of the two neighbouring buildings. The house restores the previously interrupted horizontal building line without exploiting every last inch of the available space.

The new building is connected to an existing four-storey house with courtyard inside the block. The apartments extend throughout the new building and the old building, with stairs connecting the different levels at the junction between the two buildings. The more spacious living areas such as living rooms and kitchens are accommodated in the new part of the building, while the existing smaller room layouts have been preserved in the old building. The more private areas of the apartments are situated here, including bedrooms and bathrooms. The fifth and sixth floors, neither of which are connected to the old courtyard house, incorporate a duplex apartment. A striking aspect is the facade lining of vertically profiled



and glazed ceramic panels whose colouring alters from brown-black to silver according to the incidence of the light falling on them. This choice of material means that the building blends in well with the clinker facades of the period of promoterism in this area while at the same time the radiant and colourful finish emphasises the building's modern character. In deference to the historical buildings in the area once again, the almost room-high windows feature surrounds in prefabricated lustrous matt facing

Light-coloured, square trims in fair-faced concrete frame the windows and form a contrast to the black facade embellishment.

concrete which set the mainly transverse windows off against the dark facade.

#### Owner:

huggen berger fries Architekten AG ETH SIA, Zurich, CH

#### Architects:

huggen berger fries Architekten AG ETH SIA, Zurich, CH

#### Location:

Zurlindenstraße 186, Zurich, CH

#### Sto products:

Ventilated rainscreen cladding system  
(StoVentec / StoVerotec facade)

#### Applicator:

Robert Spleiss AG, Küssnacht, CH (facade),  
Peter Schönbächler, Affeltrangen, CH (ceramic coverings)

Photographs: Beat Bühler, Zürich, CH



Ground floor plan

## Branch office of Südwestmetall, Reutlingen, D

Allmann Sattler Wappner Architekten

The new building for a training centre and regional office in Reutlingen was to provide its owners, the Südwestmetall company, with adequate prestige value while at the same time doing justice to its historical setting surrounded by buildings dating from the period of promoterism at the end of the 19th century. Architects Allmann Sattler Wappner have pulled off this balancing act with a combined facade consisting of a render course fronted by ventilated metal panels.



## 2. Sto references

### Branch office of Südwestmetall, Reutlingen, D



The stainless steel ornamental panels in front of the plinth facade produce a lively play of light and shade inside the building.

Südwestmetall's new training centre and regional office is situated in the east of Reutlingen, close to the town centre. The surrounding area is characterised by buildings from the period of promoterism at the end of the 19th century, featuring pitched roofs and facades finished in stucco or fair-faced masonry. The buildings in this district are typically of mixed usage by private residents, the service sector and small businesses. The three buildings belonging to the company are aligned with the eaves of the surrounding buildings and cite the latter's depth and the facade widths to create – in the architects' words – “an unusual prospect in a familiar form”. The entire exterior facade rising above the three metre high plinth consists of a seamless stainless steel shell in a satin-finish. The plinth storey and forecourt feature the same material, but in a different finish. Square ornamental stainless steel panels have been installed in front of the external wall insulation system as a second facade, also featuring as paving on the grounds outside the building. Using a laser, recesses have been cut out of the 3,164 panels, which fit together like a puzzle to create a large, continuous pattern. This trick combines the three



buildings and the site on which they stand into a large-than-life metallic sculptural object. The outer “skin” can be “folded back” to create openings in the buildings. In the plinth area, some of the panels can be turned away like doors. To maintain the buildings' monolithic effect on the upper storeys as well. The openings here are concealed by flush-fitting steel boards featuring varying hole patterns, which also afford solar protection. The atmosphere inside the building in the plinth area is shaped

The closed walls on the ground floor have been provided with an external wall insulation system finished in black render which is also faced with ornamental panelling.

by the light that enters through the half-open ornamental facade panels to produce a dynamic play of light and shade on the light-coloured and smooth surfaces of the floor and the walls.

#### Owner:

Südwestmetall, Reutlingen, D

#### Architect:

Allmann Sattler Wappner Architekten, Munich, D

#### Location:

Schulstraße 23, 72764 Reutlingen, D

#### Sto products:

External wall insulation system (StoTherm Mineral), with impact resistant reinforcement in some areas, floor coatings (foyer, cafeteria, corridors)

#### Applicator:

Stuckateurbetrieb Schweizer GmbH, Metzingen, D (facade)

Gebr. Hörner, Schwäbisch Gmünd, D (floor coatings)

Photographs: Studio Tümmers, Leinfelden-Echterdingen, D



Ground floor plan

# Haus Broll, Ludwigsburg, D

Fuchs, Wacker Architekten BDA

The Brolls' house attests to the harmonious cooperation between the owners and their architects. Both the ground plan and the tailor-made details reflect the occupants' predilections. White rendered surfaces and extensive glazed areas combine to produce an entity whose lightness of touch belies its essential geometric stringency.



## 2. Sto references

### Haus Broll, Ludwigsburg, D



The bedroom on the west side of the upper storey offers a panoramic view over the surrounding unspoilt countryside.

Haus Broll stands on a site to the north of Stuttgart which is undeveloped on three sides and set to remain so. The neighbouring low terraced houses and renovated apartment houses maintain a respectful distance. An impression of tranquillity and plenty of greenery prevails. The building is dominated by a harmonious blend of three materials which are to be found throughout the house – beige-coloured stone, white rendered ceilings and walls and the dark-stained maple of the few carefully positioned items of furniture. Glass surfaces, some running over the entire height of the building, and virtually frameless window strips extending around the corners, add an element of variety to the all-white rendered surfaces. Each side has its own face: in the east is the entrance with driveway and single-storey garage, while the south side is separated from the road by a grass strip and a hedge. While the north side remains largely closed, the west facade opens onto the terrace and the garden. The transition from the living room into the outside area is virtually seamless, the large-format limestone slabs of the living room floor continuing onto the terrace. Apart from the central air space, the



layout of the building is not apparent from a distance. This would appear to be deliberate – the house displays the maximum possible openness while at the same time guaranteeing its two occupants the privacy they require.

North view: The differently proportioned and oriented windows showcase the building at night.

#### Owner:

Mr. and Mrs. Broll, Ludwigsburg, D

#### Architects:

Fuchs, Wacker. Architekten BDA, Stuttgart, D

#### Location:

Ludwigsburg, D

#### Sto products:

External wall insulation system (StoTherm Classic),  
facade paint

#### Applicator:

Eugen Schwarz Stuckateur GmbH Ausbau + Fassade,  
Stuttgart, D

Photographs: Johannes Vogt, Mannheim, D



Ground plan sketch

# International School, Bonn, D

RKW Rhode Kellermann Wawrowsky

The Bonn International School (BIS) has moved into its new premises on the banks of the Rhine in Bonn-Plittersdorf. The building's colourful render facades by RKW – Rhode Kellermann Wawrowsky cite the Rhine and its floodplains, as well as the national flags of the no less than 63 nations represented by the pupils attending the school.



## 2. Sto references

### International School, Bonn, D



The Bonn International School was founded in 1997 and offers an English-language curriculum for around 350 children and adolescents aged between three and 19. In keeping with the extreme age spread of its pupils, the school comprises three sections – pre-school, known here as the Early Learning Section, a primary school and a secondary school. The new school building by RKW – Rhode Kellermann Wawrowsky is the result of an international competition staged shortly after the school's foundation. The three-winged new building extends like an outstretched hand northward into the parkland on the left bank of the Rhine. At the "wrist" in the south a straight edge to the

complex forms the counterpart to the UNO administrative building opposite. The central element and the link between the individual fingers is the break hall, from which the science and art classrooms, the sports hall, the canteen, the library and the offices are accessed. The hall's communicative character is continued in the spacious corridors between the classrooms. These corridors are intended above all to provide an interesting refuge from bad weather during breaks. The architects have also been careful to avoid any hint of monotony on the facades. Fine plastic profiles divide the large rendered areas into horizontal colour fields. Two white render strips, each at lintel height, are the sole features

**The building, only two storeys in height blends harmoniously into the landscape on the floodplains of the Rhine despite its large ground plan, yet without being "swallowed up" by its surroundings. This feat is achieved by means of the colourful render facades, which are divided up into individual fields, thereby emphasizing the building's horizontal character.**

running along the entire length of the building as a visual element separating the storeys.

#### Owner:

Vebo Futur GmbH, Bonn, D

#### Architects:

RKW Rhode Kellermann Wawrowsky  
Architectur + Städtebau, Düsseldorf, D

#### Location:

Martin-Luther-King-Str. 14, Bonn, D

#### Sto products:

Special variant of the external wall insulation system  
StoTherm Classic

Photographs: Michael Reisch, Düsseldorf, D



Layout plan with ground floor plan

## Service centre of LUWOGGE/GEWOGGE, Ludwigshafen, D

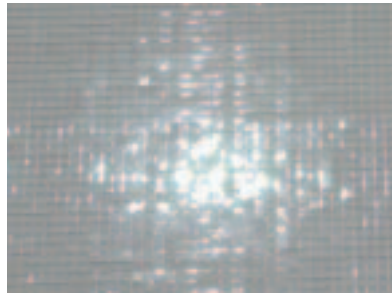
Allmann Sattler Wappner Architekten

The facade of the new Luwogge/Gewogge service centre in Ludwigshafen is made up of thousands of small-format glass tiles. The apparently solid facade is actually a ventilated structure based on the StoVerotec Glas facade system, demonstrating the latter's versatility in both technical and design terms.



## 2. Sto references

### Service centre of LUWOG/GEWOG, Ludwigshafen, D



The glass mosaic facade adds a sparkle to the otherwise plain building.

At the end of the 1990s, the Ludwigshafen company LUWOG/GEWOG, a subsidiary of BASF, staged a competition for the design of its new service centre. The commission went to Munich-based firm Allmann Sattler Wappner. The five-pronged building has been in use since its completion in the spring of 2003.

The new building consists of five office modules arranged in a row along a busy road, docking up at their northern ends with a narrow transverse section of around 160 metres in length. The latter section connects the three-storey office wings and houses conference and service rooms and the entrance area. For this most public part of the building, the architects chose a white, reflective facade cladding comprised of thousands of small glass tiles with enamelled rear sides. Contrary to the initial impression, these tiles were not applied directly to the solid reinforced concrete wall, but to the ventilated carrier boards of the StoVerotec Glass facade system. These boards are made of expanded glass granulate, resulting in expansion characteristics similar to those of the glass tiles. The tiles – custom-made from Austria of eight millimetres thickness – were delivered to the construction site as



30 x 30 centimetre panels on a mesh backing for bonding to the panels. Particular attention was devoted to ensuring a homogeneous overall appearance for the facade, which meant that tilting of individual mesh units was taboo.

**Bonding 30 x 30 cm mesh-backed panels of glass tiling to the carrier boards of the facade system called for maximum precision.**

#### Owner:

LUWOG/GEWOG, Ludwigshafen, D

#### Architects:

Allmann Sattler Wappner Architekten, Munich, D

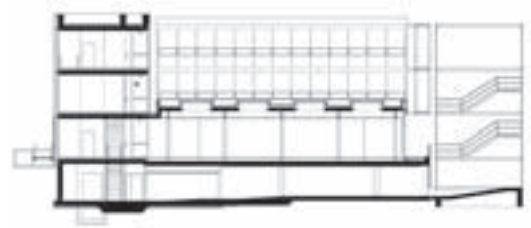
#### Applicator:

Gebrüder Neuner KG, Mannheim, D

#### Sto products:

Ventilated rainscreen-cladding system  
(StoVerotec Glass)

Photographs: BauBild Falk, Berlin and Jens Passoth, Berlin, D



Cross-section

# Renovation of the “Blumläger Feld” estate, Celle, D

Ivan Kozjak, Architekt BDA

Otto Haesler’s last housing project in the pre-war period was a typical terraced housing complex in the classic modern style – until it received a “facelift” from Ivan Kozjak. Kozjak has added a new, three-storey extension to the existing row of housing. While somewhat contentious in terms of preservation principles, this measure made it possible to adapt the building to modern-day housing standards on the inside.



## 2. Sto references

### Renovation of the “Blumläger Feld” estate, Celle, D



The so-called “lung block” at the northern edge of the estate has retained its original form.

The “Blumläger Feld” estate was built in Celle in 1930, at the time of the Great Depression. The style was extremely frugal and the standard of the apartments in terms of construction and the sizes of the housing units was below the minimum requirements that architect Otto Haesler (1880-1962) initially specified to his clients. Haesler, a staunch advocate of Neue Sachlichkeit (new objectivity), had already realised numerous estates in Celle at this time. His modern terraced housing, stringently oriented from north to south, shaped the townscape and saw Celle become a centre of the “New Building” style. Today, the terraced buildings are protected as historical monuments. The owner realised, however, that they would only remain lettable if they were adapted to modern-day standards. The sizes of the housing units, ranging between 34 and 49 m<sup>2</sup>, were too small by present standards. The eastern row was therefore enlarged by the addition of a new storey and a three metre wide front section with cellar facing onto the green area to the west. This resulted in a twofold increase in the total available living space. The standard of insulation on the existing facade was far from



worthy of preservation. The east facade was provided with a new facade insulation system in place of the original thermal insulation consisting of six centimetre thick pressed straw matting. This preserved the solid character of the 220 metre long row of housing. In contrast, the extension on the west side was provided with a metal-clad lightweight facade. The two houses at either end of the row have retained their original form without the additional storey.

In the east, the roof area is accessed via galleries. Only the row's two end houses have retained their original volume.

#### Owner:

Städtische Wohnungsbau GmbH, Celle, D

#### Design:

Ivan Kozjak, Hanover, D

#### Location:

Rauterbergweg, Celle, D

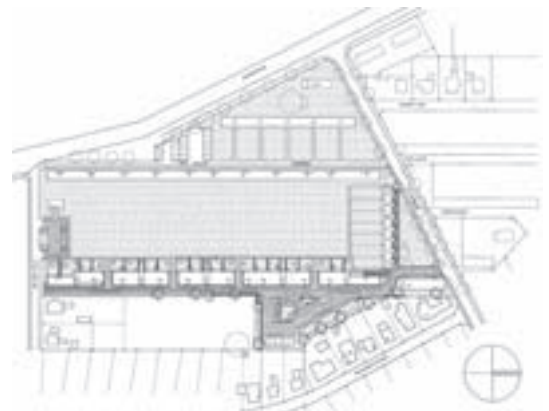
#### Sto products:

External wall insulation system

(StoTherm Classic),

Renovation system (StoReno)

Photographs: Thomas Götz, Düsseldorf, D



Layout plan

## Archive of the State Archaeological Museum, Schwerin, D

State building authority, Schwerin

The gleaming black, monolithic archive of the State Archaeological Museum maintains a respectful distance from the historical walls of the former riding stables of the “Old Artillery Barracks” in Schwerin. This unusual combination of a brickwork ruin and an insulated rainscreen cladding system in black glass was designed by the architects at the state building authority of Mecklenburg-West Pomerania.



## 2. Sto references

### Archive of the State Archaeological Museum, Schwerin, D



The brick walls of the former riding hall were dilapidated by the time the state authority for the preservation of historical monuments decided to build the archive.

The architect Friedrich Wachenhusen built the "Old Artillery Barracks" in Schwerin between 1859 and 1862. The fort-like complex in the neo-Gothic style with battlements and four corner towers accommodated artillerymen and their accoutrements behind its massive brick facades, as well as stables and a riding hall. The latter is situated in the middle of an inner courtyard which is enclosed by the main buildings on three sides. While the majority of the buildings on the site have survived their military usage virtually unscathed and currently house local government offices, the riding hall was initially earmarked for conversion into a sports hall after the Second World War. By the time this project was abandoned, key parts of the building were already missing. Only decades later was the ruin revived by Schwerin's authority for the preservation of historical monuments. Between the brick walls, which were in a ruinous state of repair but secured against collapse, the architects have inserted a "Black Box" which is to serve henceforth as the archive of the State Archaeological Museum. The black, sharp-edged and shiny cube is devoid of any window openings or differentiating structural features. Inside, it contains



three storeys for store, archive and depot. The building has been constructed as a reinforced concrete construction with external walls of lightweight bricks, in front of which a ventilated facade consisting of six millimetre thick opaque black glass has been installed. Only on one side does the new building establish physical contact with the stairway and entrance of the historical edifice, otherwise maintaining a respectful distance from the brick walls.

In the middle of the building the "Black Box" protrudes above the flat roof of the old building. The old and new parts of the building have been visibly separated.

#### Owner:

State of Mecklenburg-West Pomerania, D

#### Design:

State building authority, Schwerin, D

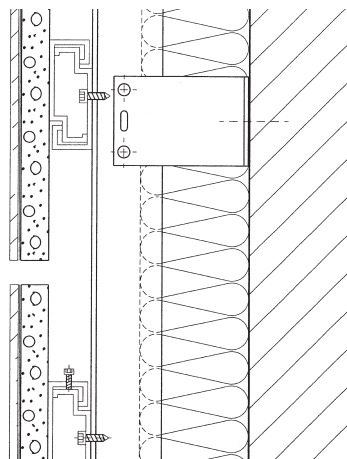
#### Applicator:

KMB Schwerin, D

#### Sto products:

Ventilated rainscreen cladding system  
(StoVentec Creativ)

Photographs: Punktum / Hans Christian Schink, Leipzig, D



Facade detail

## **"Berliner Bogen" office building, Hamburg, D**

BRT Architekten Bothe Richter Teherani

Hamburg architecture office Bothe Richter Teherani is renowned for its office buildings featuring sculptural forms, which are always closely related to the given interior concept. BRT designed the "Berliner Bogen" office building according to the "house-in-a-house" principle. Its air-conditioning envelope under the outer glass shell is formed by reinforced concrete arches to which a highly durable external wall insulation system has been applied.



## 2. Sto references

### "Berliner Bogen" office building, Hamburg, D



Six winter gardens divide up the building's interior. The reinforced concrete arches of the building's inner envelope have been provided with an external wall insulation system.

The "Berliner Bogen" office building by architectural firm BRT Bothe Richter Teherani has stood in the inhospitable, traffic-ridden setting of Anckelmannplatz Square in the south-east of Hamburg since the end of 2000. The new building of 140 metres in length accommodates 1200 office employees. Its imposing form evokes a glass ship's hull lying keel-up. The actual solid, thermally insulated building is visible beneath this outer shell. The architects refer to this project as a "building without a plot", as the building was erected over an old flood basin. A giant mixed water basin is located under the new building to compensate for the lost reservoir volume. Eight stories rise over this basin, becoming increasingly narrow towards the top on account of the building's paraboloidal cross-section. The building reaches a height of 36 metres at the top of the parabolic arch.

The glass shell, resting on 22 diagonally crossing steel arches, spans the reinforced concrete vault of the inner building, which is structured by six building-high winter gardens protected by the glass shell. These winter gardens serve as green climatic buffer zones and ensure natural illumination and ventilation of the office storeys.

The vertical facades facing the winter gardens are fully glazed; the cantilever floors are provided with mineral insulation to meet fire protection requirements. The concrete arches have also been provided with an external wall insulation system, in order to prevent the concrete from heating up. Instead of the mineral wool insulating boards which are customary for curves, dimensionally stable mineral foam boards were used here. As the arches serve as both wall and roof, they must provide a suitable

**The arching structure of the supporting framework spans the former flood basin on which the office building has been erected.**

base for a mobile maintenance ladder employed for cleaning the inside of the glass shell. So as to adapt the insulating boards to the curvature of the arches, small formats were used and the surface was skillfully levelled when applying the adhesive and render.



#### Owner:

Becken Investitionen & Vermögensverwaltung, Hamburg, D

#### Architects:

BRT Bothe Richter Teherani, Hamburg, D

#### Location:

Anckelmannplatz 6, Hamburg, D

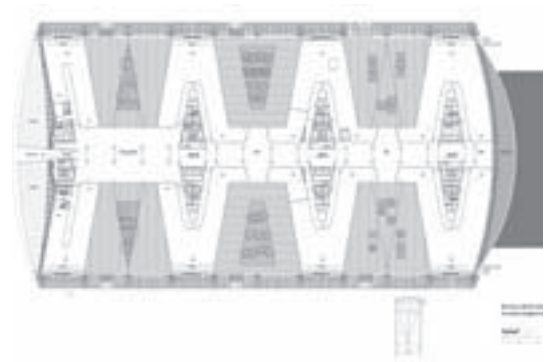
#### Applicator:

Seifert + Prasse GmbH, Schneeberg, D

#### Sto products:

External wall insulation system (StoTherm Cell, StoTherm Mineral), facade render (StoMiral)

Photographs: Dieter Hergeth, Kirchtimke, D



Ground plan of lower storey

## Primary school, Krk, HR

Randić – Turato

Architects Randić and Turato have designed and realised the new “Fran Krsto Frankopan” primary school directly alongside the reconstructed medieval town wall. The new building’s rendered exterior harmonises with its historical surroundings, while the bold colours inside the school form a rich contrast to the town’s light natural stone buildings.



## 2. Sto references

### Primary school, Krk, HR



Steps made of maple overcome the height difference in the assembly hall and provide a place for pupils to sit.

The location for the new primary school was the subject of lengthy debates on the town council of Krk in Croatia. At issue was the question of whether the new building should be sited in the town's readily accessible outskirts or remain at its previous location in the middle of the town's historical centre. The competition was won by architects Saša Randić and Idis Turato, whose design envisaged a new school building in the town centre. The distinction between the public area and the school has been abandoned and the town's streets and squares defined as recreation areas for the pupils during their breaks, while the school grounds are accessible to the public. In accordance with the boundaries of the building plot and the topography of the site, the architects designed a two-storey, Z-shaped building in the north-east of the town's old quarter, at a respectful distance from the restored town wall. The facade facing away from the town is characterised by a projecting, shading frame consisting of precast concrete elements and by extensive glazing. The classrooms on the ground floor look across the school yard towards the town wall, while the older pupils on the first floor have an



unobstructed view beyond the wall. The front of the building, facing the town's maze of streets and houses, presents a more closed appearance, its light-coloured render finish harmonising with the historical surroundings. The grain size and colouring of the render vary, lending the building attractive proportions. Isolated areas in bold colours add highlights to the render facade, hinting at the celebration of colour to be discovered inside. The school's flat roof is covered with crushed limestone from the region – the same material that was used to reconstruct the town wall. As a granular aggregate, it also lends the concrete facade elements a rock-like

A glass facade opens up the school onto the sheltered yard and reveals its colourful interior.

colour, thereby establishing a dialogue with the surrounding area.

#### Owner:

Krk municipal authorities, Krk, HR

#### Architects:

Randić – Turato, Rijeka, HR

#### Location:

Stjedana Radica 11, Krk, HR

#### Sto products:

Exterior renders and interior plasters

#### Applicator:

Sipak company, Zagreb, HR

Photographs: Randić – Turato, Rijeka, HR

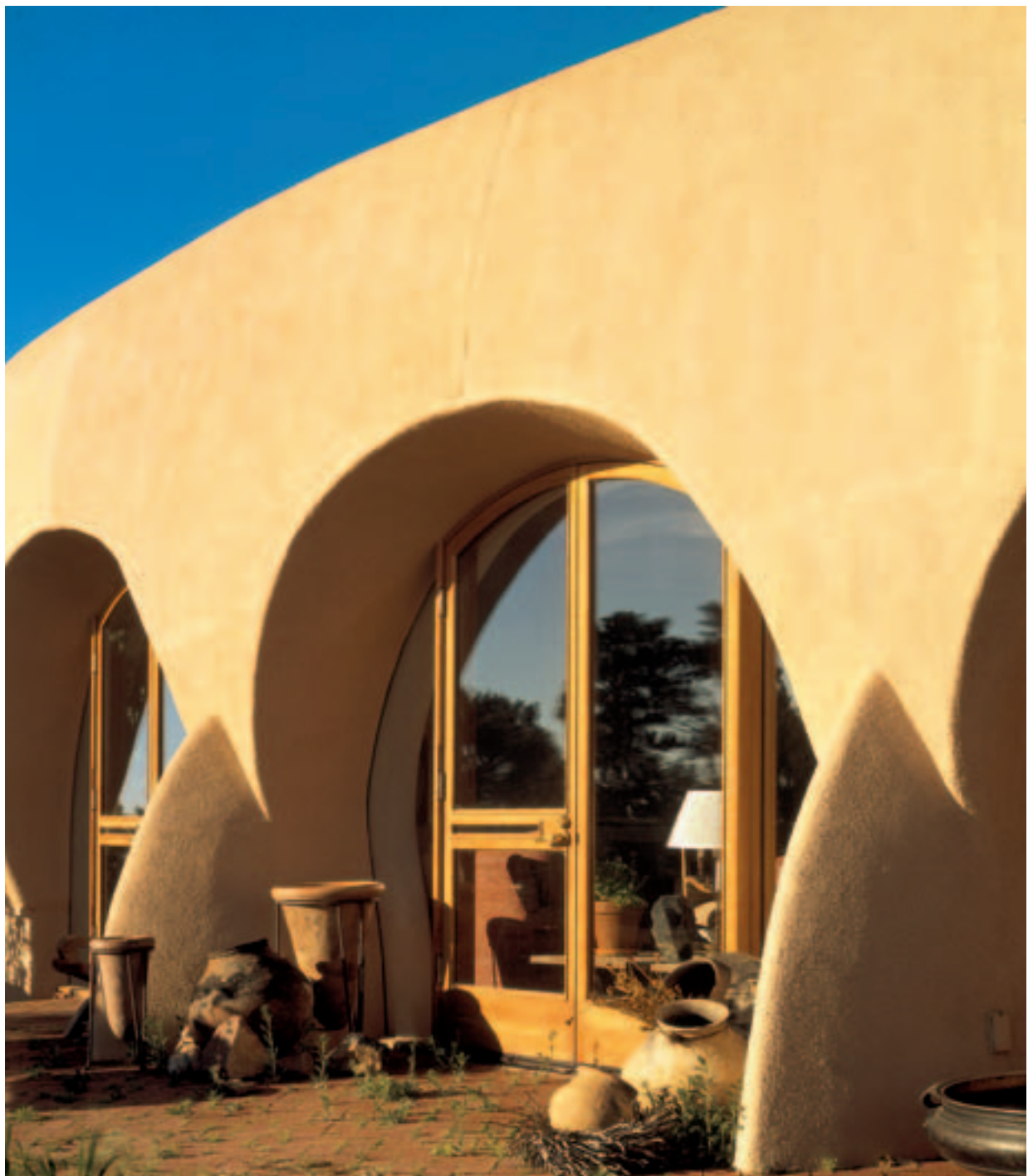


Map of the town

# Pottery House, Santa Fe, USA

Frank Lloyd Wright

Organic architecture – the unity of form and function and, ideally, of building and landscape – was Frank Lloyd Wright's declared credo. This approach is manifested in the "Pottery House" in Santa Fe, which was completed by Taliesin Architects in 1984, 25 years after Wright's death.



## 2. Sto references

### Pottery House, Santa Fe, USA



The “Pottery House” combines influences from pueblo architecture with an organic architectural style.

It was back in 1908 that Frank Lloyd Wright added the concept of “organic architecture” to his vocabulary. For him it was an extension of the concept of “form follows function” evolved by his teacher, Louis Sullivan. Wright developed this into “form and function are one”. For Wright, organic building also entailed blending buildings and landscape into a single entity. “Falling Water”, a house completed in Bear Run, Pennsylvania, in 1937, provides a masterly example of this school. His attitude to the landscape is best summed up by the following quotation: “No house should ever be on a hill or on anything. It should be of the hill. Belonging to it. Hill and house should live together, each the happier for the other.”

Frank Lloyd Wright produced initial design sketches for the “Pottery House” in 1941. They remained unrealised up to his death, however. It was later built by Taliesin Architects in two different versions at two separate locations – one in Phoenix and one in Santa Fe. The house appears to form an organic, intrinsic part of its surroundings. This impression derives not only from the building’s sweeping contours, but also from the uniform ochre colouring of the building and the garden walls. In keeping



with an ancient tradition which goes back to the region’s original Indian inhabitants, the walling of the Pottery House was produced with adobe bricks, to which an organic render was subsequently applied to afford protection from the extreme climatic influences in New Mexico’s semi-desert landscape. Wright used small watercourses and a pond in the oval courtyard to provide the house with a natural form of air conditioning and a pleasant background sound. Most of the interior fixtures follow the oval

The windows are either set back deep in the facade or – as here – are shaded by protecting roofs.

“bowl” shape that gave the house its name. This form is also to be found in the large fireplace in the living room, which is modelled on Indian ceramics.

The walls in the uniform ochre colour blend house and garden into a single entity.

#### Owner:

Charles Klotzsche, Santa Fe, USA

#### Architect (design):

Frank Lloyd Wright, Taliesin West, USA

#### Architects (realisation):

Charles Mantooth, Taliesin Associated Architects, Taliesin West, USA

#### Location:

Santa Fe, USA

#### Sto products:

Facade render (Stolit K 1.5)

Photographs: Sto AG



## Former post office in Bolzano, I

Michael Tribus Architecture

A change for the better has taken place at Bolzano's main railway station: A formerly unsightly building dating from 1954 now sports a new facade which not only provides an attractive overall impression but is also extremely environment-friendly. South Tyrolean architect Michael Tribus has carried out a thorough renovation of the former post office building and transformed it into Italy's first public passive house.



## 2. Sto references

### Former post office, Bolzano, I



The small proportion of window space was ideal for the purposes of converting the building into a Passivhaus.

With heating oil consumption of around one litre per square metre, the former post office building situated directly at platform 1 of Bolzano's main railway station is the first public building in Italy designed to meet the Passivhaus standards. The introverted, somewhat unprepossessing functional building dating from 1954, to which a fourth storey was added in 1975, featured a compact volume and a very low proportion of window space at just 16 per cent, making it an ideal candidate for conversion into a Passivhaus. First, the slightly set back top storey from 1975 was removed and replaced with two new storeys, so that the former post office building now comprises a total of five storeys, each housing 700 m<sup>2</sup> of floor space. In order to attain a high level of heat recovery through the use of a controlled ventilation system, high insulation values were a key consideration in renovating the facade. To this end, the windows were fitted with triple glazing and all the outside walls were provided with a 35 centimetre insulation layer. The regular geometry of the existing punctuated facade was continued on the additional storeys. Window reveals in different designs add a touch of variety to the building's



austere face – the polystyrene insulation around the windows has been cut at various angles using a hot wire. The resultant variations in the design of the reveals have become a key design feature of the facade. The direction and angles of the sloping reveals were determined not only by design criteria, however, but also by the forms of use of the rooms behind the windows and the amounts of daylight needed. The lower rooms receive more light as a result of reveals extending far up the facade, while narrower reveals offer more shade for the upper storeys. At the same time, the side reveals afford individuals views of the surrounding area, according to their positioning.

The old building renovated by Michael Tribus at Bolzano's main railway station used to house the post office.

#### Owner:

Autonomous Province of Bolzano, I

#### Architects:

Michael Tribus Architecture, Lana, I

#### Location:

Rittnerstraße 4, Bolzano, I

#### Sto products:

External wall insulation system StoTherm Vario

#### Applicator:

Isoleur di Pederiva, Bolzano, I

Photographs: René Riller, Schlanders, I



View North-West

## Extension for the Waldorf school, Villingen-Schwenningen, D

Lederer Ragnarsdóttir Oei Architekten

With their extension to the school in Villingen-Schwenningen, Lederer Ragnarsdóttir Oei have continued the unspectacular architecture of the existing building while at the same time creating a new building with a distinctive character of its own. Their example shows that good architecture hinges not on generous budgets, but is rather down to a conscious balancing of functional and design preferences against the attendant costs.



## 2. Sto references

### Extension for the Waldorf school, Villingen-Schwenningen, D

The two-storey building dating from 1985 which houses the Waldorf school in Villingen-Schwenningen differs only little from traditional school buildings of its era, sporting an orange-brown render facade and a pitched roof covered with rust-red shingles. The new building by Lederer Ragnarsdóttir Oei which adjoins the existing school to the south incorporates additional classrooms, a day nursery, a dining room with kitchen and a two-storey hall. It was the architects' declared aim to build an extension that represents an organic addition to the existing building, but in a different architectural style. Towards the entrance yard, the building appears as a continuation of the existing school in a different guise. Window strips with white frames in a glazed finish and industrial metal blinds emphasize the horizontal lines. The building's parapet describes a zig-zag pattern, outlining the gentle slope of the roof surfaces which are drained via voluminous rainspouts. A change of material lends structure to the facade area: While the entire new building sports a coarsely textured roller-applied render finish in sunflower yellow, the areas around the windows on the upper storey have been



coated with a lighter-coloured and smoother float-finished render. At the south of the new building a concreted ramp describes a semi-circle as it leads up to the first floor. Behind this ramp is a gravel-covered, sheltered forecourt for the day nursery which is integrated on the ground floor. Coloured glass panels have been fitted in front of the randomly positioned hall windows in the west facade. A cylindrical tower contains the fire escape, leading outside from the hall gallery. The interior of the

**A ramp leads up to the first floor on the south side of the building. Behind the ramp is the sheltered yard of the day nursery. The facade of the main hall, sporting numerous lively coloured glass panels, can be seen on the left.**

new building is finished in through-coloured loam render in a similar dark yellow to the facade. On the upper floor in particular, the daylight enters through numerous skylights to bathe the rendered curved contours of the stairwell and hall in a gentle luminescence.

#### Owner:

Förderverein für Waldorfpädagogik, Villingen-Schwenningen, D

#### Architects:

Prof. Arno Lederer + Jónunn Ragnarsdóttir + Marc Oei, Stuttgart, D

#### Location:

Schluchseestraße 55, Villingen-Schwenningen, D

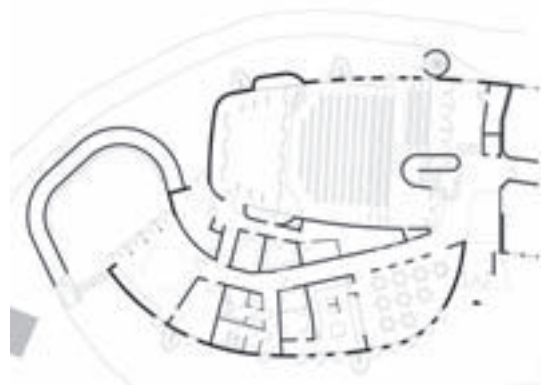
#### Sto products:

Facade render (StoMiral K6 as roller-applied render) in trowelled look

#### Applicator:

Scholl Stuckateur, Gemmrigheim, D

Photographs: Sto AG



Ground floor plan

## Residential house, Pöllau, A

Reinhard Hausbauer

It is a rather rare occurrence for a building to be more energy-efficient in reality than on paper. The house built for the Retter family in the Styrian town of Pöllau (Austria) achieves this feat, however. Thanks to good detailed planning and workmanship this new building, which was planned as a low-energy house, actually undercuts the passive house standard of 15 kWh of heating energy per square metre of living space.



## 2. Sto references

### Residential house, Pöllau, A



From the living room the family enjoys a view of "Pöllau Valley" national park.

The Austrian designer Reinhard Hausbauer has created a home for a family of four which does without a conventional heating system. Although the building was not originally designed as a Passivhaus, it meets the Passivhaus standard by virtue of its good detailed planning and workmanship. The new building has been designed specifically to capitalise on its southern aspect, its large window openings exploiting the available solar energy to the full. When the sunshine is too weak to heat the house, a geothermal heating system provides the remaining necessary heat. This heat is released evenly into the rooms via radiant heating panels in the walls and floors. In the summer months, external solar protection prevents the rooms from overheating. In order to minimise the new building's environmental impact, in addition to its zero-emissions heating system particular importance has also been attached to the use of environment-friendly building materials. The building consists primarily of timber, cellulose insulation, glass and natural stone. Despite its solid appearance, the white rendered plinth storey actually consists of timber, like the upper storey. The walls have been provided with good insulation, with an external wall insulation



system fitted in front of the framed construction. Thanks to the good workmanship and the absence of thermal bridges, the required heating energy per annum actually falls short of the planned 18 kWh/m<sup>2</sup>, at 14 kWh/m<sup>2</sup>. Thermal imaging and a "blower door test" to assess airtightness have confirmed the building's energy efficiency.

The garage situated in the north of the site is connected to the house by a glazed corridor.

The organically bound, coarsely textured render contrasts with the wooden panelling on the upper storey.

#### Owner:

Ingrid and Johann Retter, Pöllau, A

#### Architects:

Reinhard Hausbauer, Ratten, A

#### Location:

Ehrenfeld 612, Pöllau, A

#### Sto products:

External wall insulation system StoTherm Wood,

facade render Stolit K6,

facade paint StoColor Lotusan

Photographs: Reinhard Hausbauer, Ratten, A; Günter Laznia, Bregenz, A



## Products and systems

Introduction · Textures and finishes from smooth to very coarse · Facade insulation systems  
Facade plasters · Facade paints · Surface design · Lacquers and stains  
Refurbishment projects and protection of historical buildings · Balcony coatings



## Sto references

Examples of architecture employing Sto products and systems



## Details

Detail solutions with external wall insulation systems from Sto



## StoColor System

Colour variety, according to the StoColor System and other colour systems  
The 3-level principle behind the StoColor System: The human colour perception area;  
the colour wheel with 24 basic tones; the five colour rows

## Specifications

Support in project planning

## Background information - Facade

Energy-efficient thermal insulation · Advantages and benefits of the Sto facade insulation systems  
Thermal insulation · Moisture protection · Sound protection · Fire protection · Wind loads  
Indoor climate/healthy home environment · Building physical data (U values) · Glossary

## Further information

Specific information and brochures from Sto

# Content



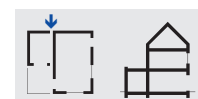
Basic information



W 0XX – System sections



W 1XX – Plinth



W 2XX – External wall/system junctions



W 3XX – Roof



W 4XX – Window and door



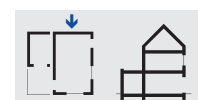
W 5XX – Window sill



W 6XX – Shutters



W 7XX – Balcony and terrace



W 8XX – Structural expansion joints



## Overview of Sto standard details

No.	Detail description	Special/Sto profiles
<b>W 0XX</b>	<b>System sections</b>	
W 010	WDVS, bonded and dowelled	
W 020	WDVS, track attachment	
<b>W 1XX</b>	<b>Plinth</b>	
W 100	Connection to soil and splash zone, mineral system	
W 105	Connection to soil and splash zone, organic system	
W 110	Connection to soil and splash zone (perimeter insulation)	
W 115	Connection to soil and splash zone with starter track (perimeter insulation)	Sto Starter Track
W 120	Connection to soil and splash zone, minimal embedding depth	
W 125	EWIS connection above ground	Sto Starter Track
W 130	Connection with starter track, plinth with glazed brick slip	Sto Starter Track
W 135	Connection with starter track, splash zone	Sto Starter Track
W 140	Connection shock-proof	Sto Starter Track
<b>W 2XX</b>	<b>External wall/system junctions</b>	
W 200	Connection of EWIS to old plaster	
W 205	Connection ventilated rainscreen-cladding system	Sto aluminium-wood mounting
W 215	EWIS connection, level wall	Sto Starter Track
W 220	EWIS connection, gable wall I	Sto Starter Track
W 225	EWIS connection, gable wall II	Sto Starter Track
W 230	Connection of precast concrete element without cover	
W 235	Connection of precast concrete element with sheet metal covering	Sto Starter Track
W 240	Connection of rustic facade	Sto Starter Track
W 245	Plate bearing with Sto Expansion Joint Profile	Sto Expansion Joint Profile type E
W 255	Anchorage	Supporting sleeve
W 260	Sealing of fixed in railing elements	
W 265	Fixing of lamp with StoFix Spirale	StoFix Spirale
W 270	Fixing of awning	StoFix installation element
W 280	EWIS, external corner, bonded and dowelled	Sto PVC Mesh Angle Bead
W 285	Fixing of a fall protection rail with compression plate	
W 290	Fixing of rail water pipe with compression plate	
<b>W 3XX</b>	<b>Roof</b>	
W 300	Connection to eaves with roof projection	Sto Roof Vent Profile
W 305	Connection to eaves with roof projection, non-ventilated	
W 310	Connection to lean-to roof	Sto Starter Track
W 315	Connection to gable	
W 320	Connection to dormer	Sto Starter Track
W 330	Attic formation	
W 335	Parapet creation with sheet metal	

### 3. Details

#### Basic information

## Overview of Sto standard details

No.	Detail description	Special/Sto profiles
<b>W 4XX</b>	<b>Window and door</b>	
W 400	Opening in building, diagonal reinforcement, mineral reinforcement and coating	
W 405	Lintel formation (fire barrier)	Mineral wool lamella
W 407	Lintel formation with continuous firebreak	
W 420	Connection of reveal, window flush with wall	Sto Stop Bead Profi
W 425	Connection of reveal, window offset, with stop bead	Sto Stop Bead Profi
W 430	Connection of reveal, window offset, with sealing tape	
W 435	Connection of reveal, uninsulated	Sto Render Stop Profile
W 440	Connection of window with mounting rail	Sto Stop Bead Profi
<b>W 5XX</b>	<b>Window sill</b>	
W 500	Connection of Sto Window Sill	
W 501	Connection of Sto Window Sill Profi	
W 505	Connection of solid window sill	
<b>W 6XX</b>	<b>Shutters</b>	
W 600	Connection of shutter guide, wooden window with existing shutter rail	Sto Stop Bead Expert
W 605	Connection of shutter guide, wooden window with new shutter rail	Sto Stop Bead Expert
W 610	Connection of shutter guide, renovation with plastic window	Sto Stop Bead Expert
W 615	Connection of shutter box (starter track)	Sto Starter Track
W 620	Connection of shutter box (mesh attachment and drip edge)	Sto Drip Edge Profile
W 625	Connection of blind I, Verotec system	Sto Starter Track
W 630	Connection of blind II, Verotec system	Sto Edge Protection Profile
<b>W 7XX</b>	<b>Balcony and terrace</b>	
W 700	Connection of balcony slab	
W 705	Connection of terrace	Sto Starter Track
W 710	Drip edge formation with drip edge profile	Sto Drip Edge Profile
W 715	Ceiling projection with drip edge	Sto Drip Edge Profile
W 720	Connection of balcony with hollow throat profile	Sto Starter Track
W 725	Connection to terrace	
W 730	Connection of balcony step	Sto channelled plate step
<b>W 8XX</b>	<b>Structural expansion joints</b>	
W 800	Expansion joint profile, surface	Sto Expansion Joint Profile E
W 805	Expansion joint profile, corner	Sto Expansion Joint Profile V
W 810	Expansion joint profile, surface	Sto Expansion Joint Profile type 2/3
W 815	Expansion joint tape, surface	Sto Expansion Joint Profile type 2/3
W 820	Expansion joint bridging with carrier board, 30 – 400 mm	Sto Expansion Joint Profile E

The enclosed construction details represent only a selection from our range.  
Additional detail drawings are available for downloading in the 'Architects' section at [www.sto.com](http://www.sto.com).

# The six most important points when planning an external wall insulation system



Stoll GmbH & Co company building,  
D-Reutlingen-Betzingen (Burk und  
Partner, D-Calw)



In the interests of problem-free planning and execution, it is crucial that only the specified components from the same system are used. We have drawn up a clear and compact 2-page overview of the points which require to be considered here.

## 1 Type of building

- Existing/new building
- Building height
- Wall material

## 2 Building physics

- Fire protection
- Moisture protection
- Sound protection
- Thermal insulation
- Stability

## 3 Basic information

- Insulant
- Fixing system
- Technical approval

## 4 Facade appearance

- Type of top coat
- Colour design

## 5 Details

- Connections
- Facade opening
- Balconies
- Splash water protection

## 6 Installation

See "Check-list for EWIS planning" overleaf

# Check-list for EWIS planning

## EWIS facade insulation on existing and new buildings

This check-list will help planners to assess properties when planning and drawing up the bill of quantities.

Property name.....	Desired colour .....
Address .....	Surface finish.....
Locality .....	Fire classification .....
Scaffold shading (thermal conductivity group 032).....	Insulant thickness optimisation .....
Execution period .....	Date.....
Scaffold spacing .....	Author.....

### 1 Load-bearing capacity of substrate

- ☐ Substrate of adequate load-bearing capacity
- ☐ Substrate of limited load-bearing capacity
- ☐ Substrate of inadequate load-bearing capacity

### 2 Substrate assessment

- ☐ Dirt, soiling
- ☐ Building moisture
- ☐ Contraction cavities
- ☐ Inadequate adhesion within plaster and paint layers
- ☐ Perpendicular and flush wall
- ☐ Settling cracks, shearing cracks
- ☐ Salts
- ☐ Algae, fungi
- ☐ Fouling
- ☐ Rising damp
- ☐ Wall moisture through cracks
- ☐ Leaky installations

### 3 Building details

- ☐ Plinth formation
- ☐ Incorporation into ground
- ☐ Integration to non-insulated surfaces and other parts of the structure
- ☐ Window sills
- ☐ Window reveal insulation
- ☐ Window sill/ledge projection adequate
- ☐ Window shutter track
- ☐ Connection joints
- ☐ Structural expansion joints
- ☐ Attic formation
- ☐ Plate bearing joints

### 4 Fixing system

- ☐ Bonded
- ☐ Bonded and dowelled
- ☐ Track attachment

### 5 Fixtures

- ☐ Lamps, switches, sockets
- ☐ Letter boxes
- ☐ Signs
- ☐ Air conditioning
- ☐ Air grating
- ☐ Awnings, solar protection
- ☐ Lightning conductor
- ☐ Railings, integrated pipe elements
- ☐ Shutter cylinders
- ☐ Bell and intercom systems
- ☐ Downpipes
- ☐ Taps
- ☐ Neon signs
- ☐ Ornamental grilles
- ☐ Oil tank venting pipe

### 6 Building details

- ☐ Balcony slab connection
- ☐ Area subject to a risk of impact
- ☐ Undersides
- ☐ Projections and recesses

### 7 EWIS system structure

- ☐ System components (and choice of dowels):  
.....  
.....  
.....  
.....  
.....  
.....

## House in Zurlindestrasse, Zurich, CH

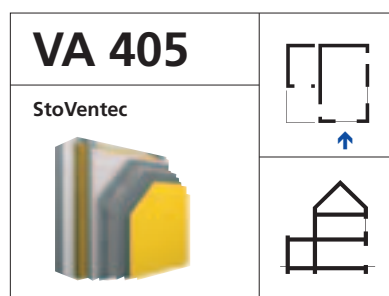
### Facade insulation system StoVentec

It is no easy task to find a contemporary architectural solution for a new building in a setting shaped by houses dating from the period of promoterism at the end of the 19th century. With their multiple dwelling in Zurich-Wiedikon, architects huguen berger fries have demonstrated how classical building styles can be reinterpreted to reconcile a new building with its surroundings. The StoVentec facade insulation system is the ideal choice for the ceramic facade of this town house.

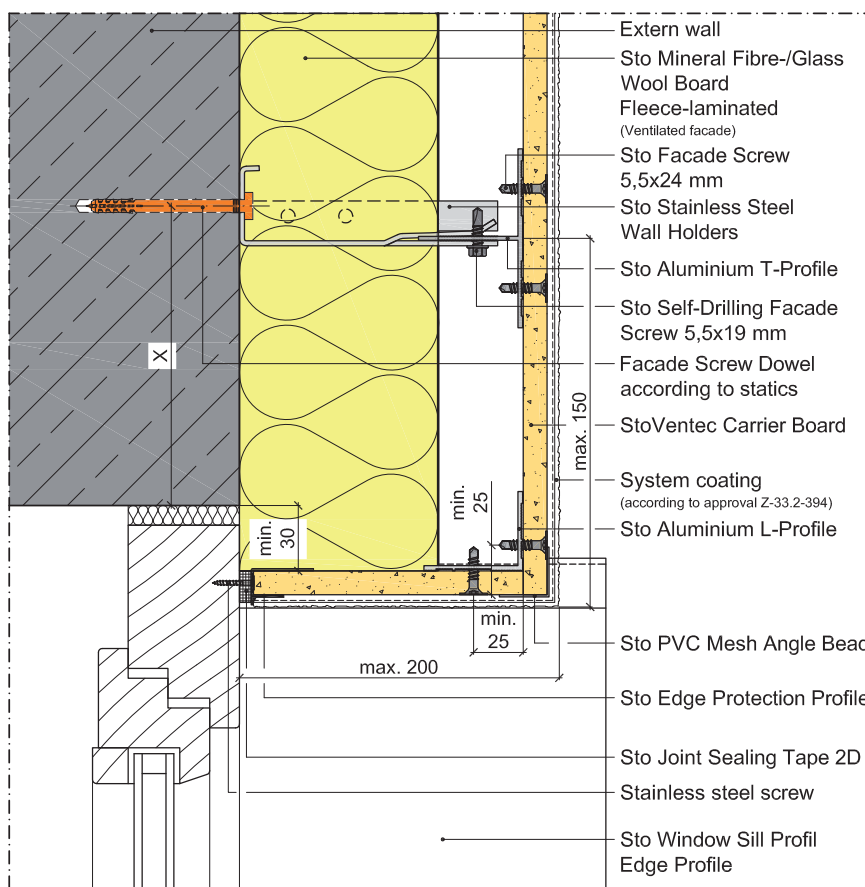
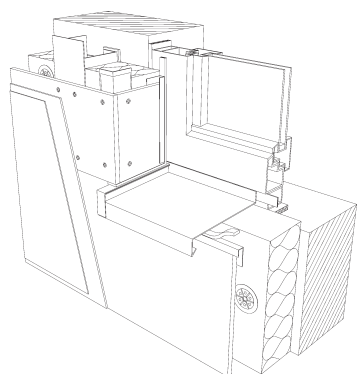


# StoVentec Aluminium sub-construction

Horizontal section, substrate flush with window, system build up max. 20 cm



Rev. Nr. 01/01, 10.09



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## **“Höflin” residential house, Freiburg, D**

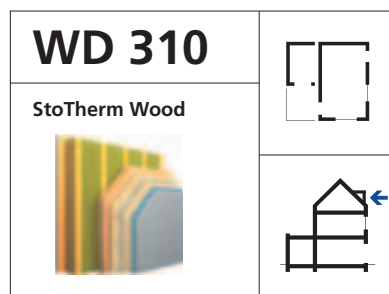
### External wall insulation system StoTherm Wood

Load-bearing timber constructions such as are often still encountered on roof dormers often prove problematic when it comes to selecting an appropriate material for insulation purposes. StoTherm Wood consists almost exclusively of wood, making it the ideal solution for such cases and for all other wood substrates. Problematic damp penetration in the wood construction is avoided by the diffusion-open wood fibre boards. StoTherm Wood thus represents an expedient choice of cladding in both ecological and economical terms, particularly on existing buildings.

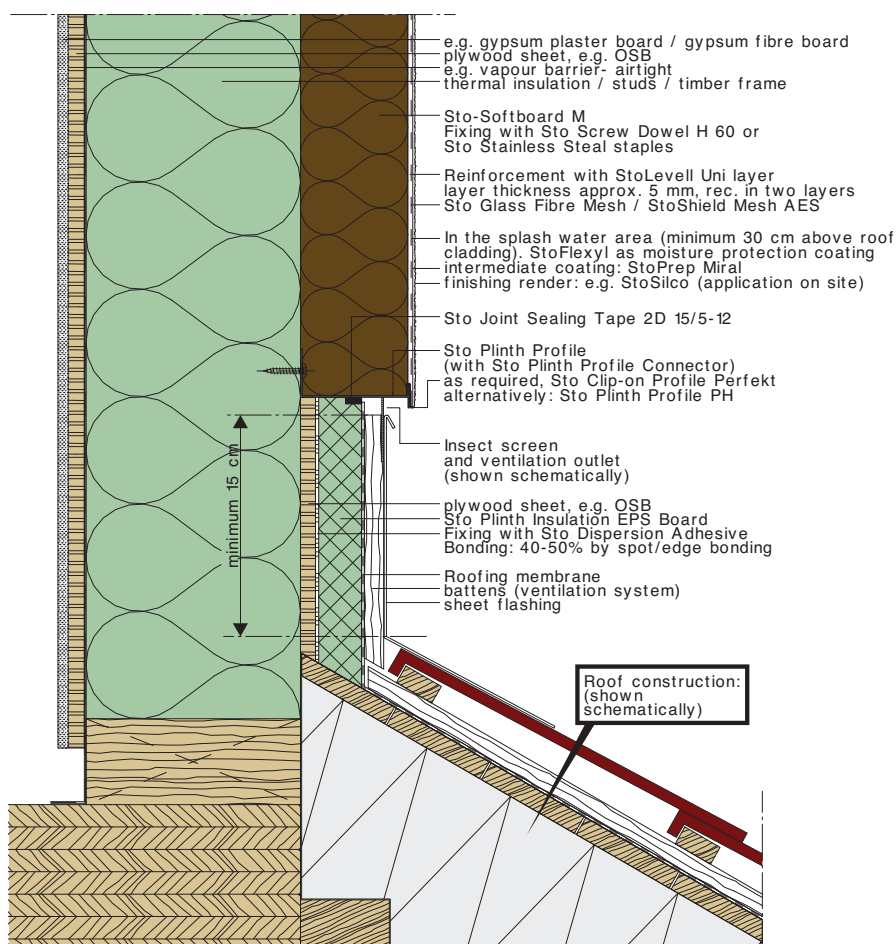
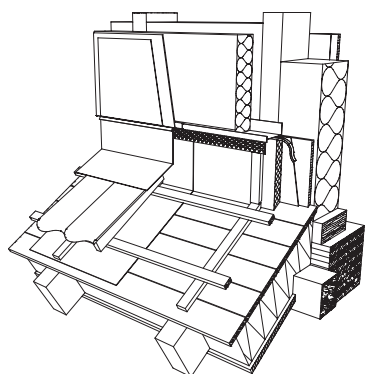


# StoTherm Wood

## Connection to lean-to roof (ventilated)



Rev. Nr. 01/03.10



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## Apartment houses, Sandkamp, D

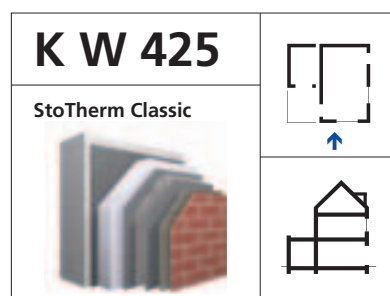
### External wall insulation system StoTherm Classic

When the facade features a combination of different materials it is particularly important to have an external wall insulation system that offers maximum versatility. StoTherm Classic can be rounded off either with a simple plaster finish or with Sto glazed brick slips. This means that the facade system imposes no limits on the scope for individual design.

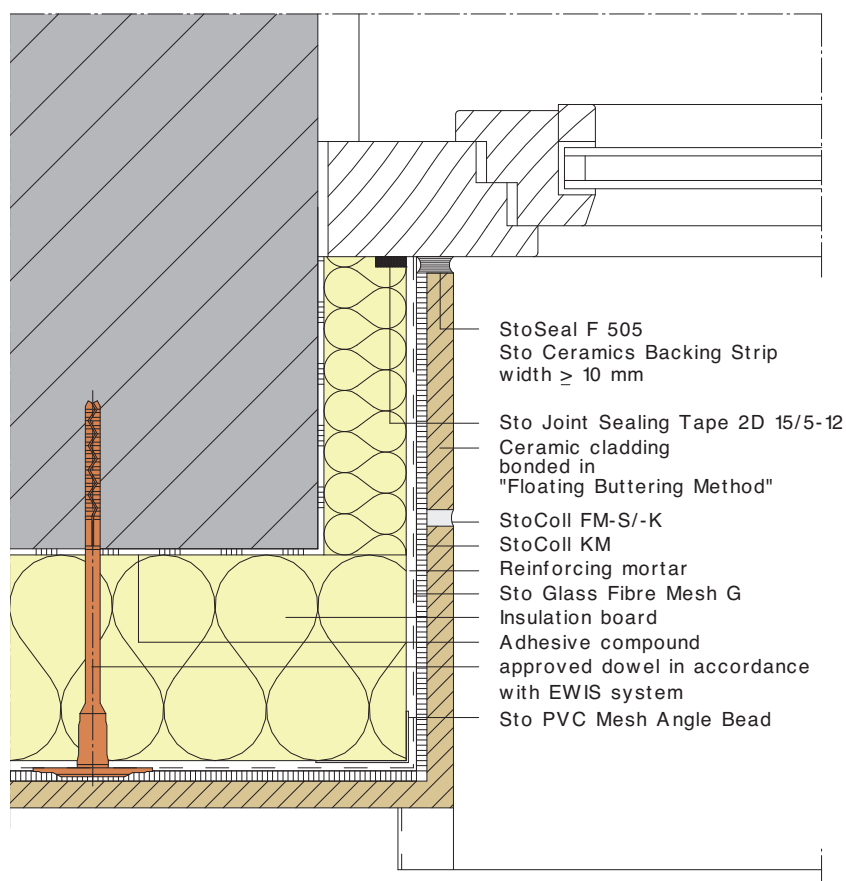
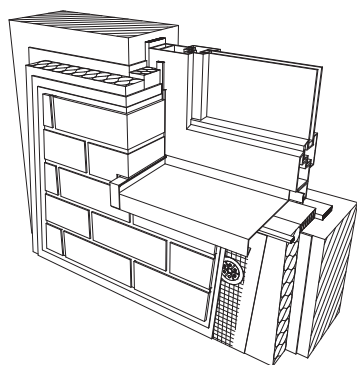


# StoTherm Classic with ceramic cladding

Reveal with corner brick slips



Rev. Nr. 01/02.10



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## **"Grobe" passive house, Ottbergen, D**

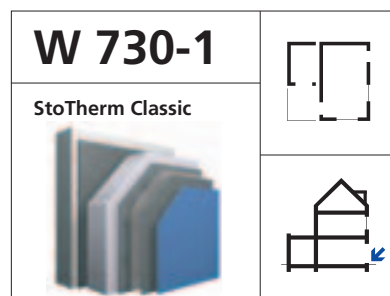
### StoTherm Classic – Connection to Sto checker plate step

In times of ecological awareness, there is no need to sacrifice modern architecture employing steel, wood and glass in the interests of attaining the most comprehensive thermal insulation possible. This is demonstrated by the "Grobe" passive house in Ottbergen, Germany, designed by architect Carsten Grobe. The extensive glazing on the south side makes the most of solar energy. Solar protection is controlled automatically. The 30 centimetre thick thermal insulation in the area of the door leading onto the terrace is protected by the Sto checker plate step with the Sto Window Sill console.

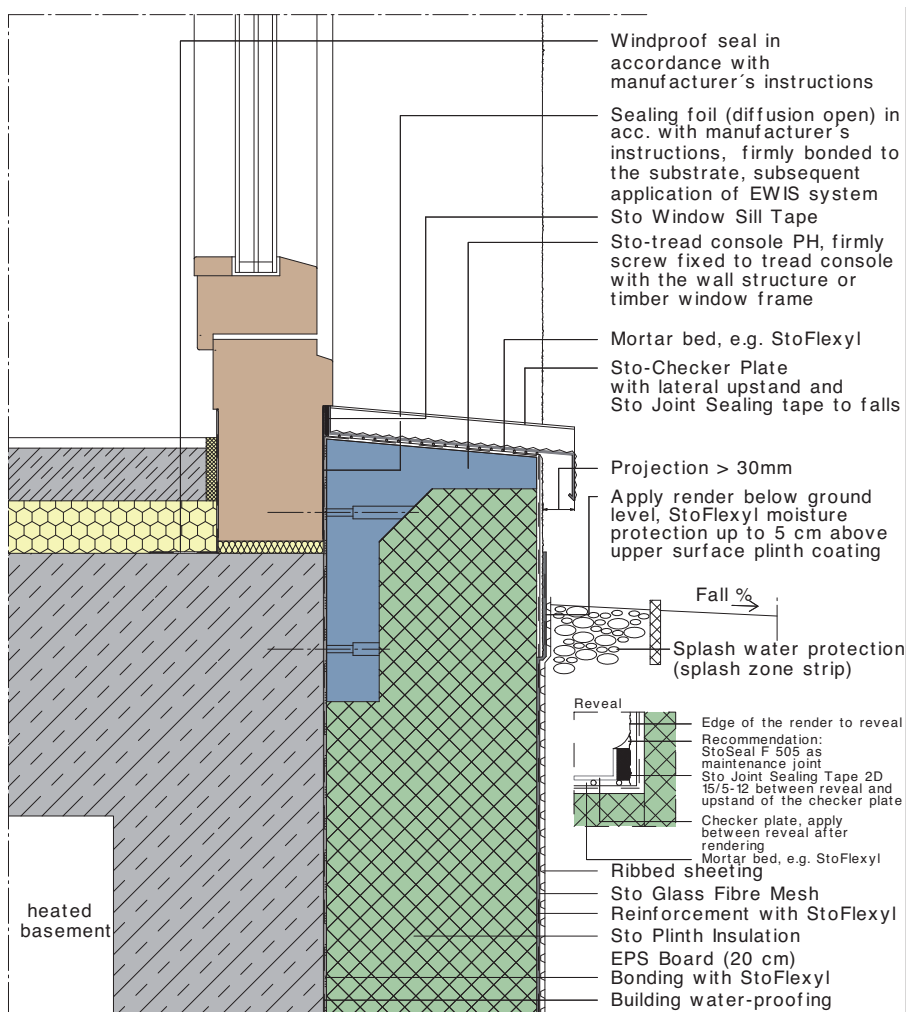
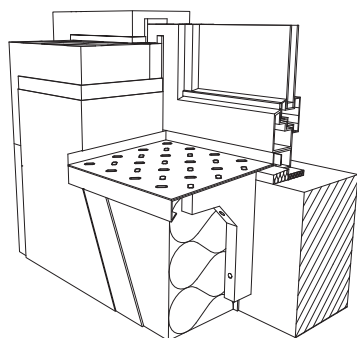


# StoTherm Classic for "Passivhäuser"

## Connection checker plate with Sto tread console



Rev. Nr. 01/03.10



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## Renovation of the “Blümläger Feld” estate, Celle, D

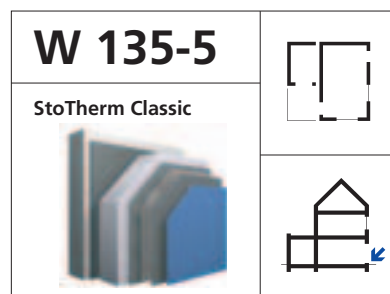
### StoTherm Classic – Sto Starter Profile

Otto Haesler’s “Blümläger Feld” estate dating from 1930 is now a protected historical building. As the building was no longer in keeping with modern-day standards with regard to the sizes of the apartments and its energy efficiency, general renovation was carried out in 2002. In the course of this work, the owner decided to add a storey and to extend the building. The original facade insulation consisting of six centimetre thick pressed straw matting was removed and replaced with StoTherm Classic.

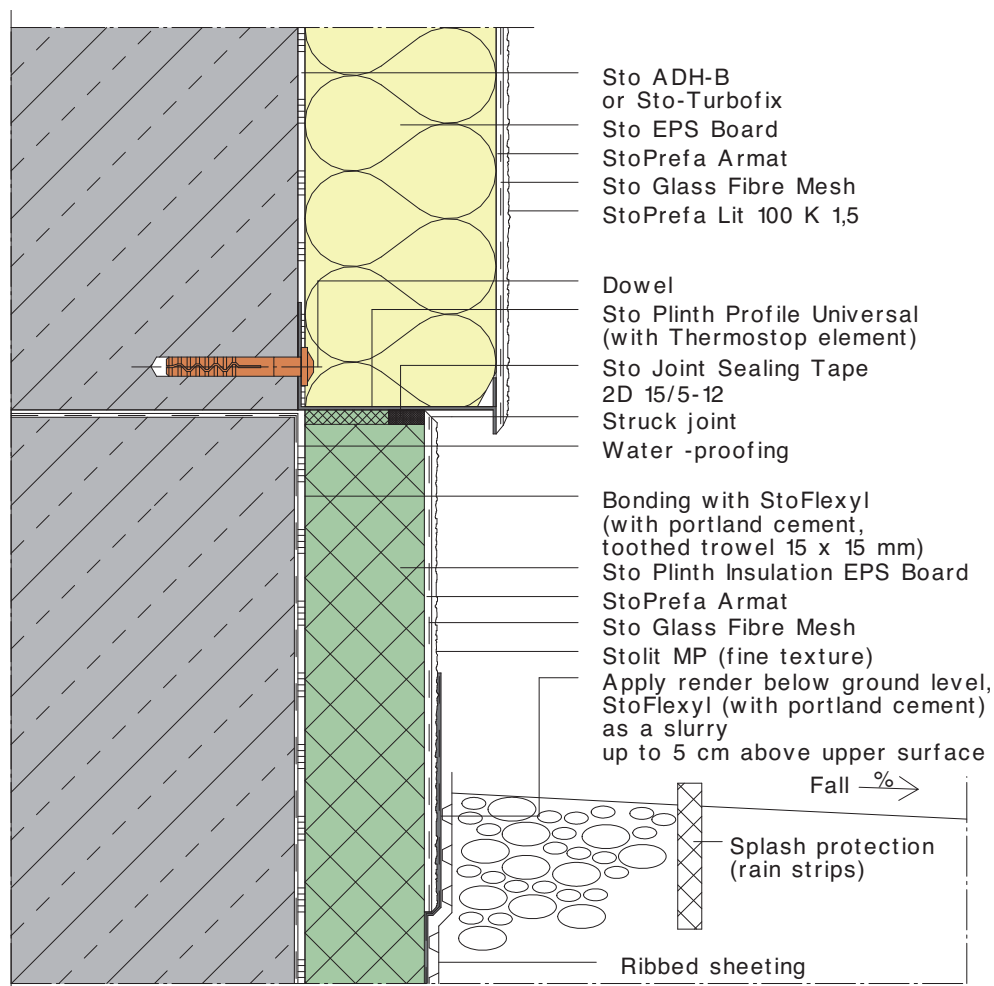
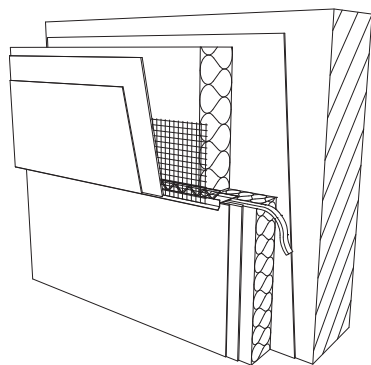


## StoTherm Classic

Connection ground and splash  
water area



Rev. Nr. 01/02.10



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## Renovation of the Verseidag building, Krefeld, D

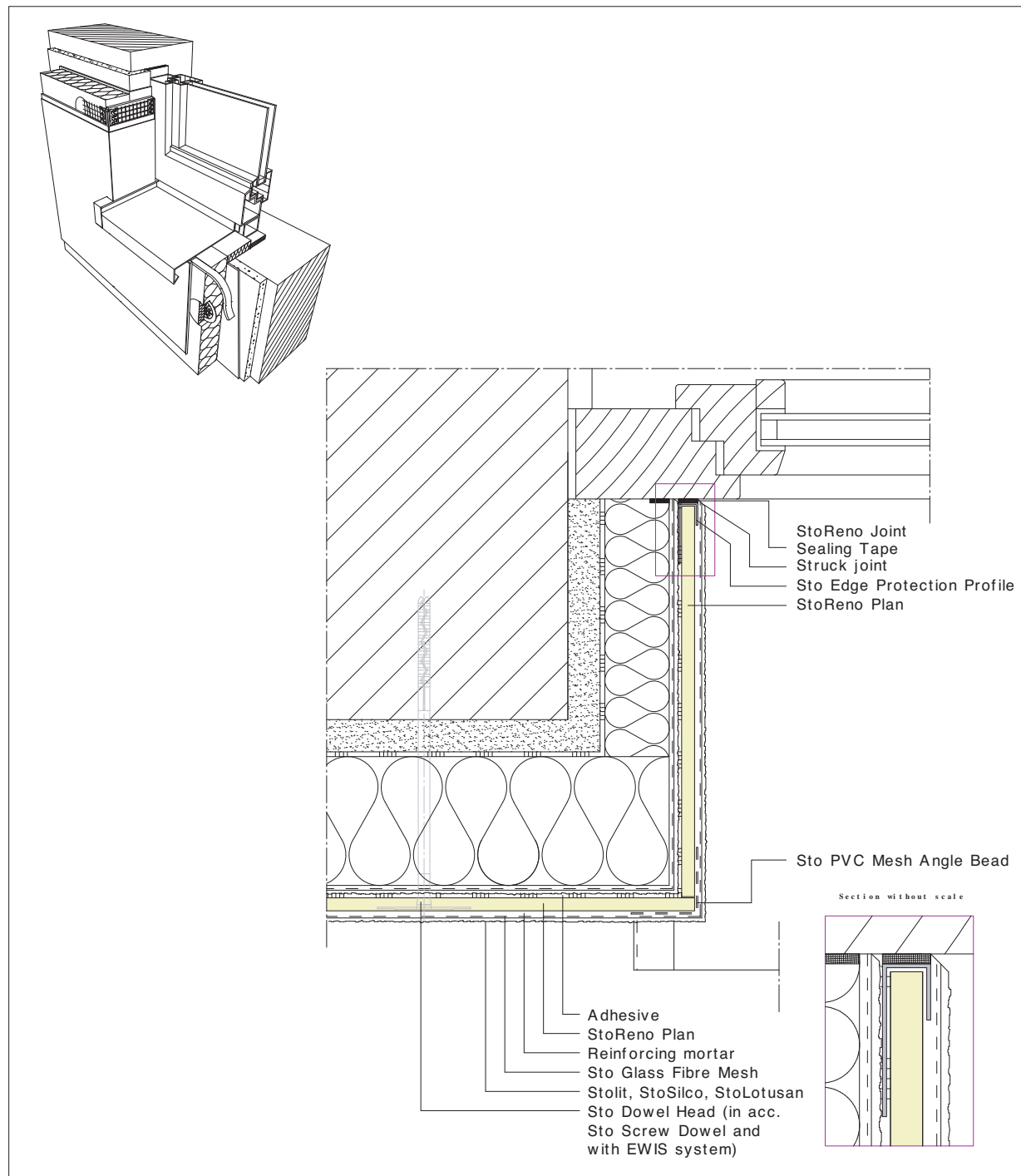
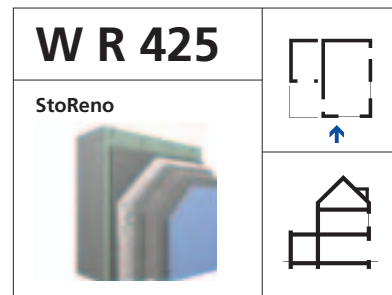
Renovation system StoReno

Ludwig Mies van der Rohe designed the warehouse and distribution building of the present-day Verseidag Technologies back in 1930. Following severe damage in the Second World War, the building was only restored to use in the 1970s. The open-plan interior concept which was typical of Mies was abandoned completely, however. Not until its refurbishment by Karl-Heinrich Eick and the raumkontor interior design firm in 1999 did the building regain its original structure. In order to avoid a facade of oversized proportions, the architects used internal insulation. On the outside they made use of the advantages of the StoReno renovation system.



## Renovation system StoReno

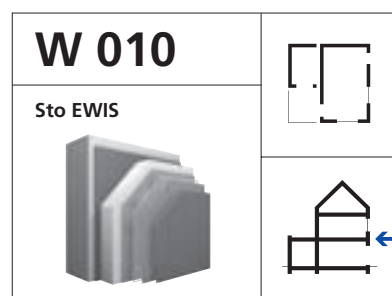
Connetion at reveal with StoReno Plan and Sto Reveal Profiles on the inside and outside



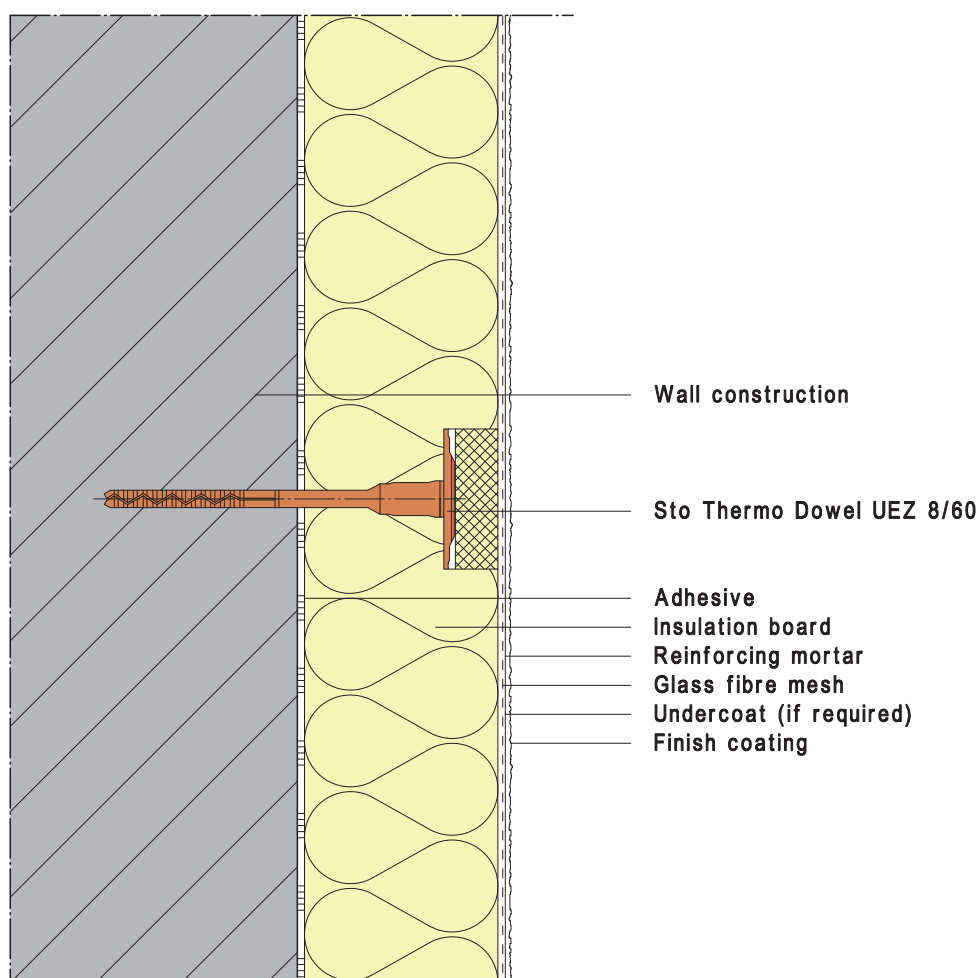
Rev. Nr. 10/02.10

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## EWIS, adhesive and dowels fixing

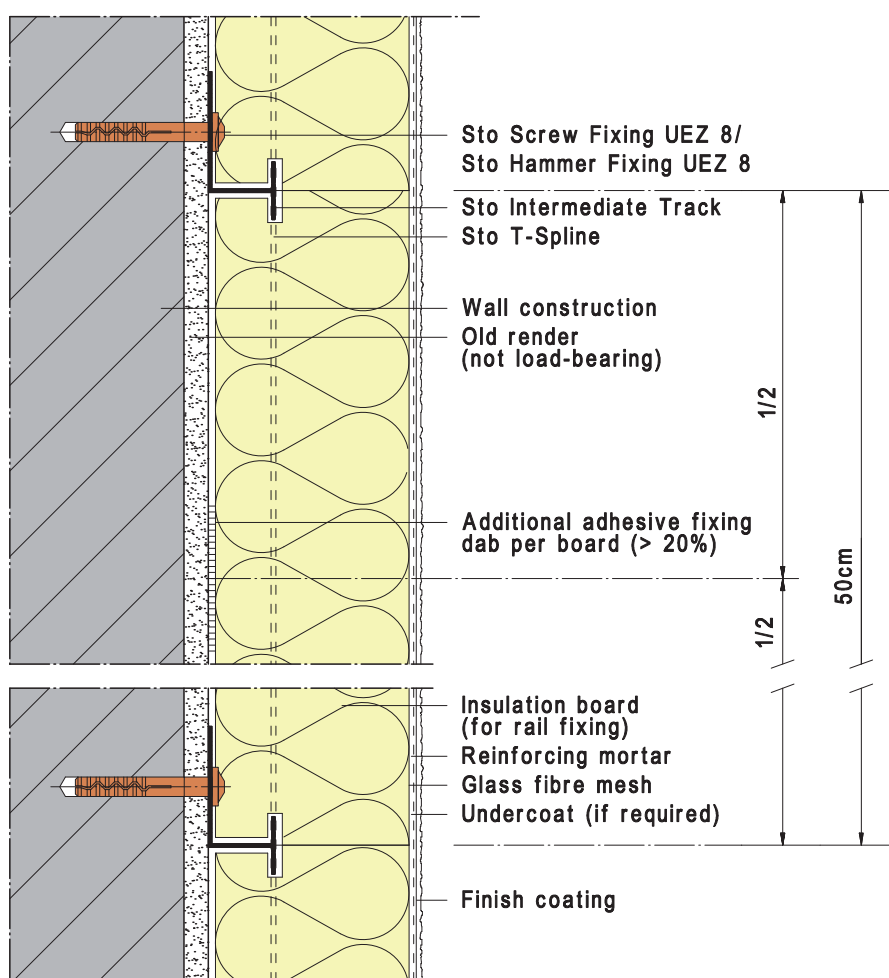
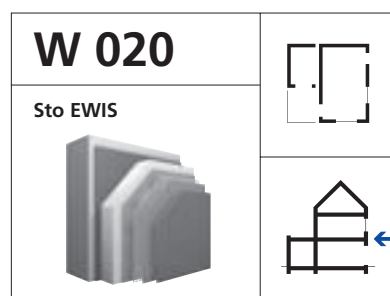


Rev. Nr. 01/08.08



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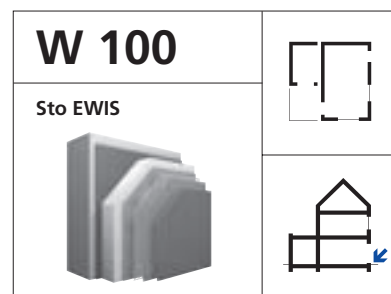
## EWIS, rail fixing



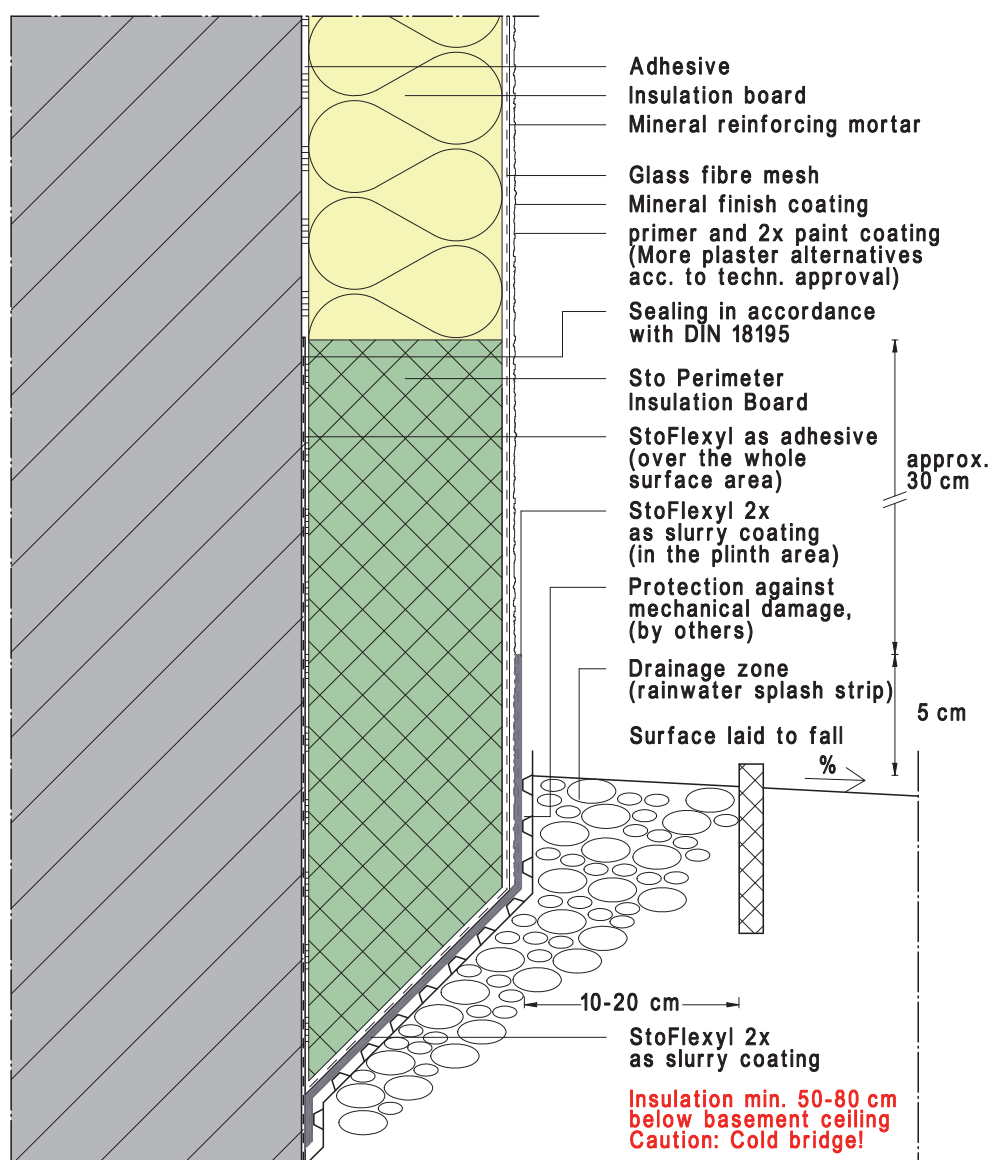
Rev. Nr. 01/08.08

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## Ground and splash water zone, mineral system

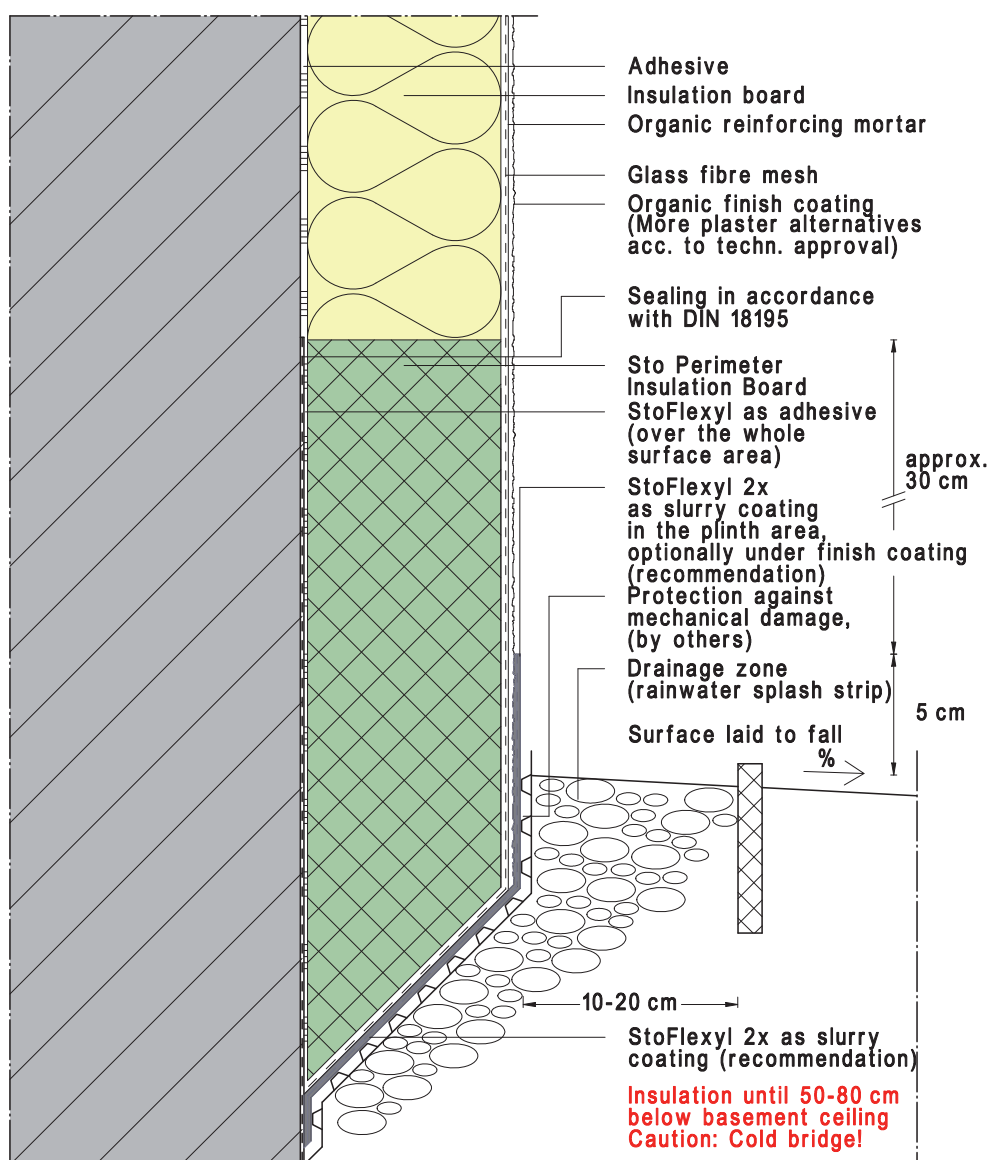
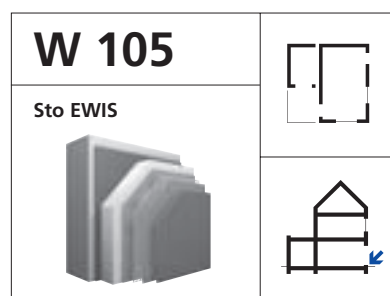


Rev. Nr. 01/08.08



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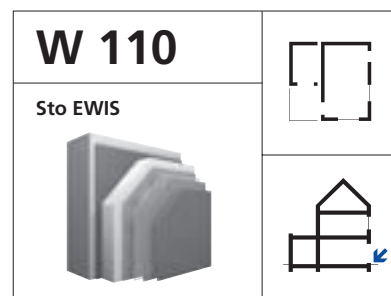
# Ground and splash water zone, organic system



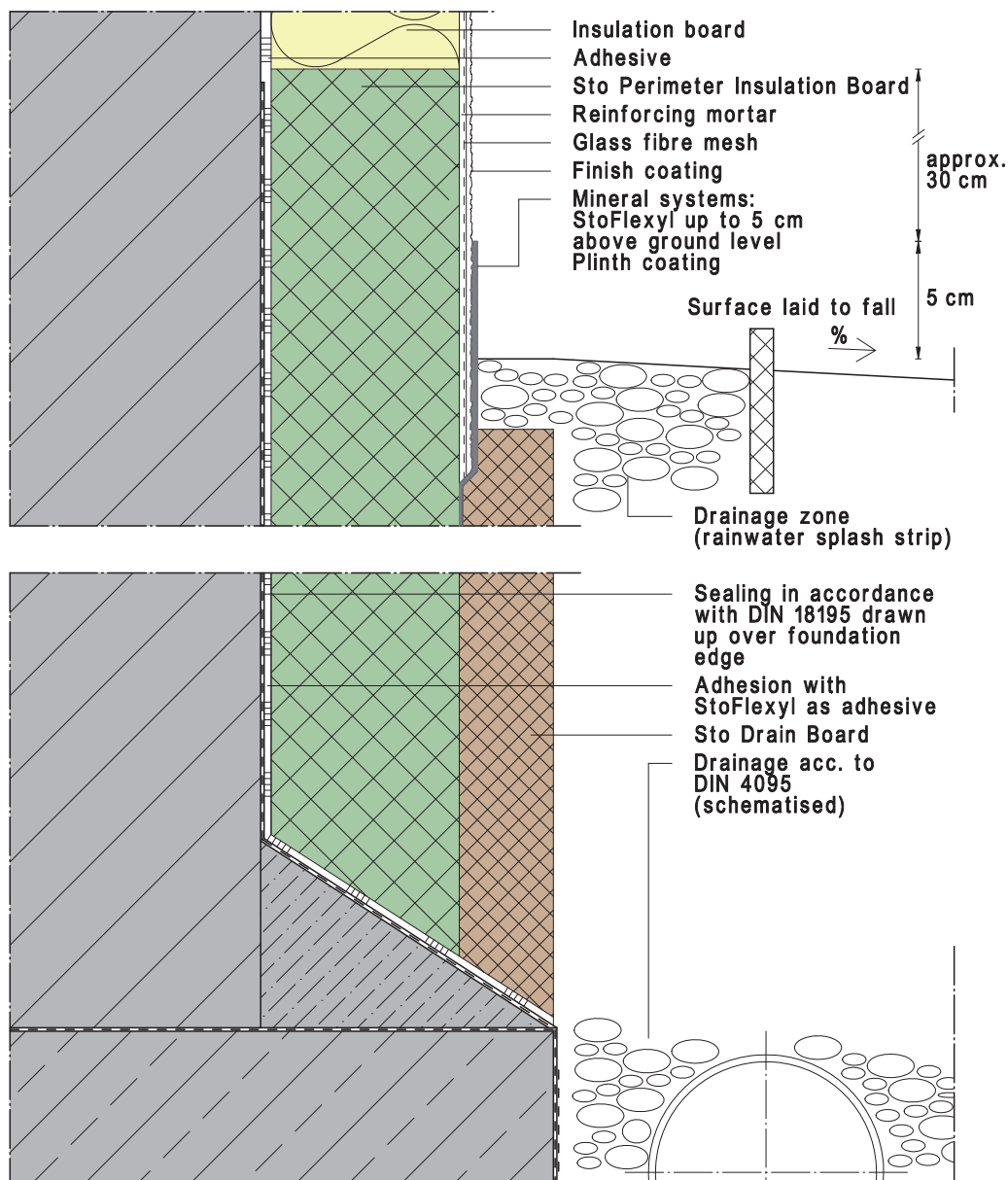
Rev. Nr. 01/08.08

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## Ground and splash water zone, with perimeter insulation

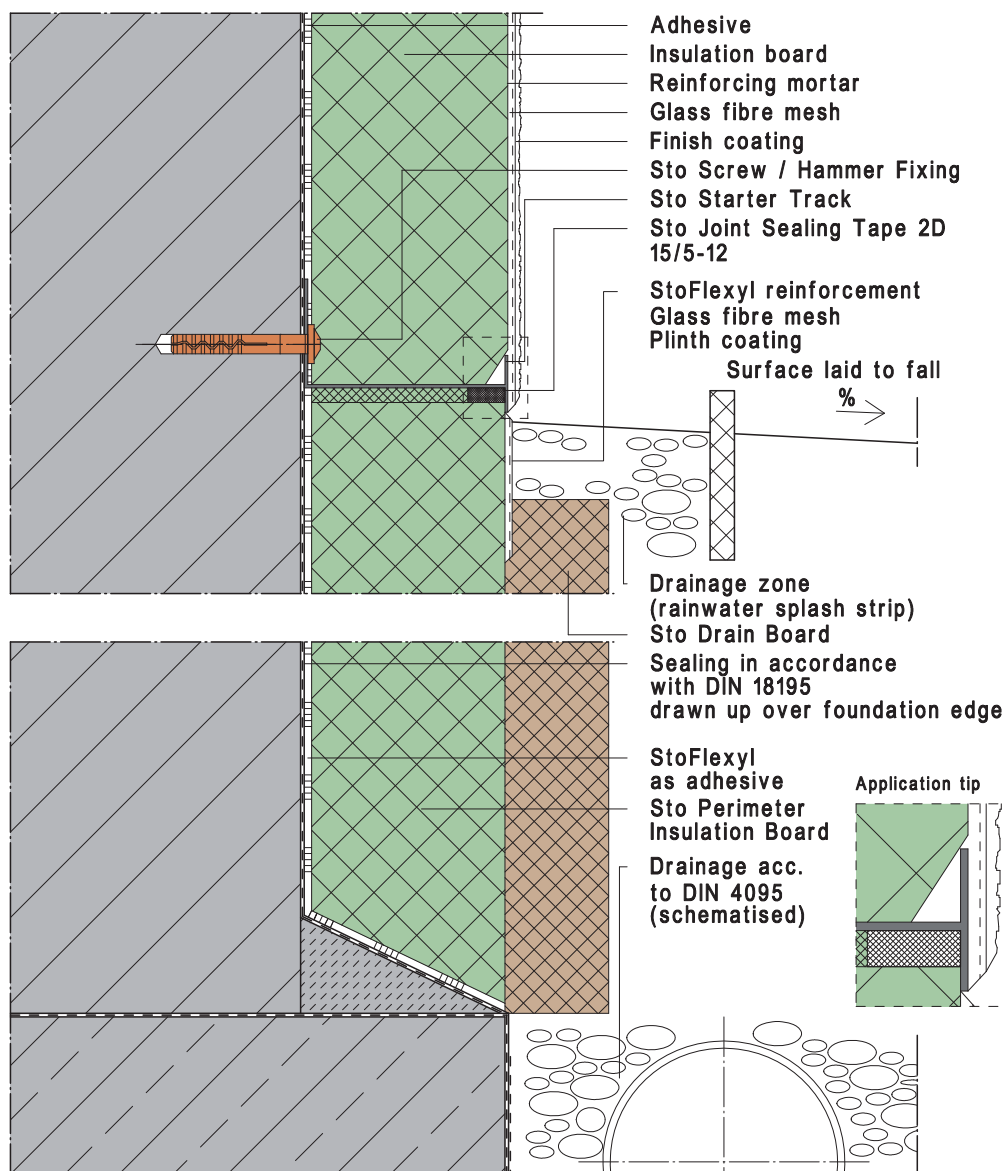
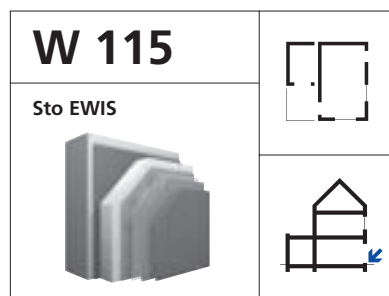


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# Ground and splash water zone with starter track, organic system

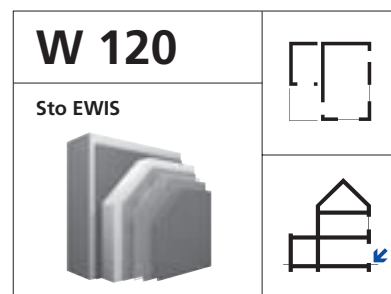


**Caution: Cold bridge!**

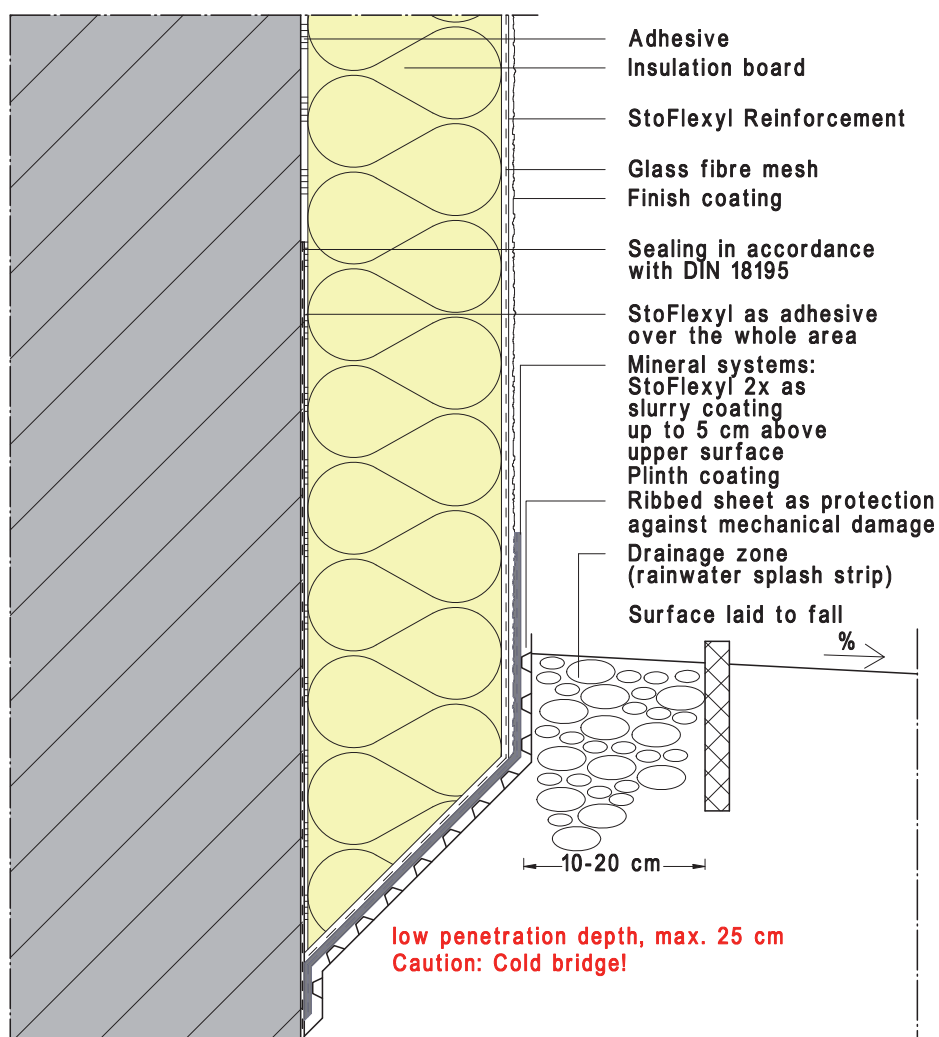
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## Ground and splash water zone, organic system, penetration into ground max. 25 cm

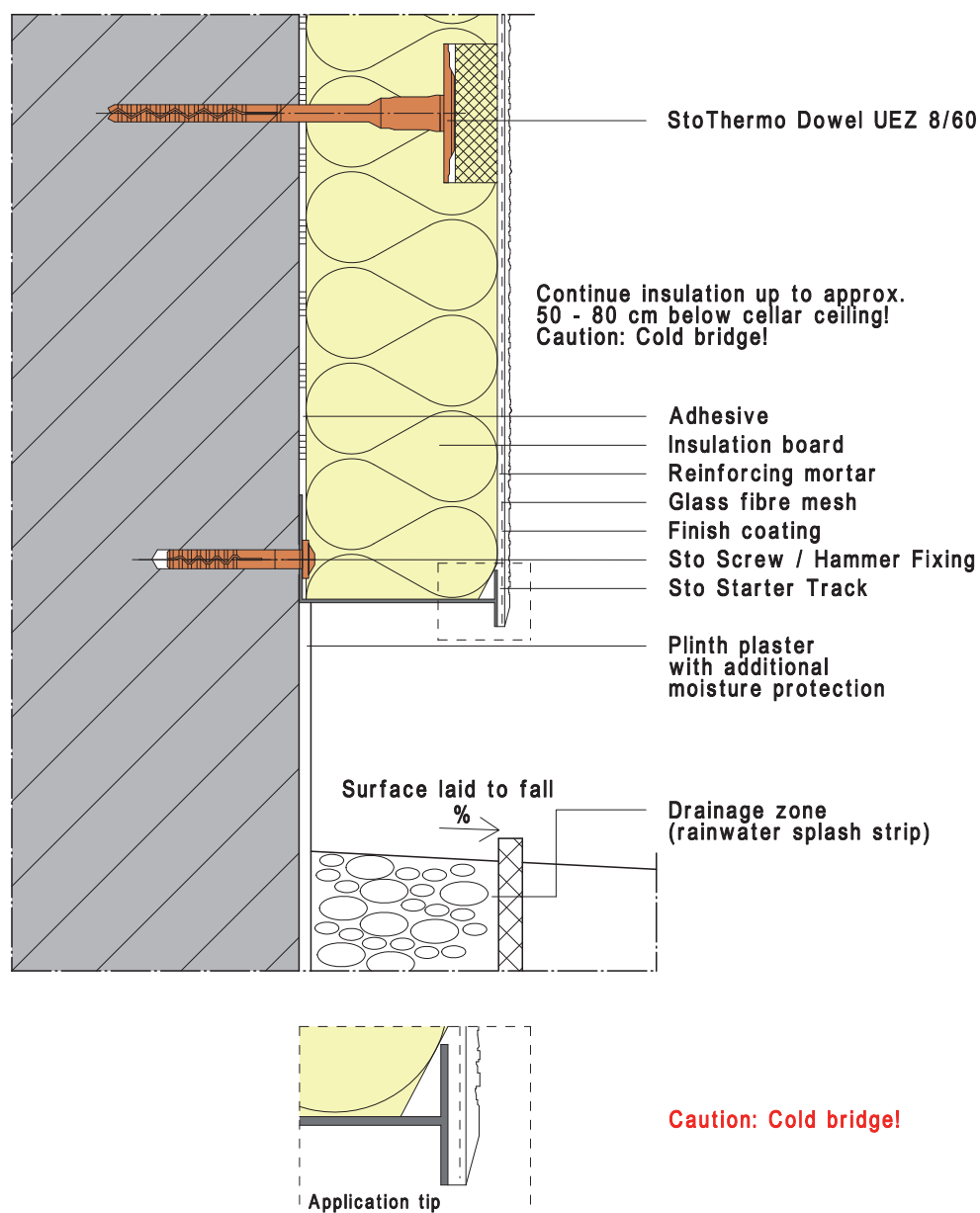
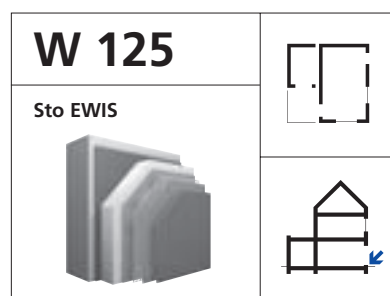


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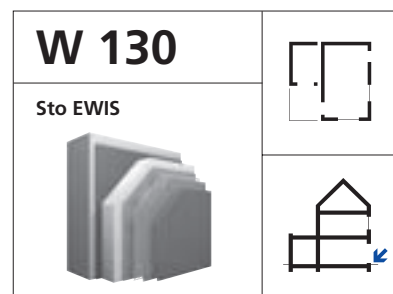
# EWIS, above ground level zone



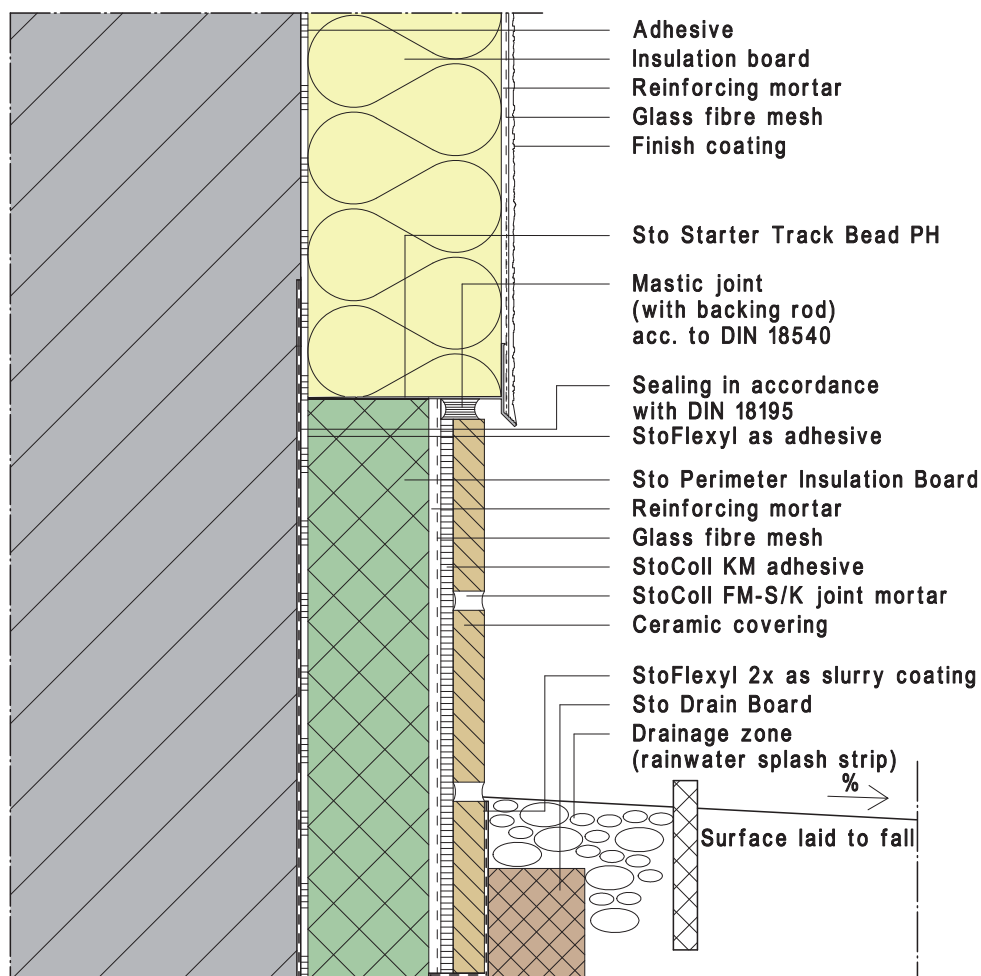
Rev. Nr. 01/08.08

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# Above ground level zone with Sto Starter Track Bead PH, plinth with clinker

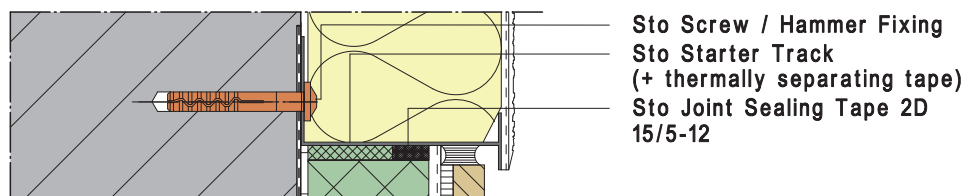


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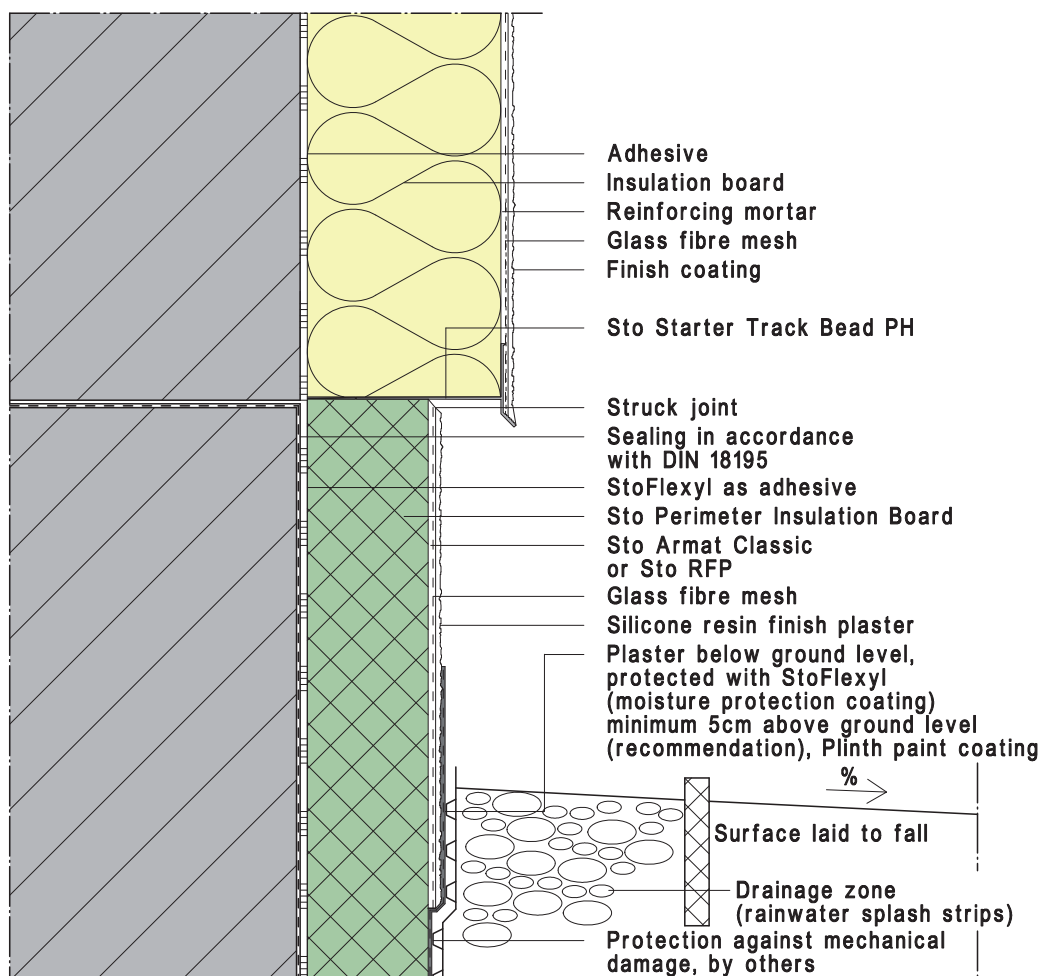
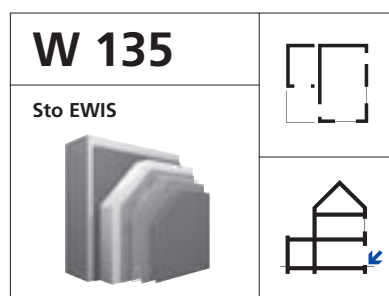
## Alternative with Sto Starter Track

**Caution: Cold bridge!**



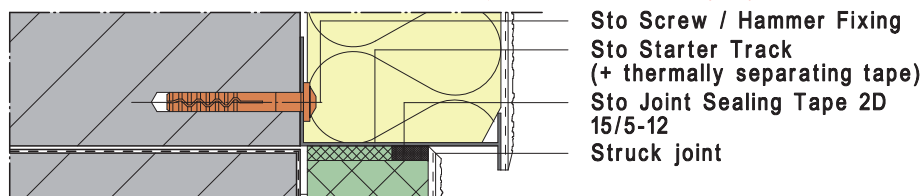
Note: Adjacent trades are shown in schematic form only. This detail is a design proposal which describes the essential modes of functioning of an EWIS / rainscreen cladding system in the example shown. The applicator/client is responsible for verifying the applicability and completeness of the system in the specific construction project concerned. This detail in no way represents a substitute for the necessary planning for the respective trades, detailed planning and installation planning. The applicator/client remains solely responsible for verifying compliance with the requirements of the building owner or the relevant planning authority with regard to the design of the facade. All dimensions are to be verified and specified by the building contractor and/or the building owner.

## Connection with Sto Starter Track Bead PH in splash water zone



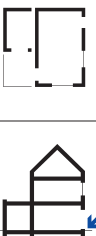
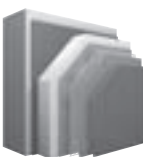
### Alternative with Sto Starter Track

( Caution: Cold bridge! )

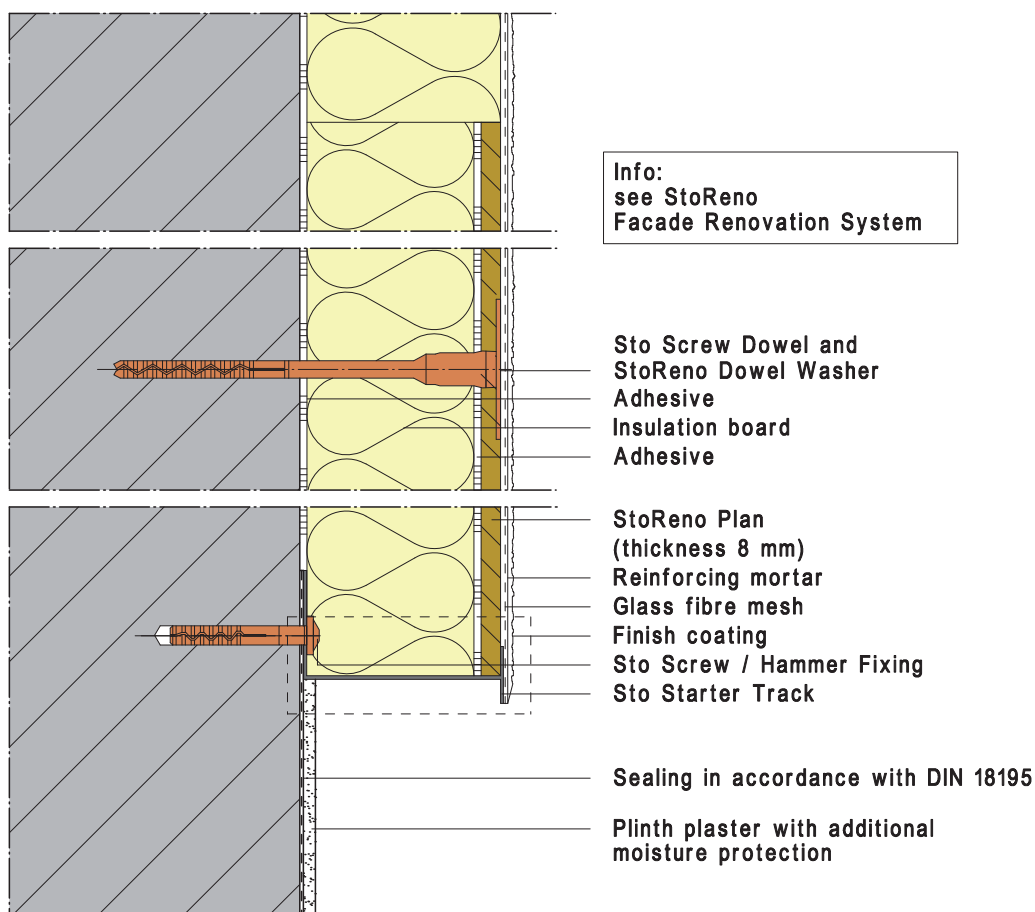


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# Impact resistant EWIS

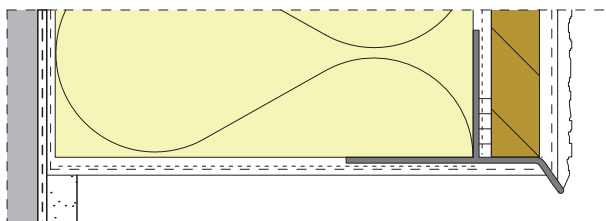
<b>W 140</b>	
<b>Sto EWIS</b> 	

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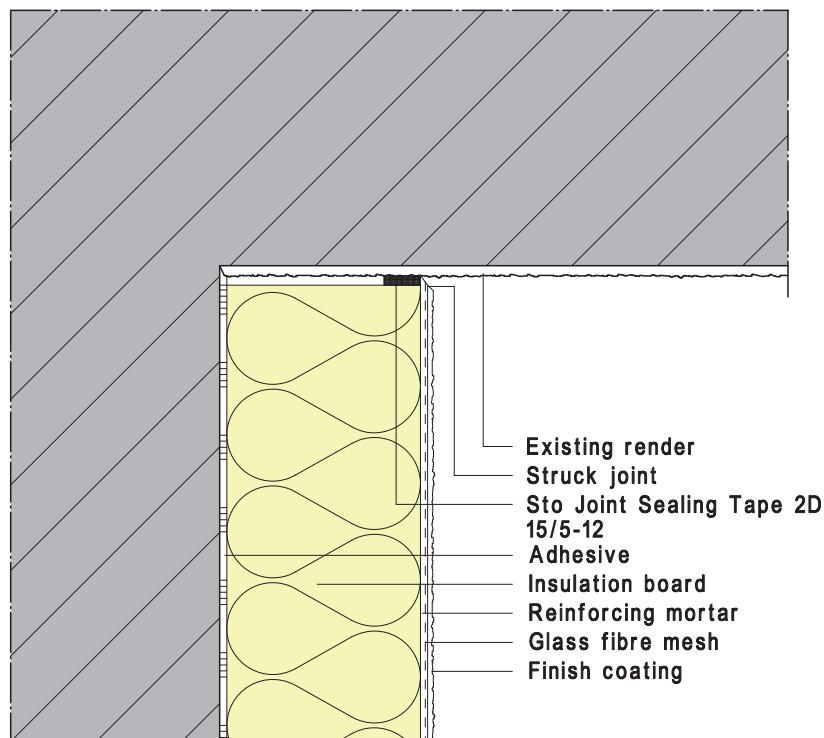
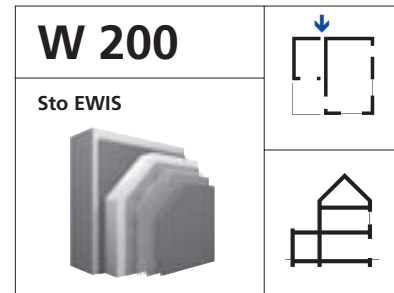
**Caution: Cold bridge !**

**Alternative: Sto Drip Edge Profile Vario**



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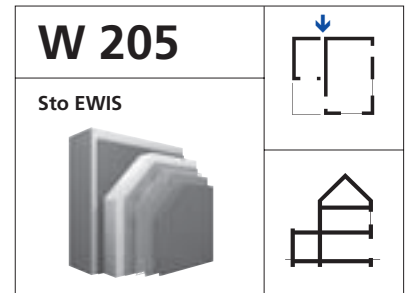
## Connection EWIS to existing rendered facade



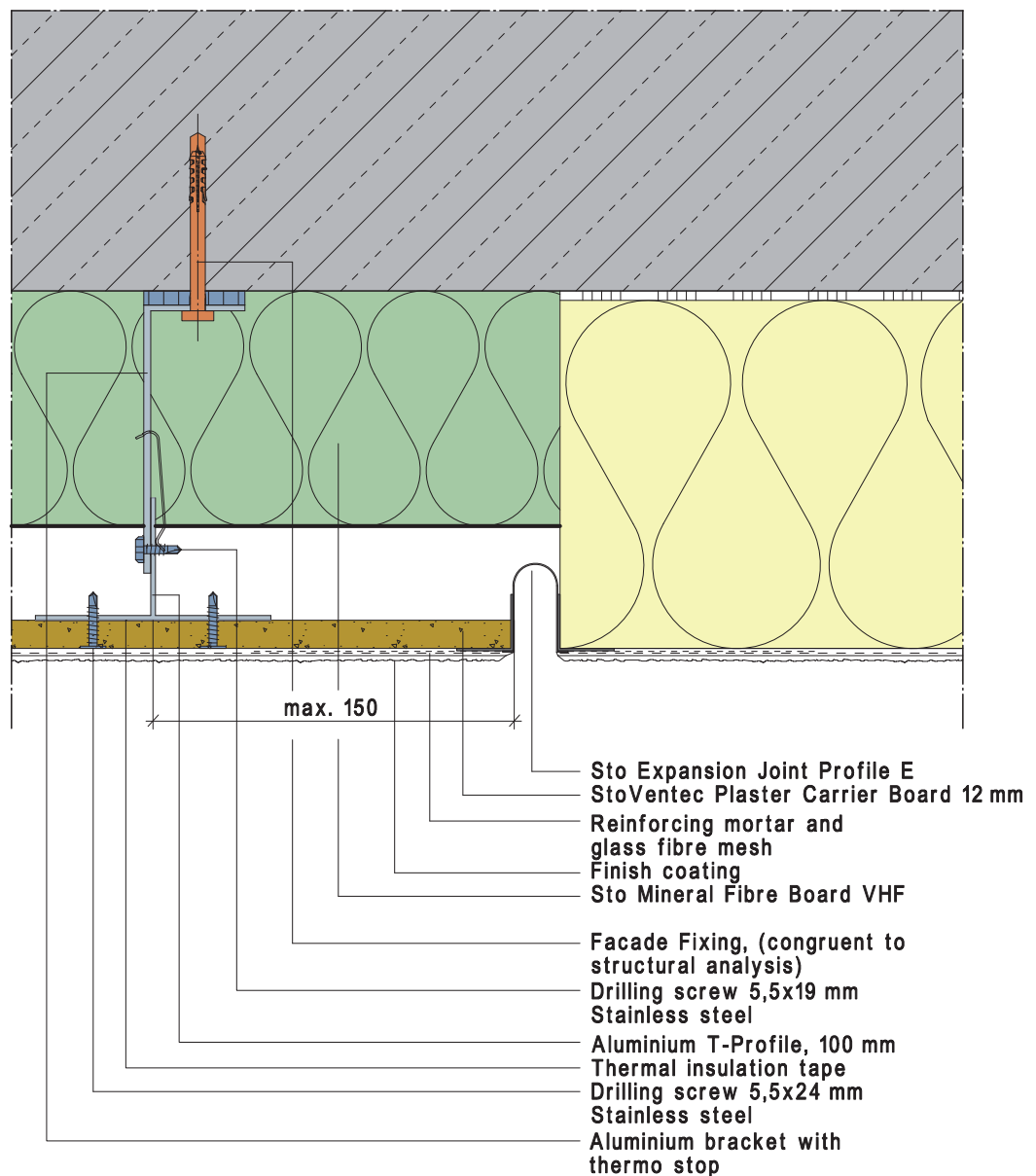
Rev. Nr. 01/08.08

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# Connection to ventilated rainscreen cladding system with Sto Joint Expansion Profile Type E

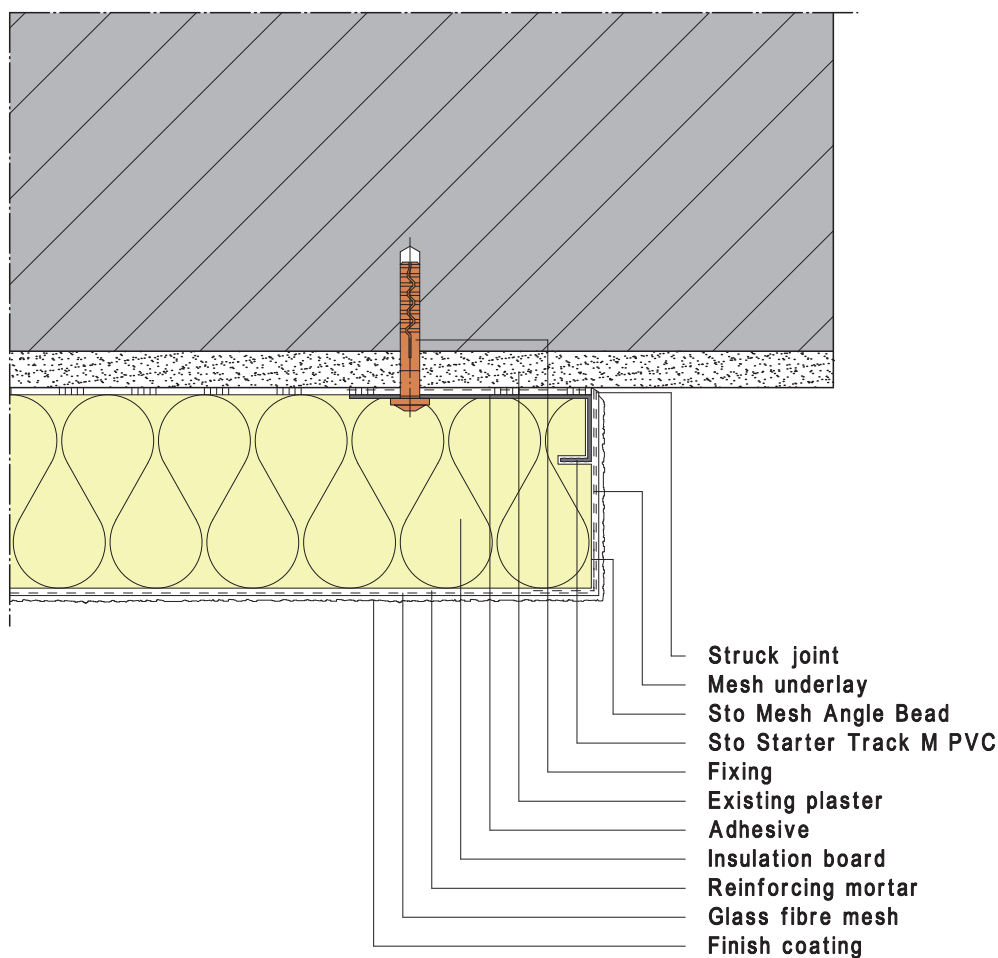
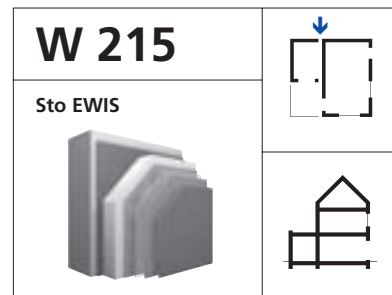


Rev. Nr. 01/08.08



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## Connection to existing rendered facade in even wall surface level



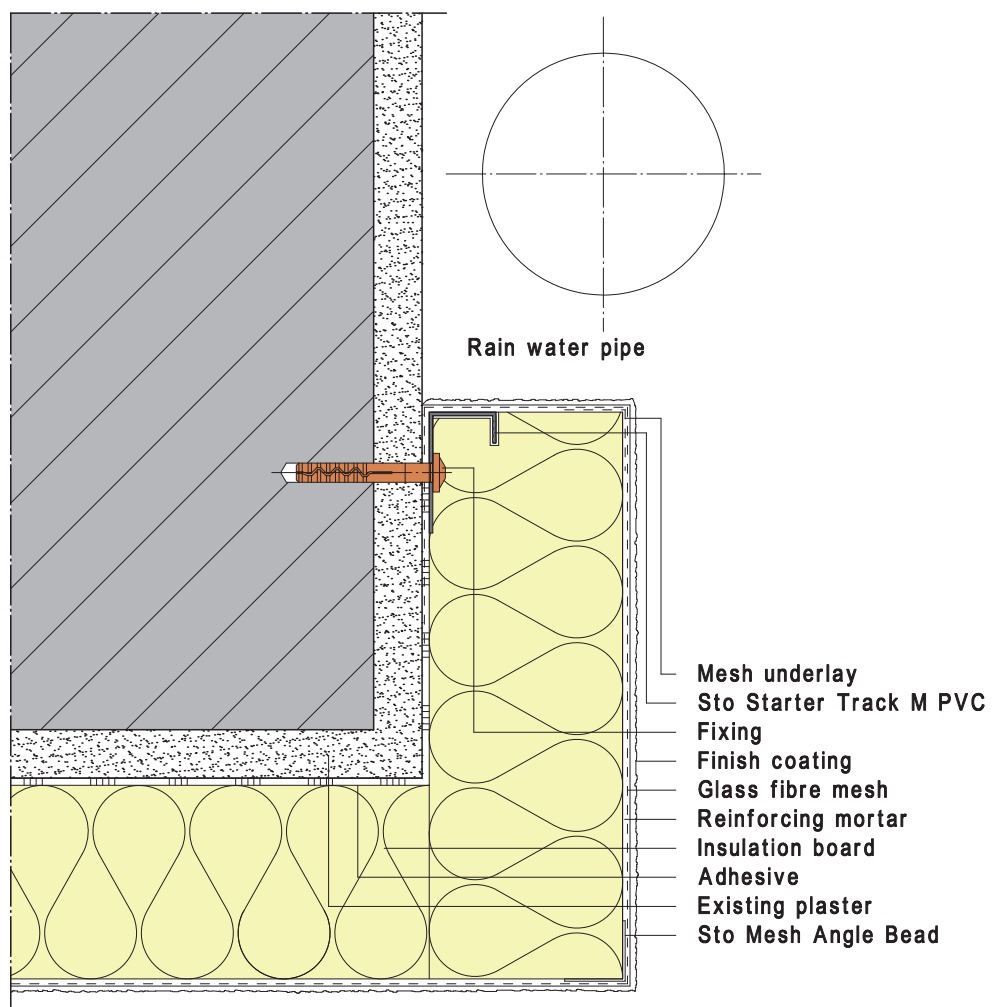
Rev. Nr. 01/08.08

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## Connection EWIS to gable wall I

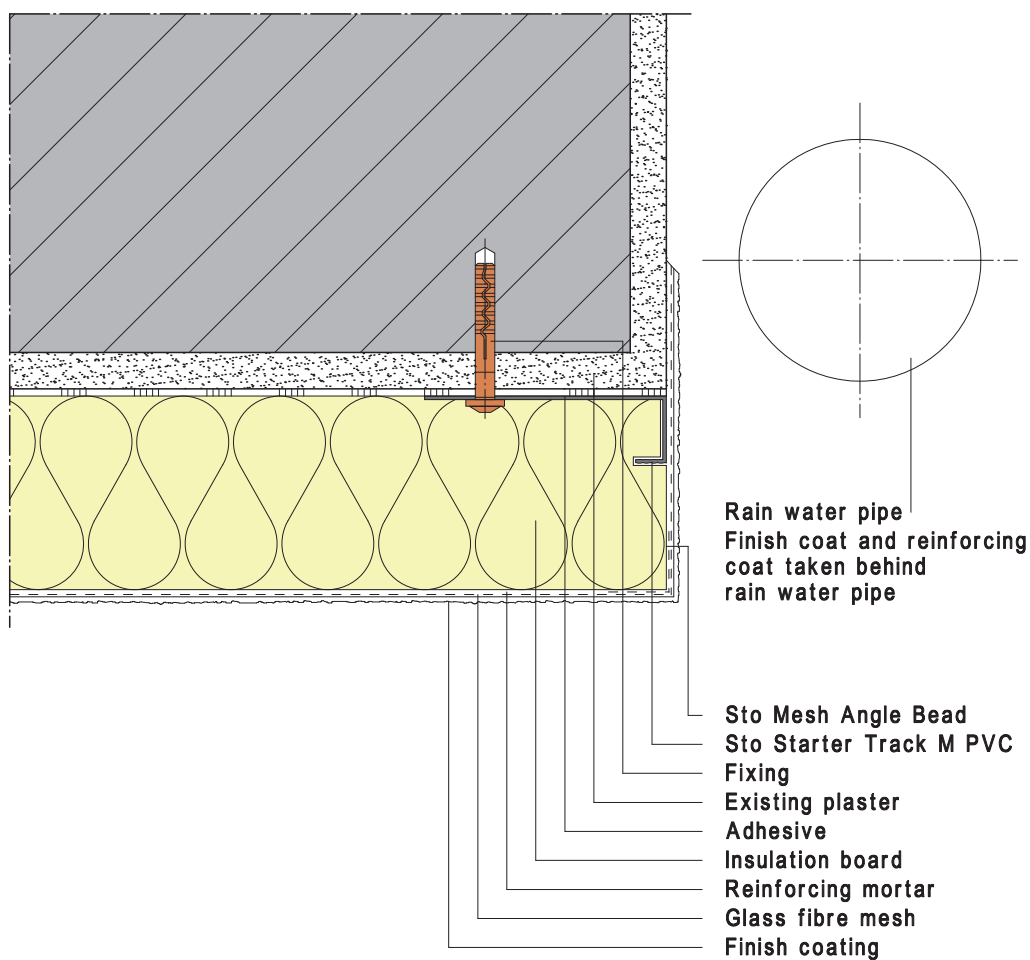
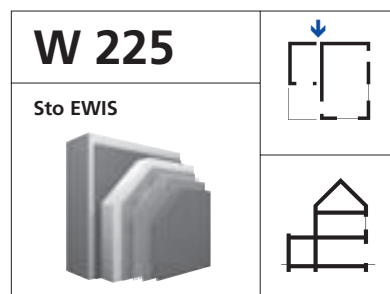
<b>W 220</b>	
<b>Sto EWIS</b> 	

Rev. Nr. 01/08.08



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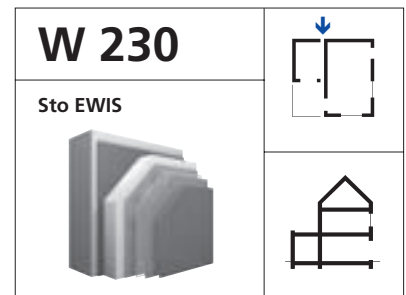
## Connection EWIS to gable wall II



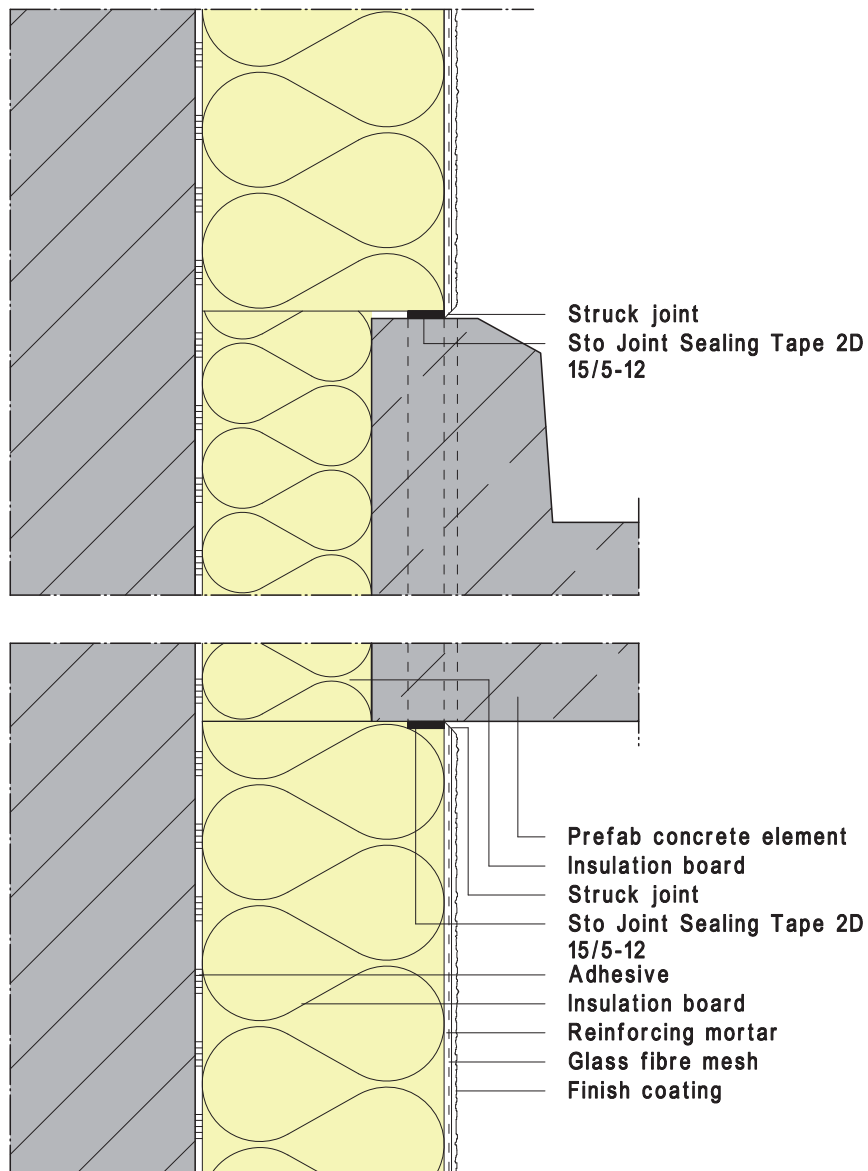
Rev. Nr. 01/08.08

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## Connection EWIS to gable wall

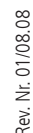


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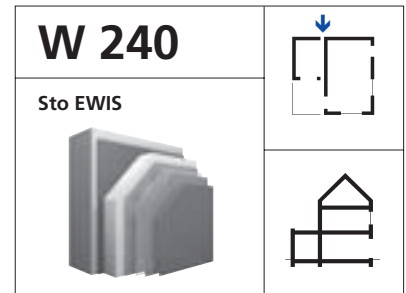
<h1>W 235</h1>			
<p>Sto EWIS</p> 			
			



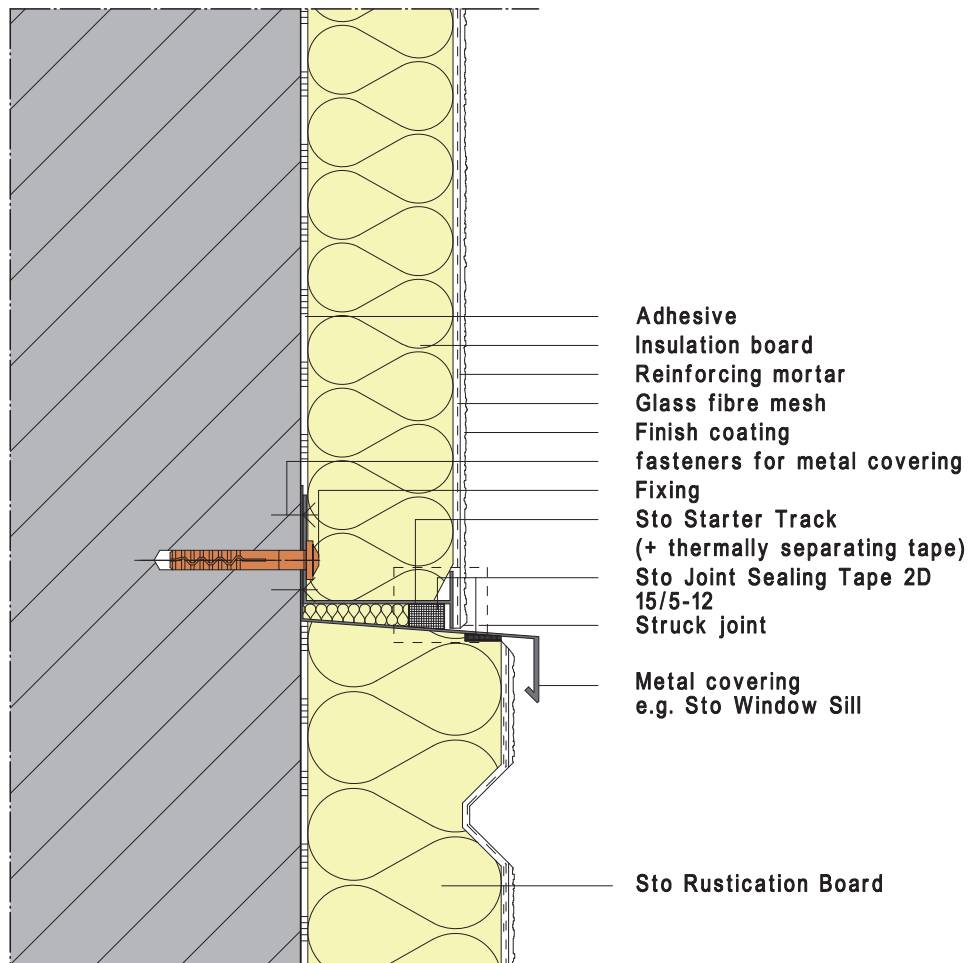
**Caution: Cold bridge!**

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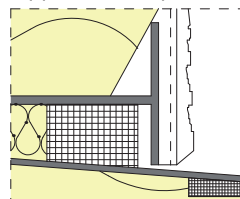
## Connection to rustication boards



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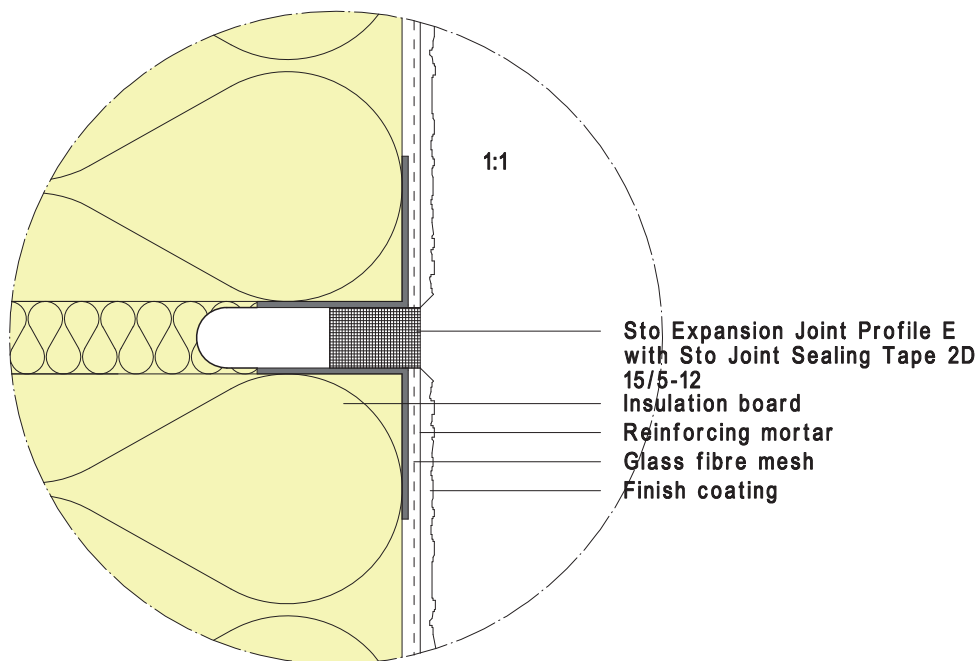
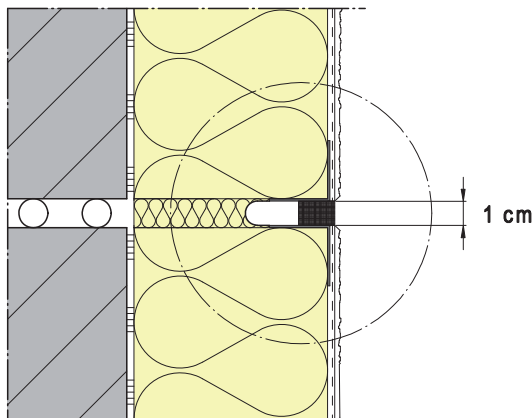
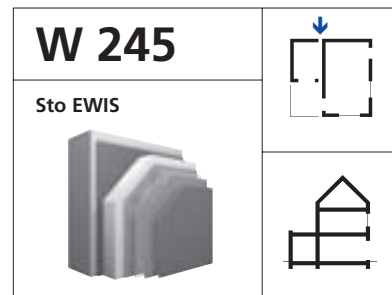
### Application tip



**Caution: Cold bridge!**

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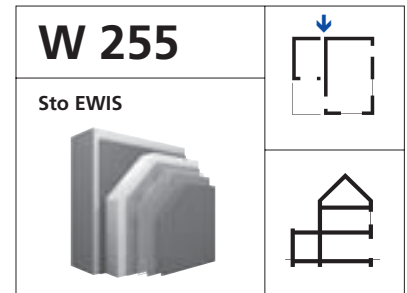
## Bearing slip joint with expansion joint profile



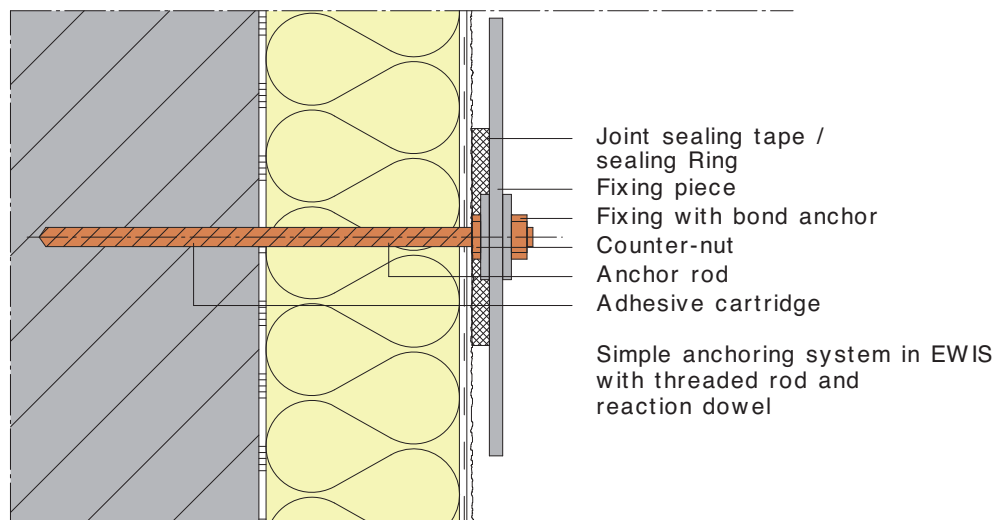
Rev. Nr. 01/08.08

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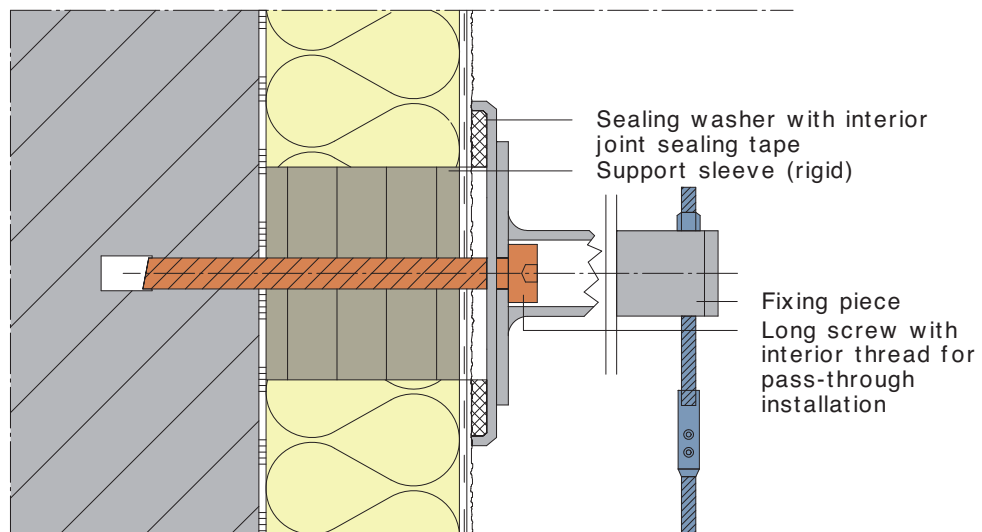
# Anchoring



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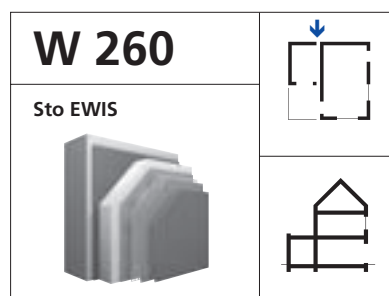
**Coution: Cold bridge!**



e.g. System Brandmeier  
([www.brandmeier.de](http://www.brandmeier.de))

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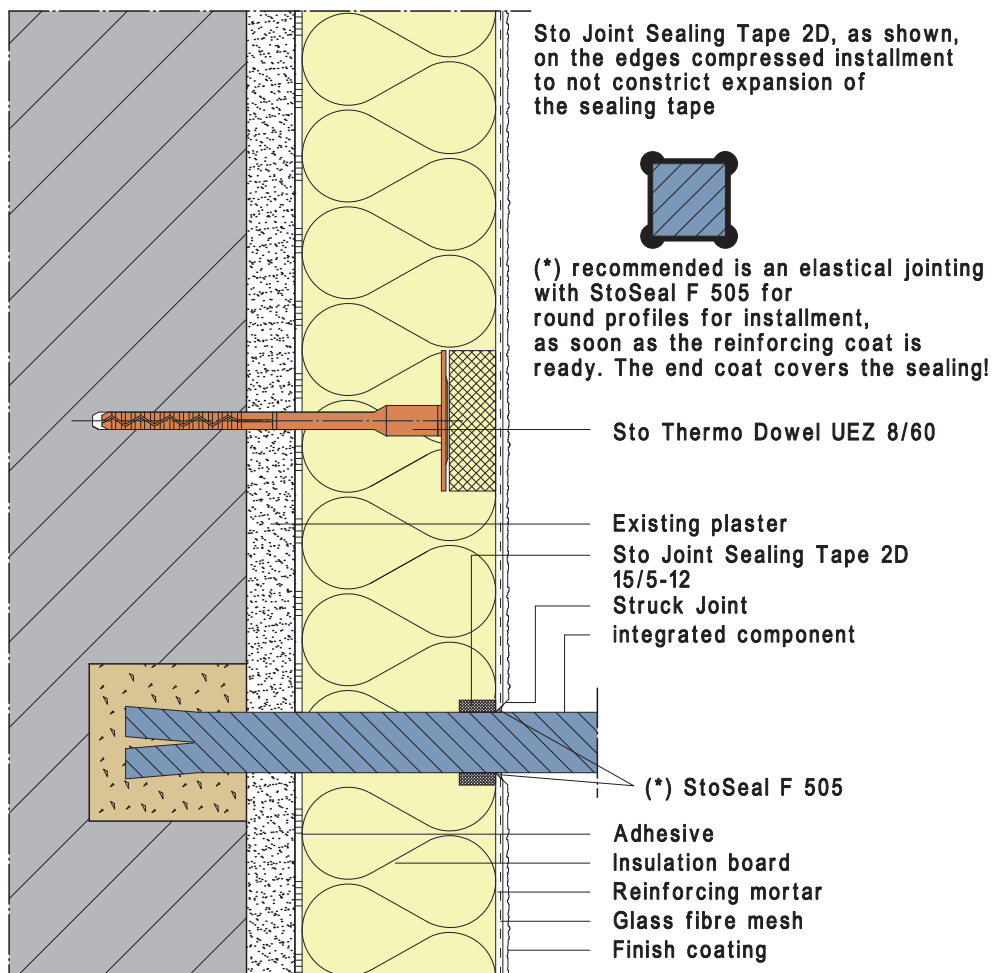
## Fixing and sealing of included railing parts



**incorrect !**



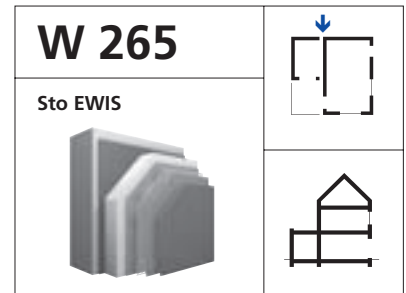
**correct !**



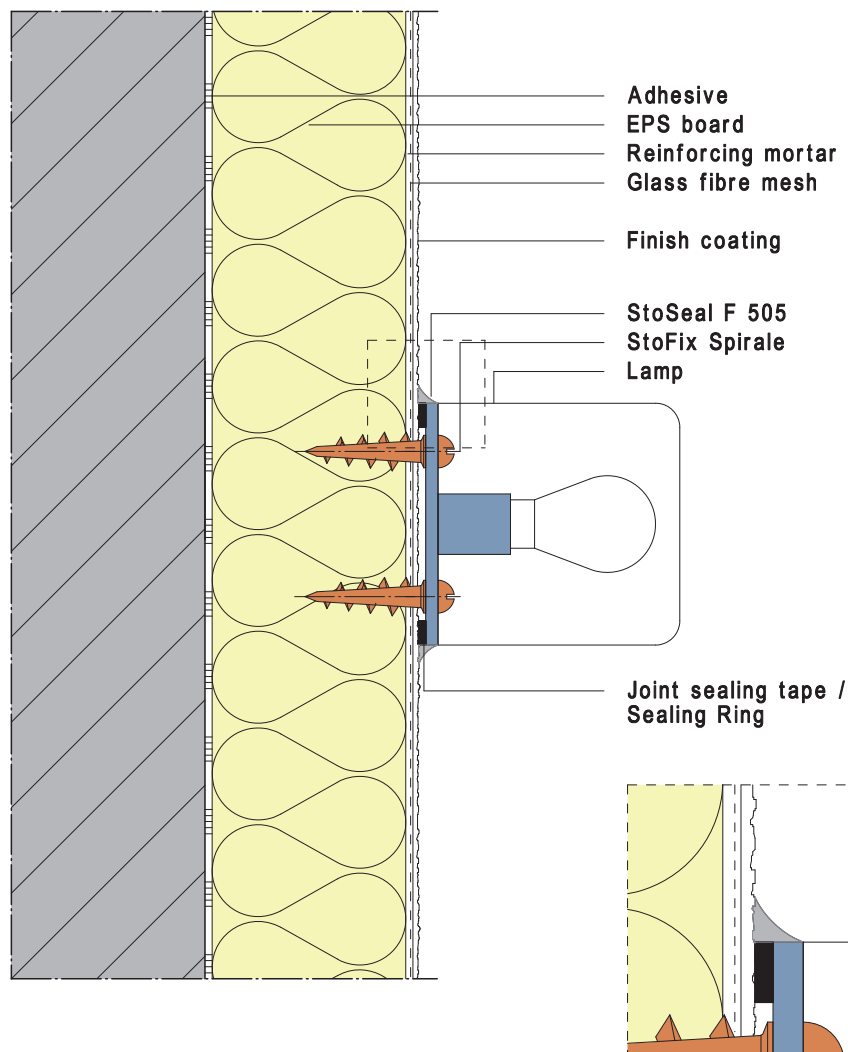
Rev. Nr. 01/08.08

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## Fixing of a lamp with StoFix Spirale

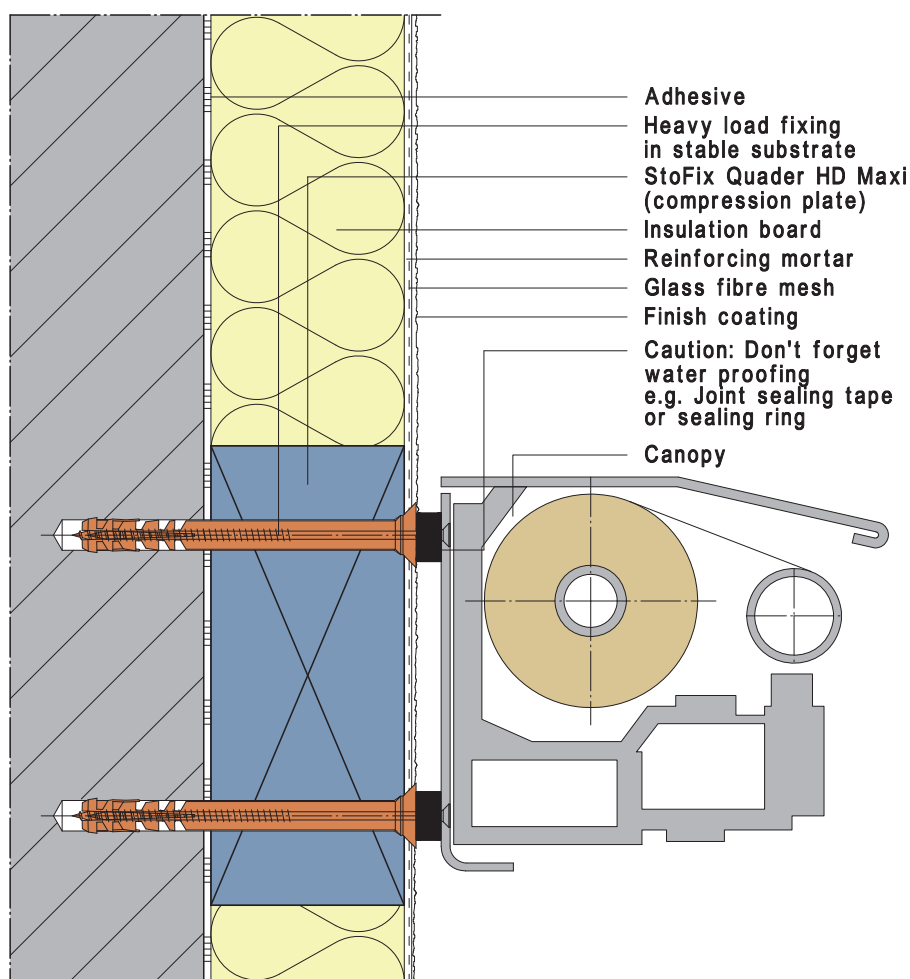
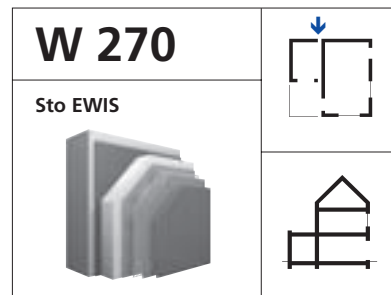


Rev. Nr. 01/08.08



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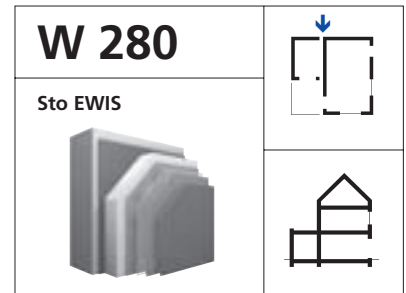
## Fixing of a canopy



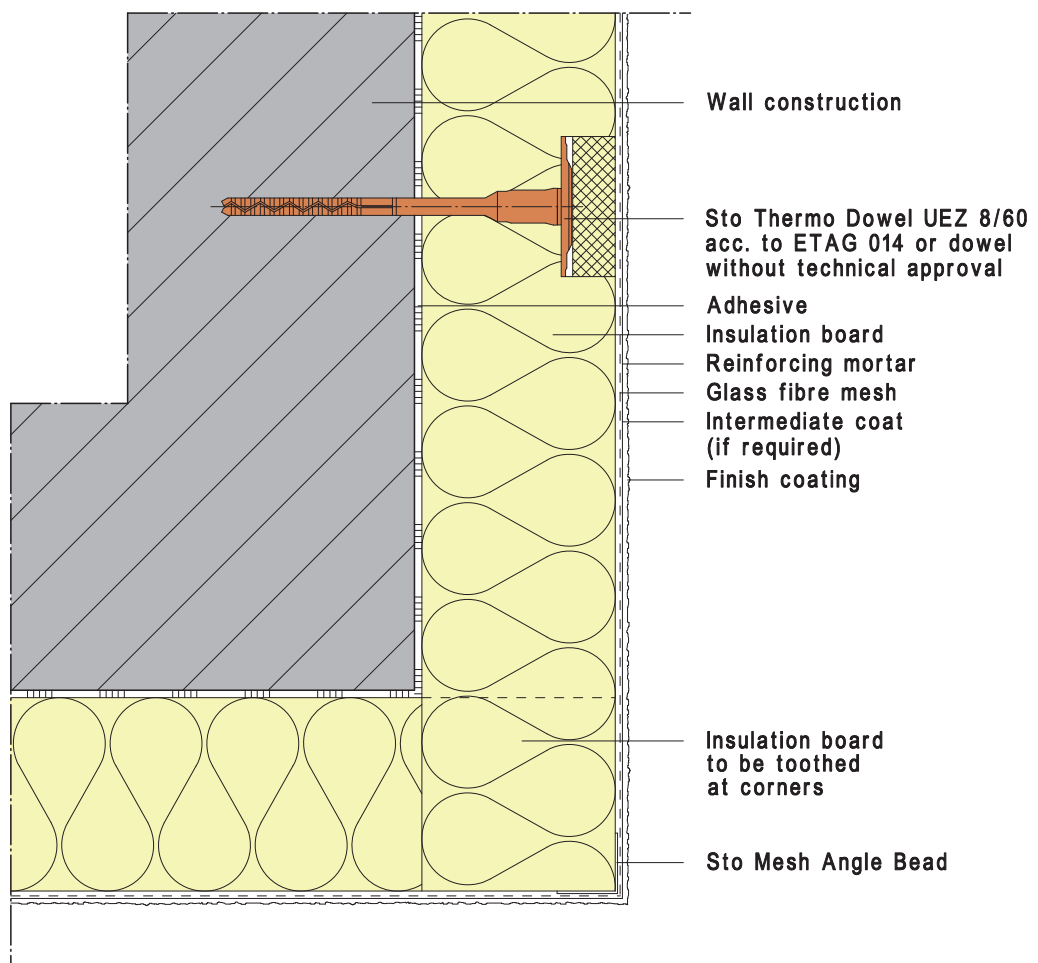
Rev. Nr. 01/08.08

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# EWIS, external corner, adhesive and dowels fixing

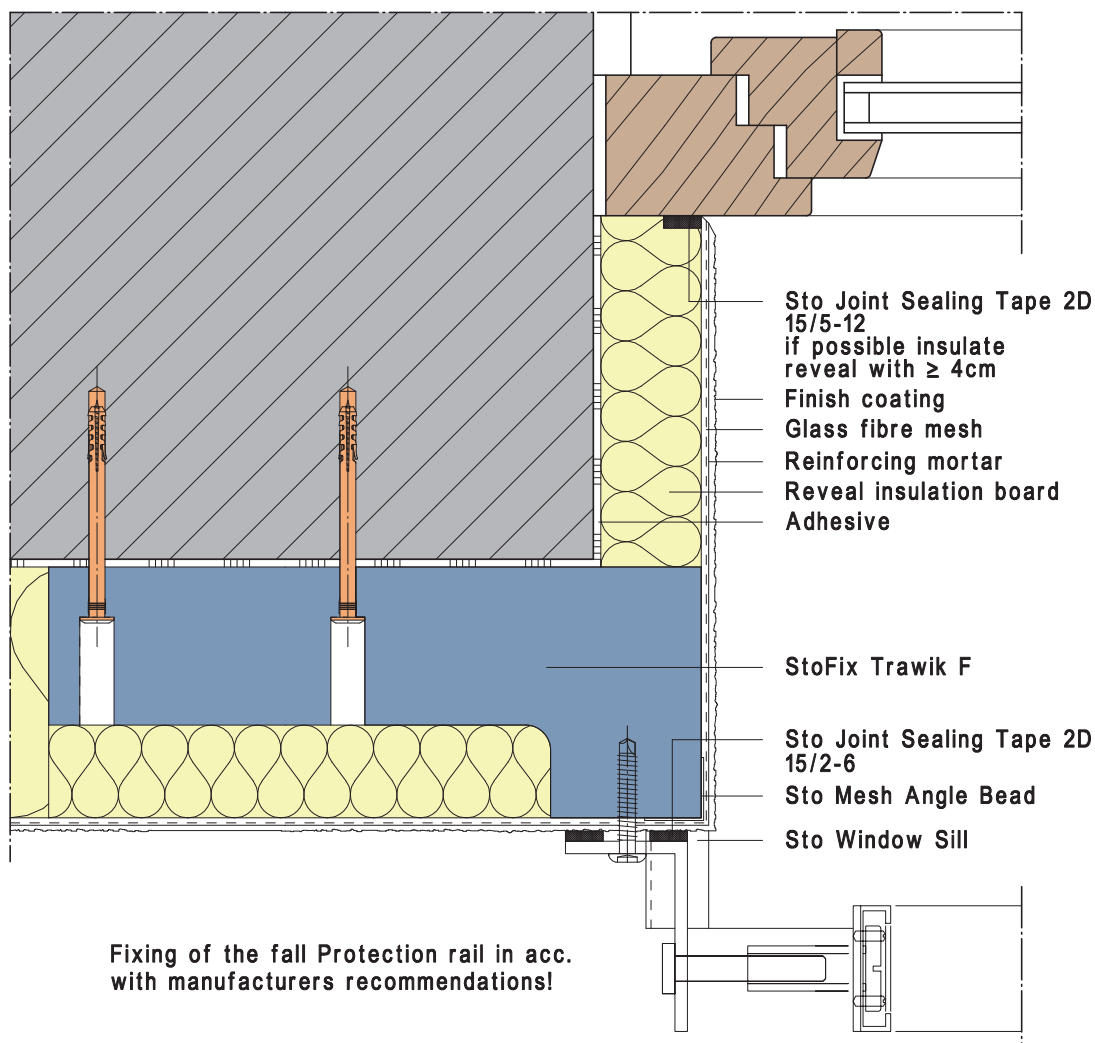
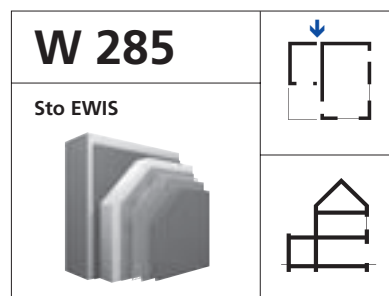


Rev. Nr. 01/08.08



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## Fixing of a fall protection rail with compression plate



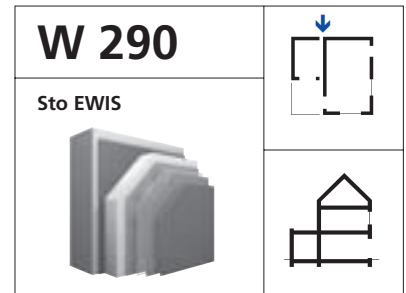
**Fixing of the fall Protection rail in acc.  
with manufacturers recommendations!**

**Wind sealing and fixing of the windows in accordance  
with manufacturers recommendations!**

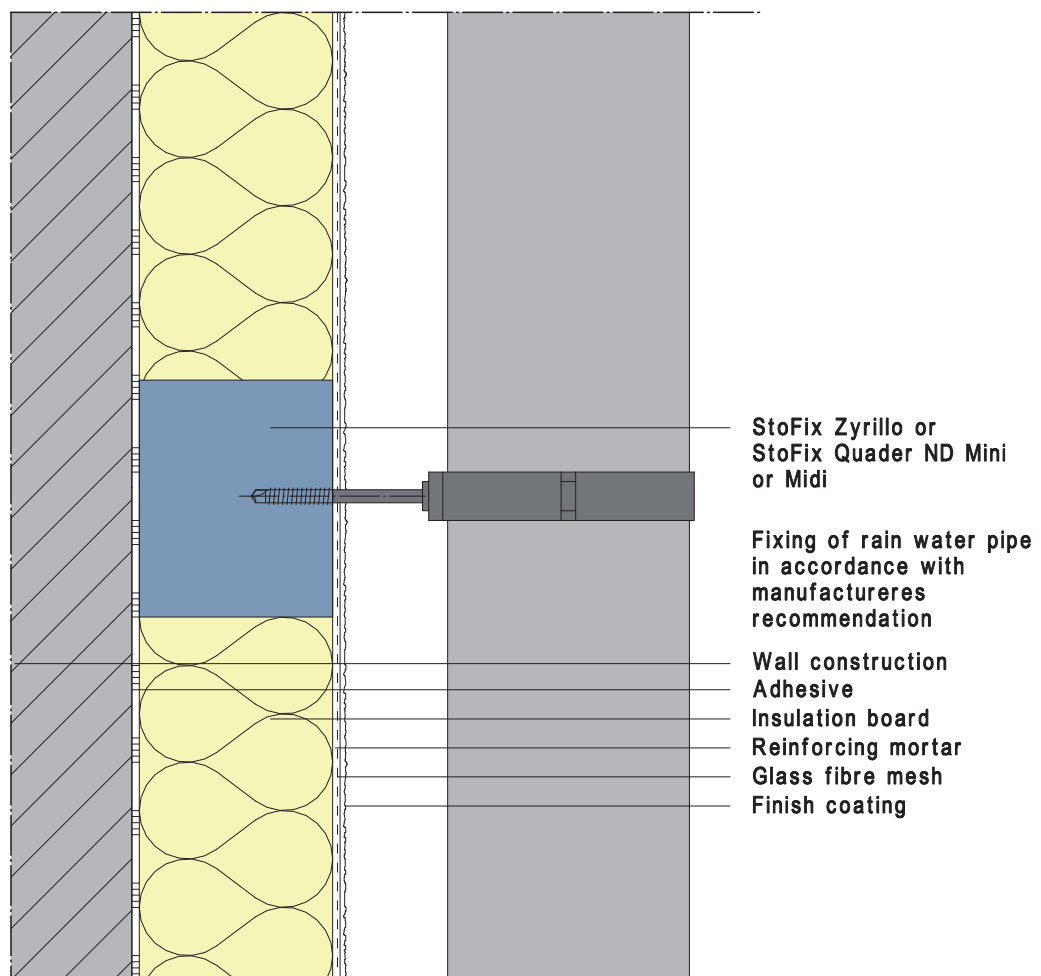
Rev. Nr. 01/08.08

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## Fixing of rail water pipe with compression plate

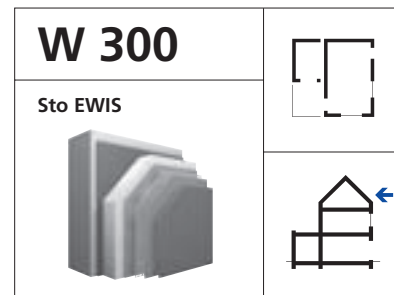


Rev. Nr. 01/08.08

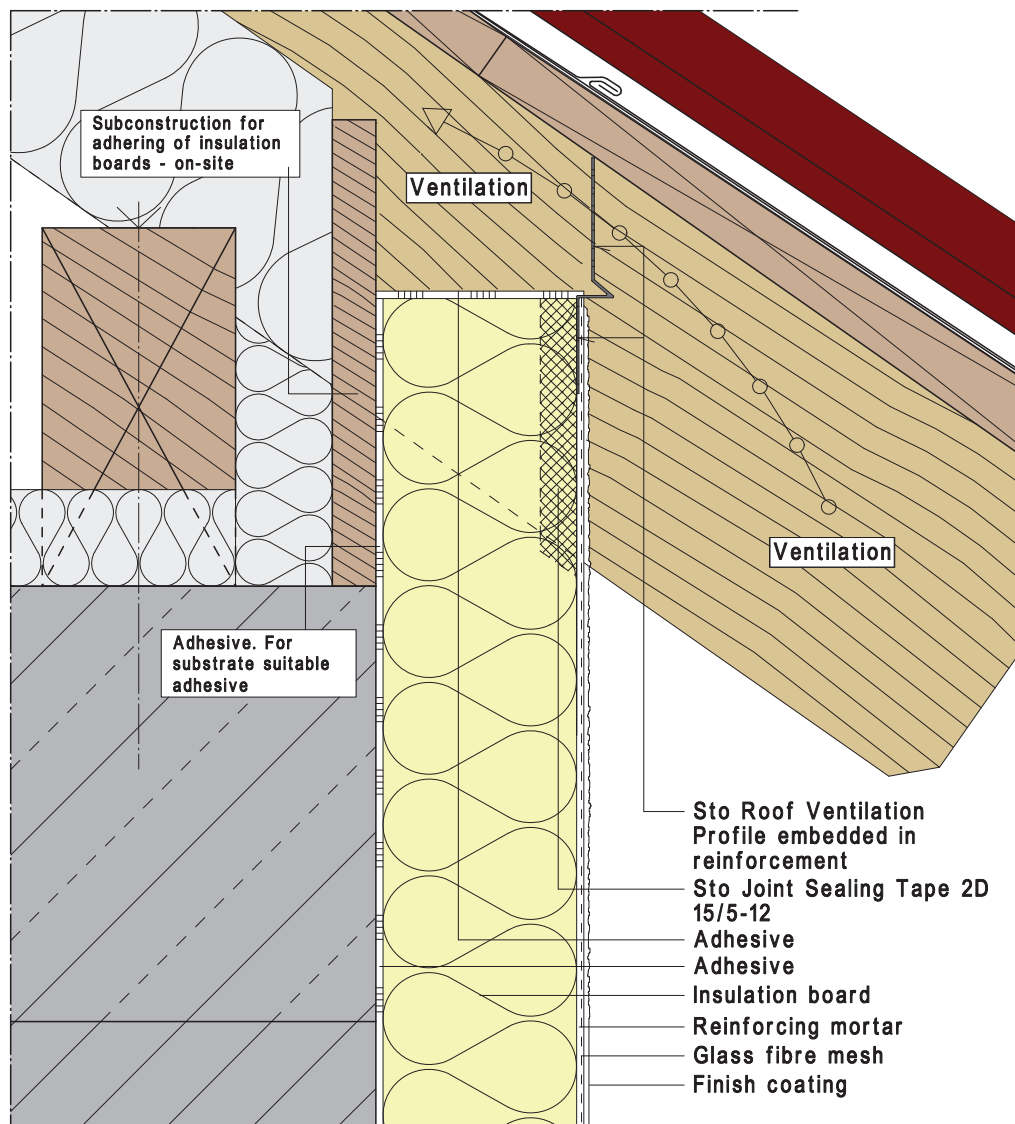


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## Connection to eaves with roof overhang, ventilated



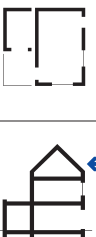

Assumed roof situation - schematic



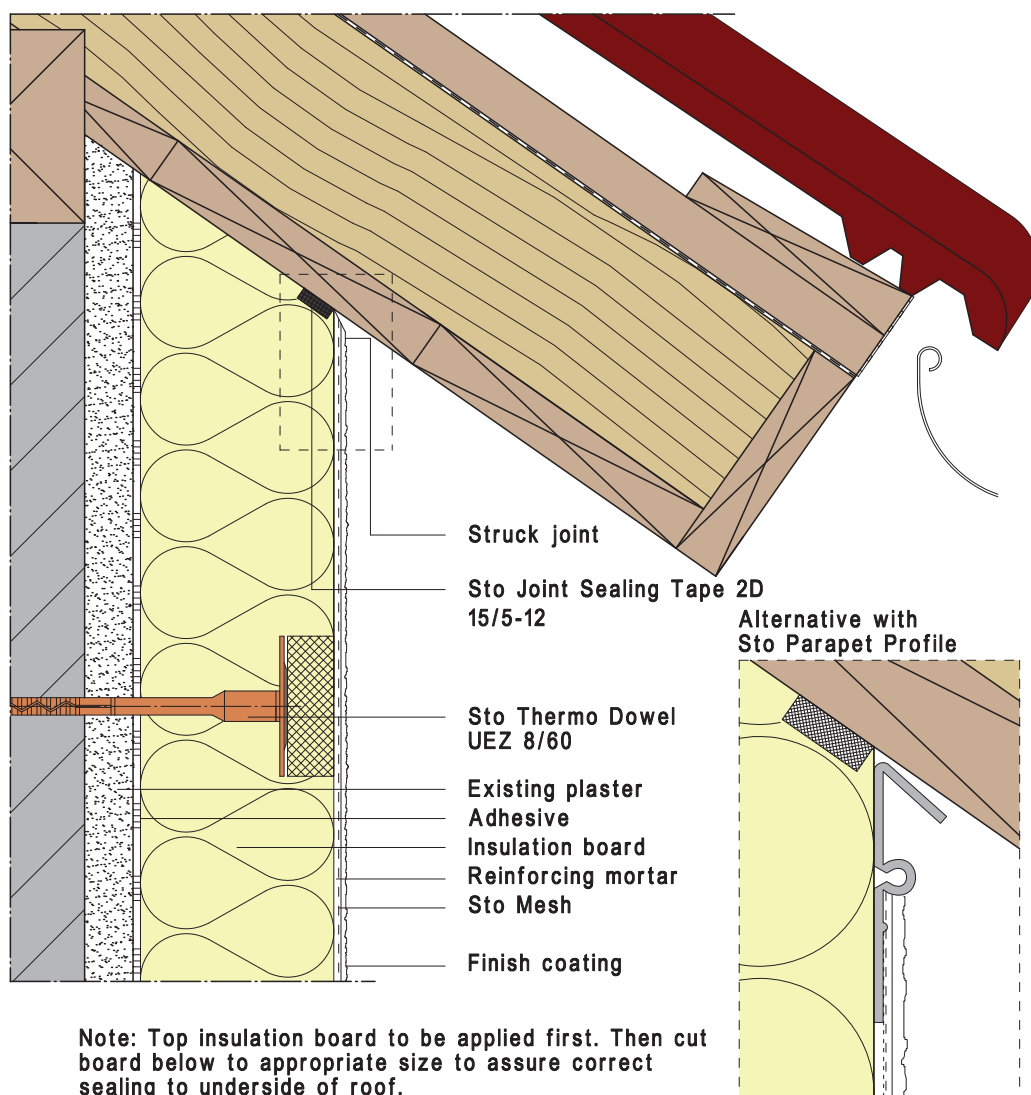
Rev. Nr. 01/08.08

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## Connection to eaves with roof overhang, not ventilated

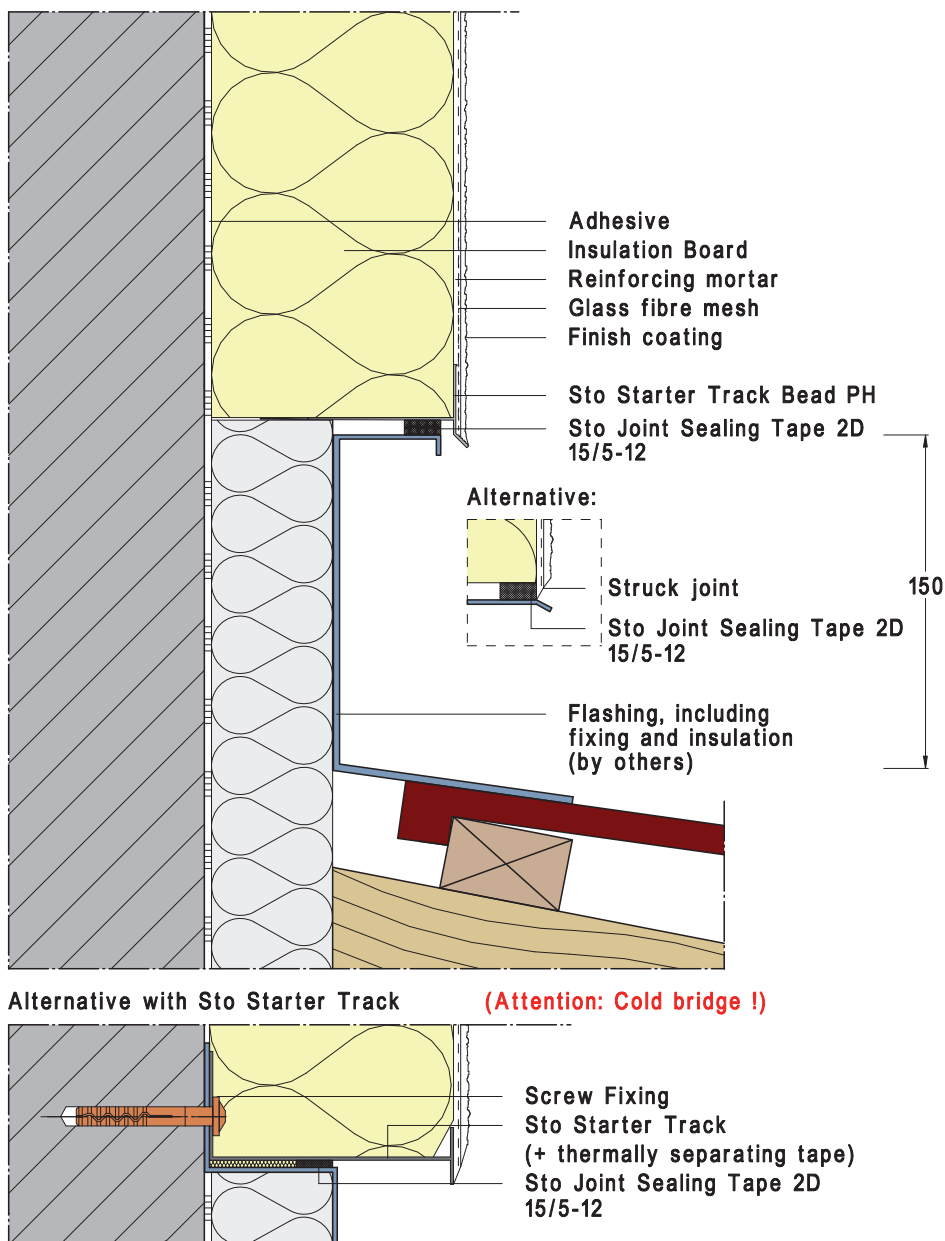
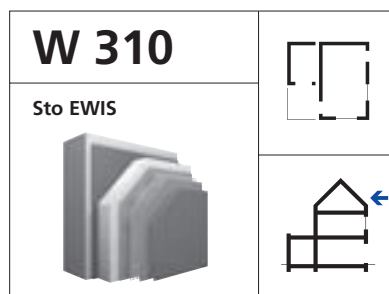
<b>W 305</b>	
<b>Sto EWIS</b> 	

Rev. Nr. 01/08.08



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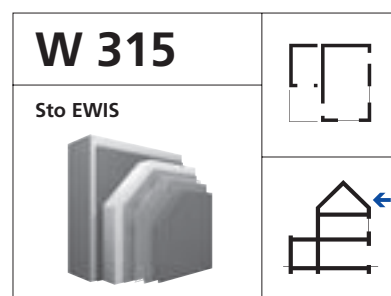
# Lean-to roof connection



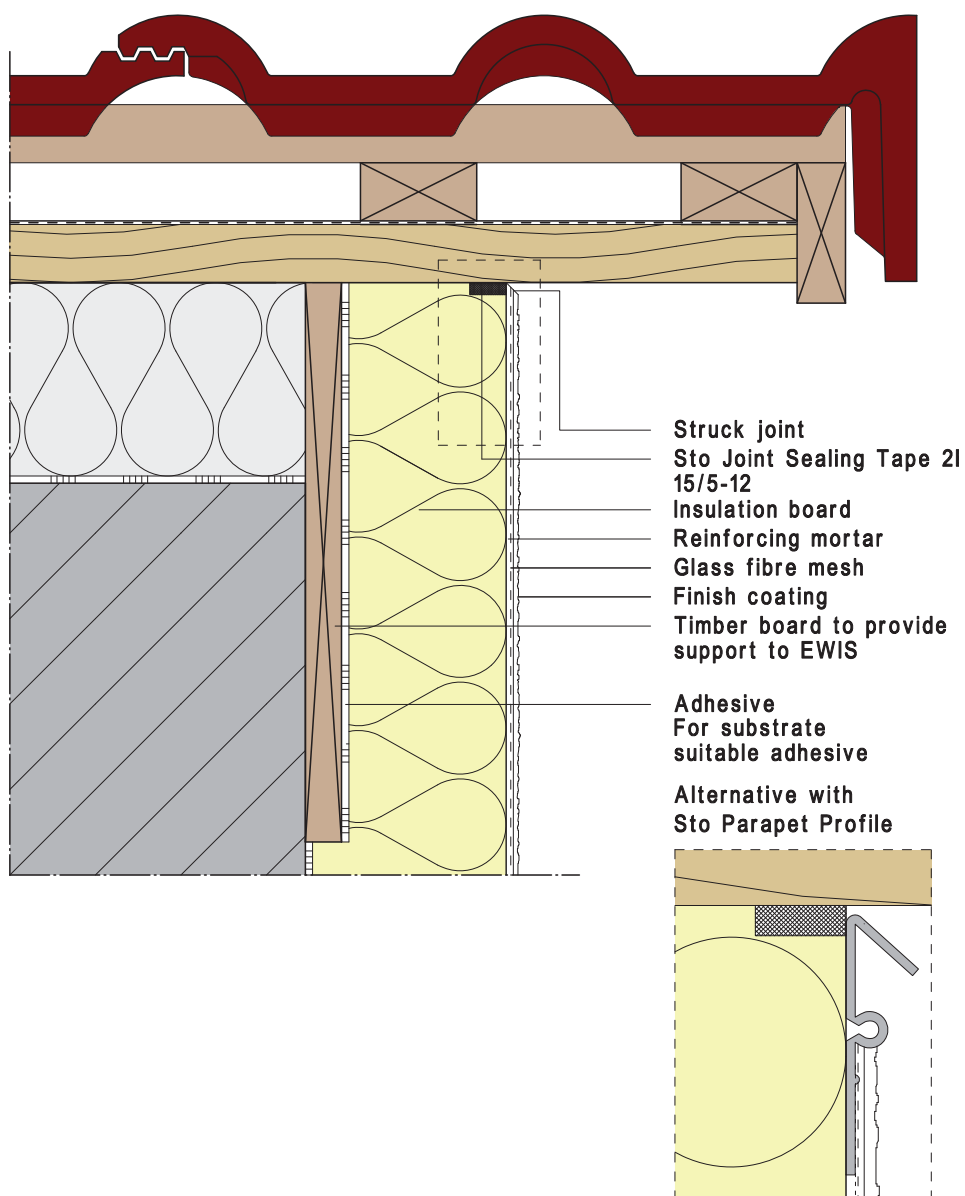
Rev. Nr. 01/08.08

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## Gable connection

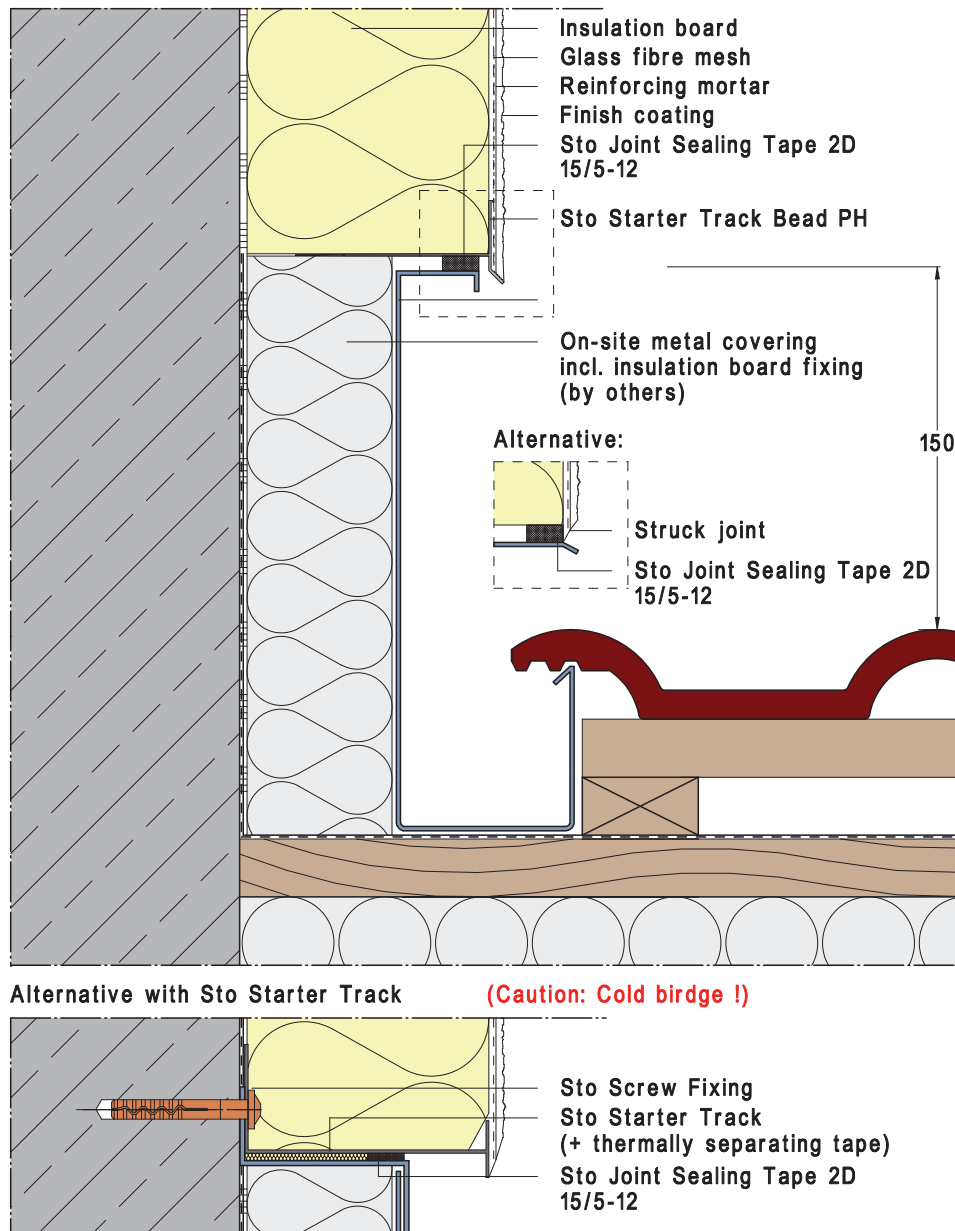
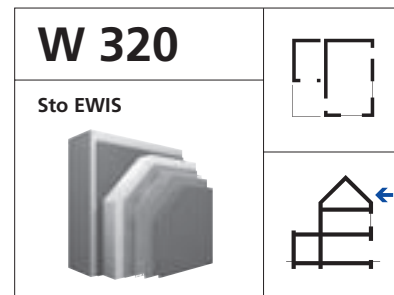


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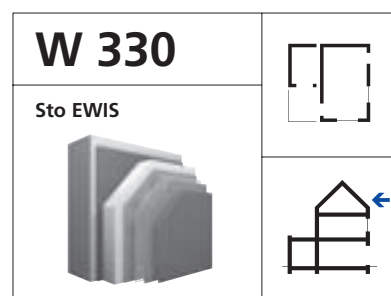
# Cold bridge free roof connection



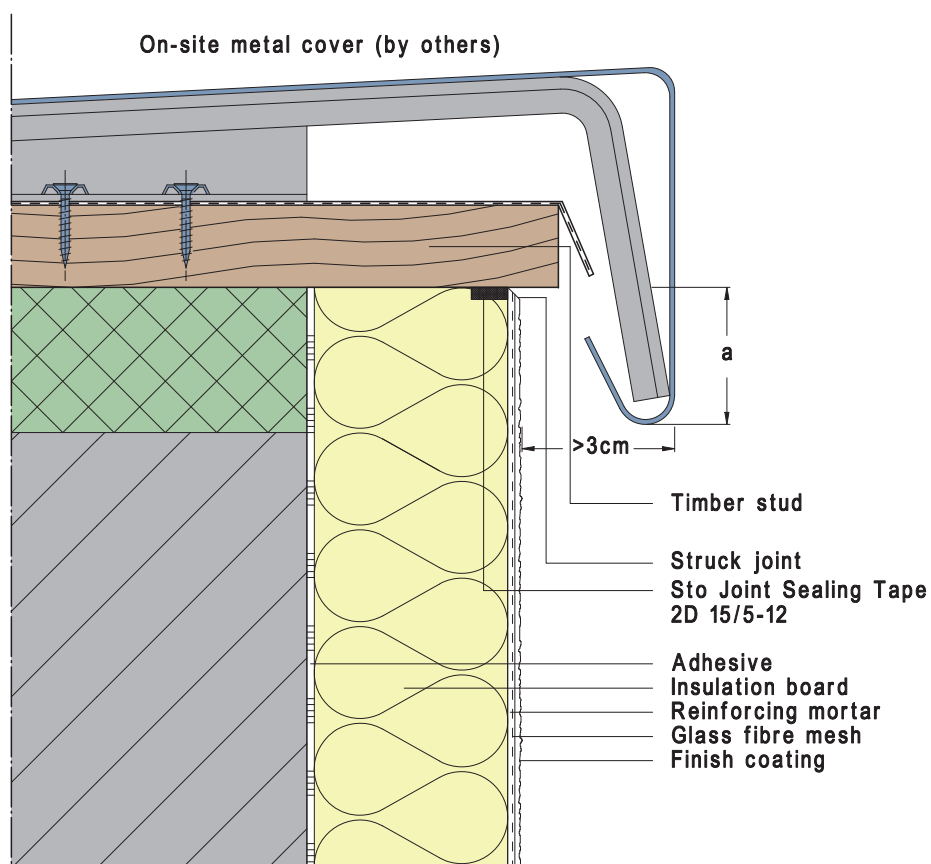
Rev. Nr. 01/08.08

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## Parapet creation



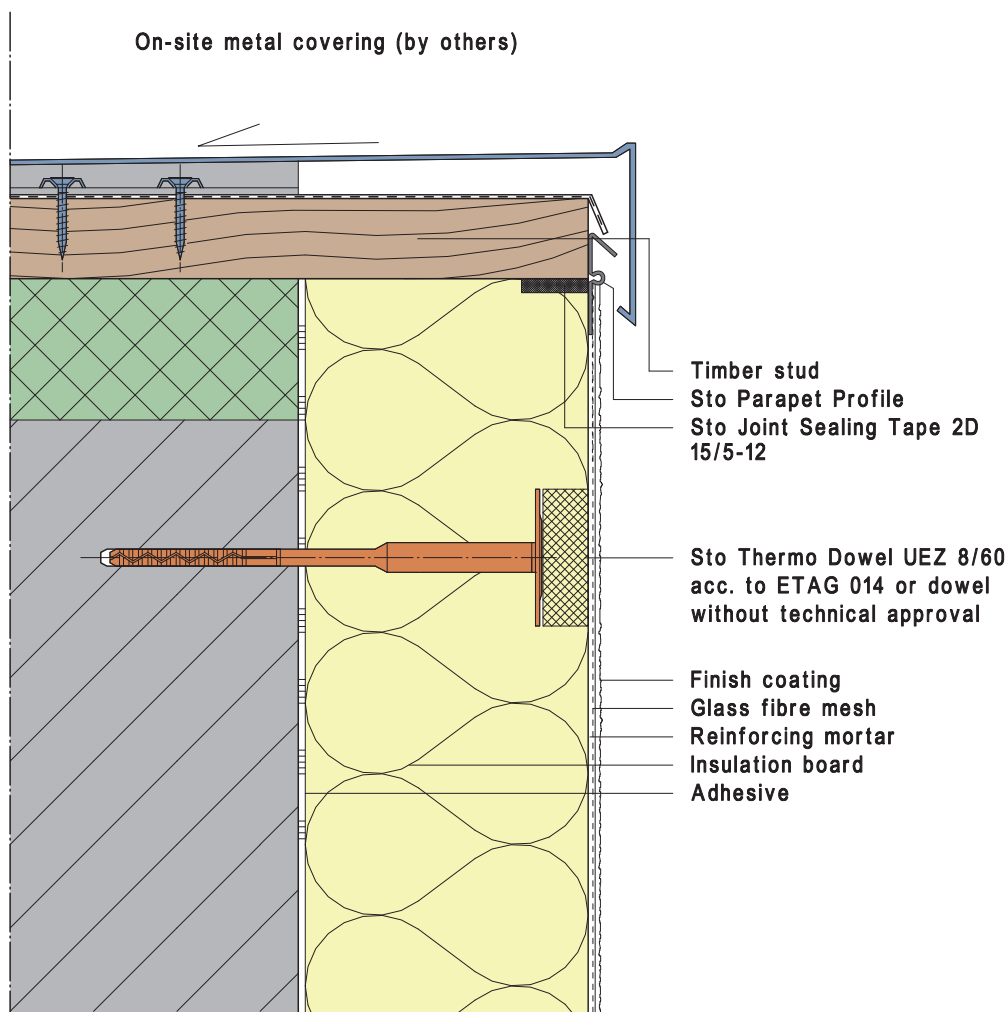
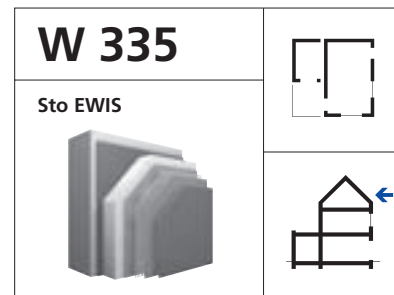
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a: up to 8 m height > 5 cm  
up to 15 m height > 10 cm  
over 15 m height > 15 cm

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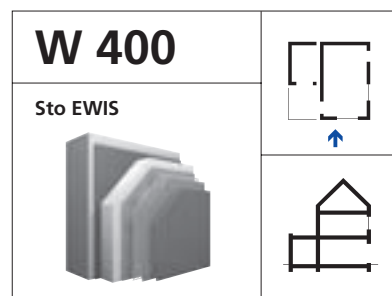
## Parapet creation with sheet metal



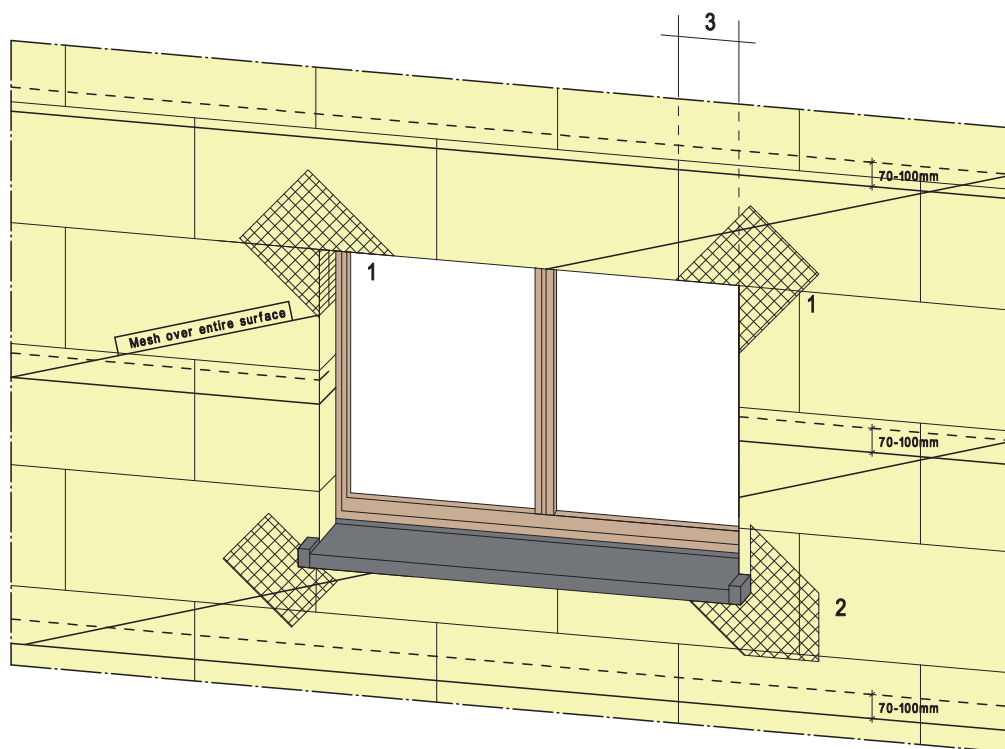
Rev. Nr. 01/08.08

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# Building opening, diagonal reinforcement in mineral and thick-layer systems



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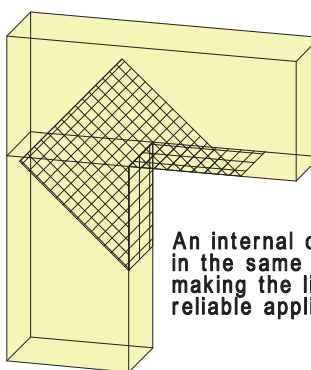


**1 Sto Stress Point Mesh**

**2 Diagonal reinforcement  
Sto Reinforcement Patch  
Sto Reinforcement Mesh Strip  
(min. 20 x 40 cm)**

**3 Bonding of insulation boards  
to be in a stretcher bond  
with min. overlap of 25 cm**

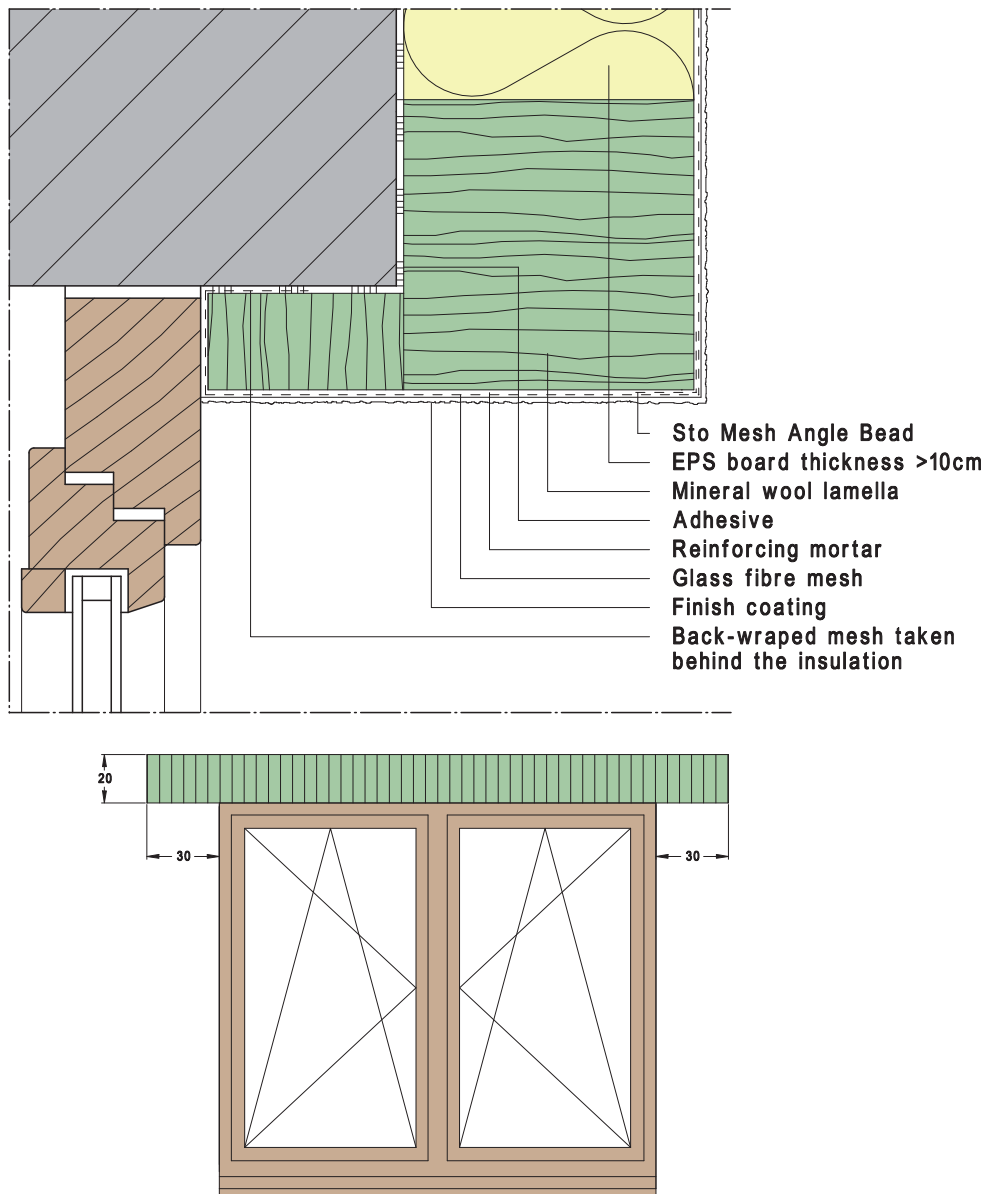
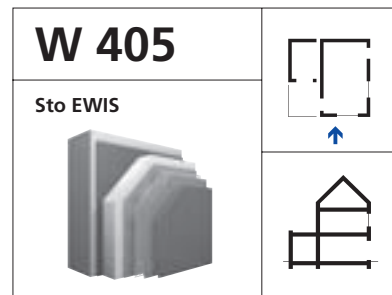
**Caution: with thick-layer  
systems, embed diagonal  
glass fibre mesh in the top  
one third of the reinforcement layer.**



**An internal corner must be reinforced  
in the same way as an external corner,  
making the lintel corner the most  
reliable application method.**

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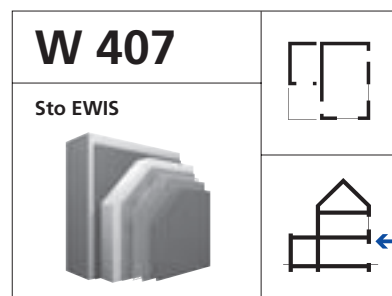
## Lintel creation, EPS System with window fire break



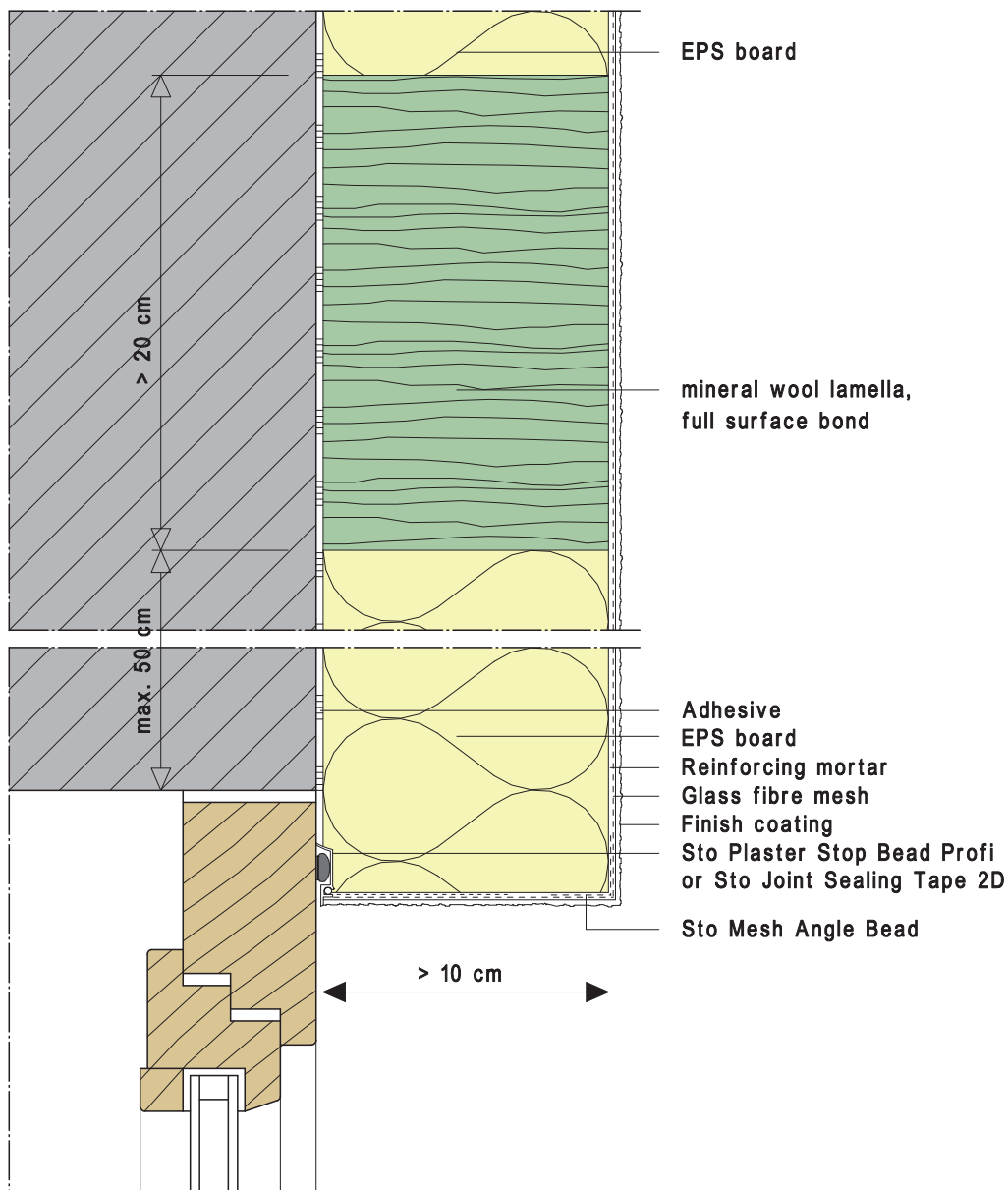
Rev. Nr. 01/08.08

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# Lintel formation with continuous firebreak

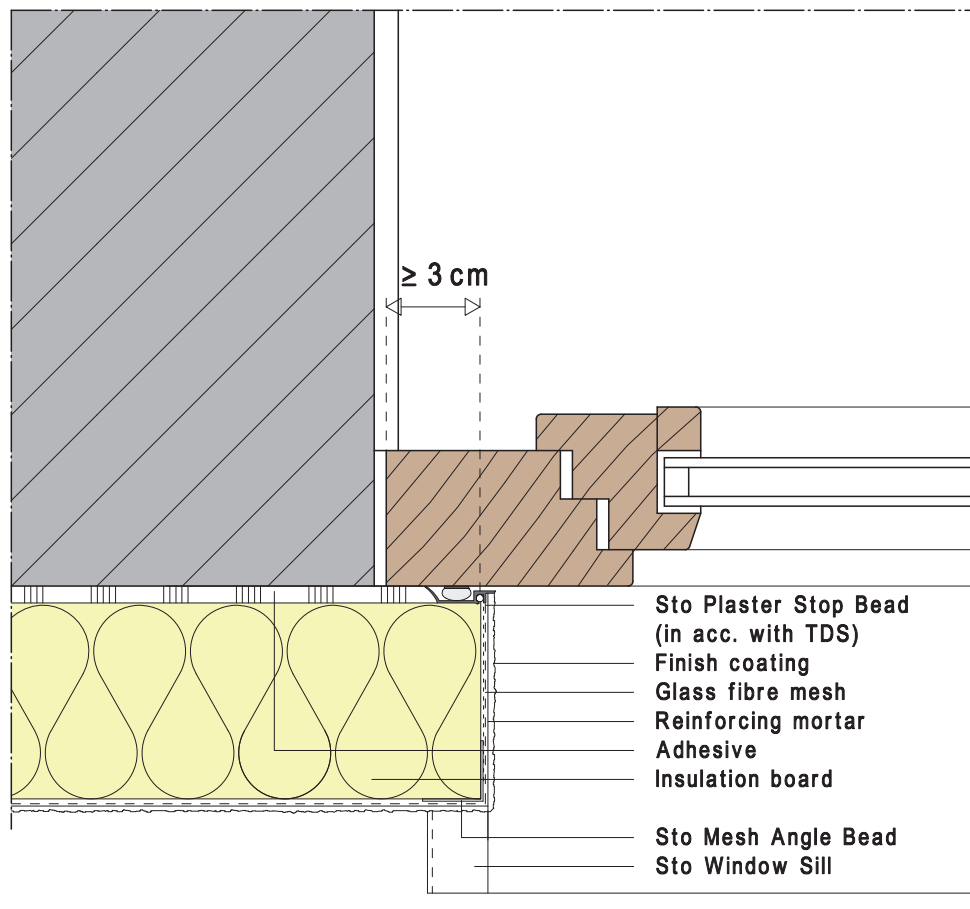
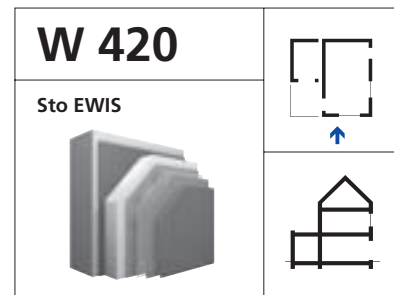


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## Reveal connection with Sto Plaster Stop Bead, window flush with wall construction surface

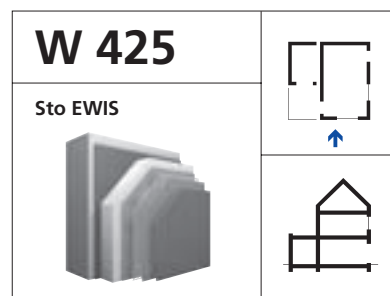


Wind sealing and fixing of the windows in acc. with manufacturers' specifications.

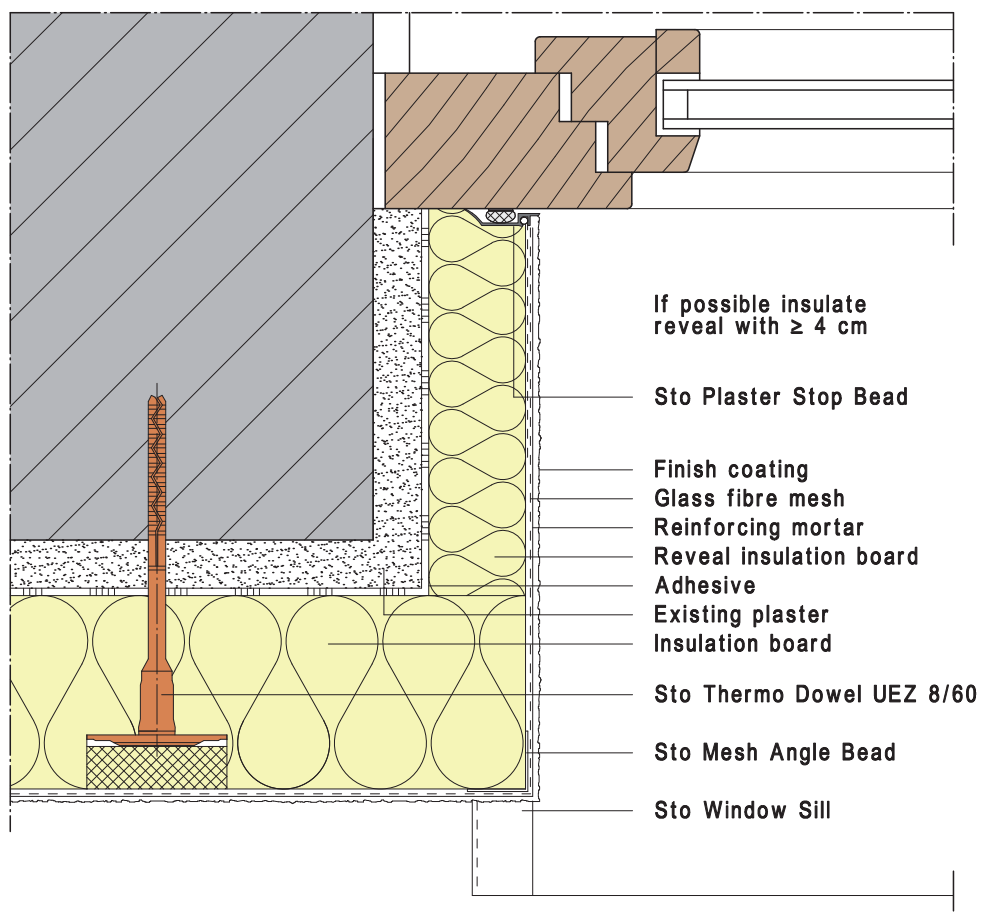
Rev. Nr. 01/08.08

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## Reveal connection, window offset with wall construction surface with Sto Plaster Stop Bead



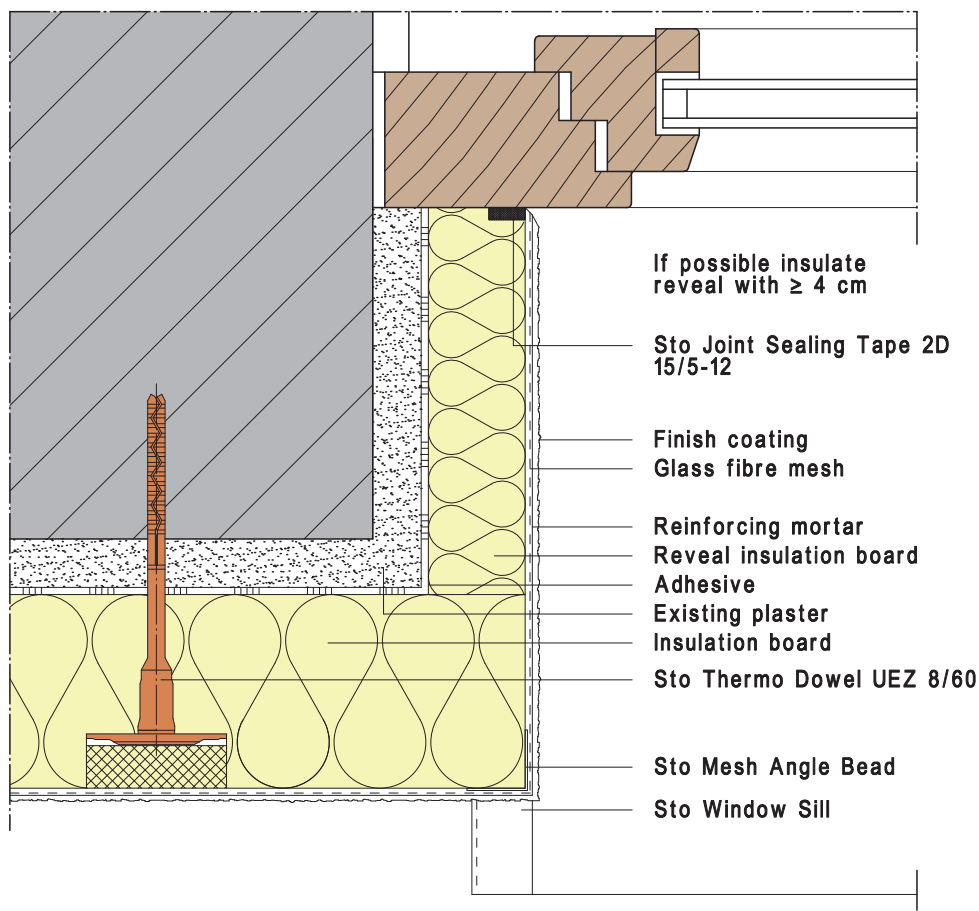
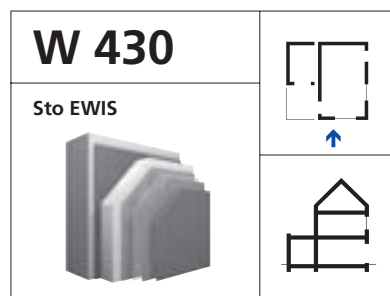
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Wind sealing and fixing of the windows in acc. with manufacturers' specifications.

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# Reveal connection, window offset with wall construction surface with Sto Joint Sealing Tape

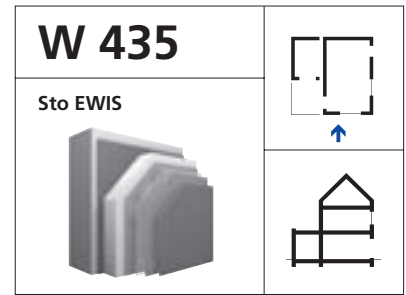


Wind sealing and fixing of the windows in acc. with manufacturers' specifications.

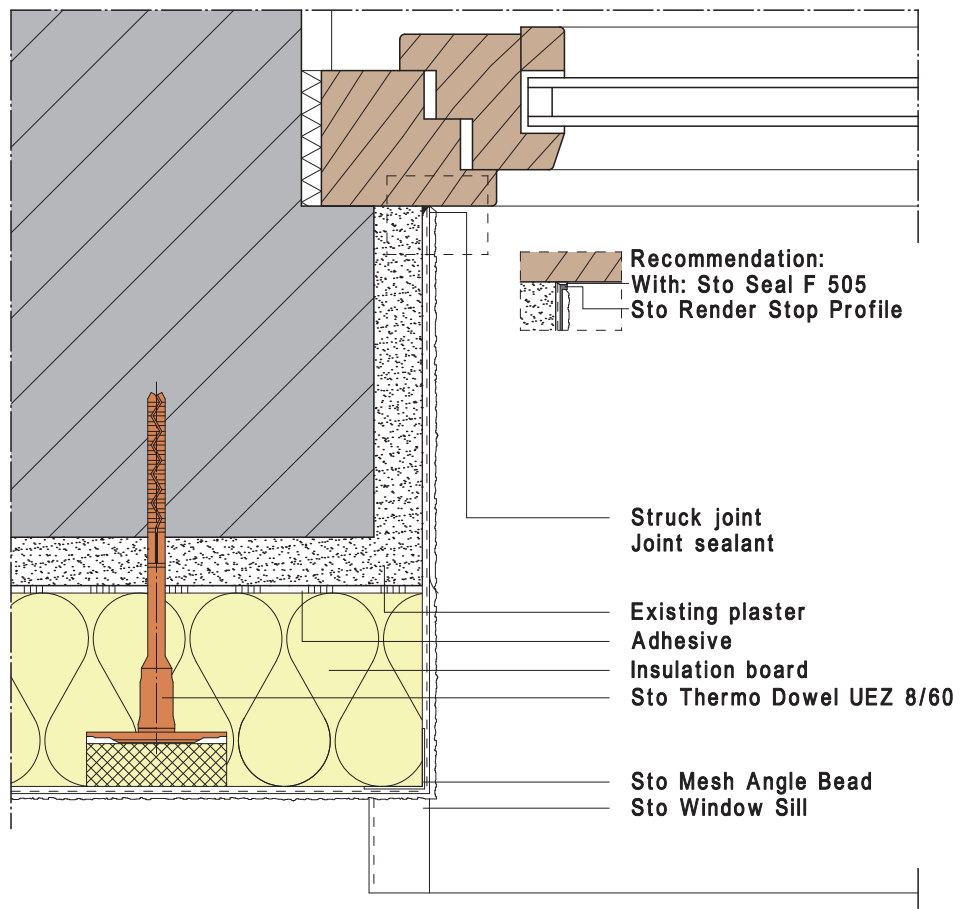
Rev. Nr. 01/08.08

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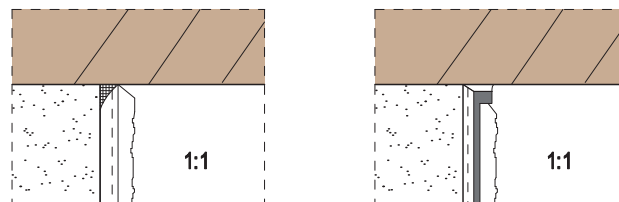
## Reveal connection, not insulated



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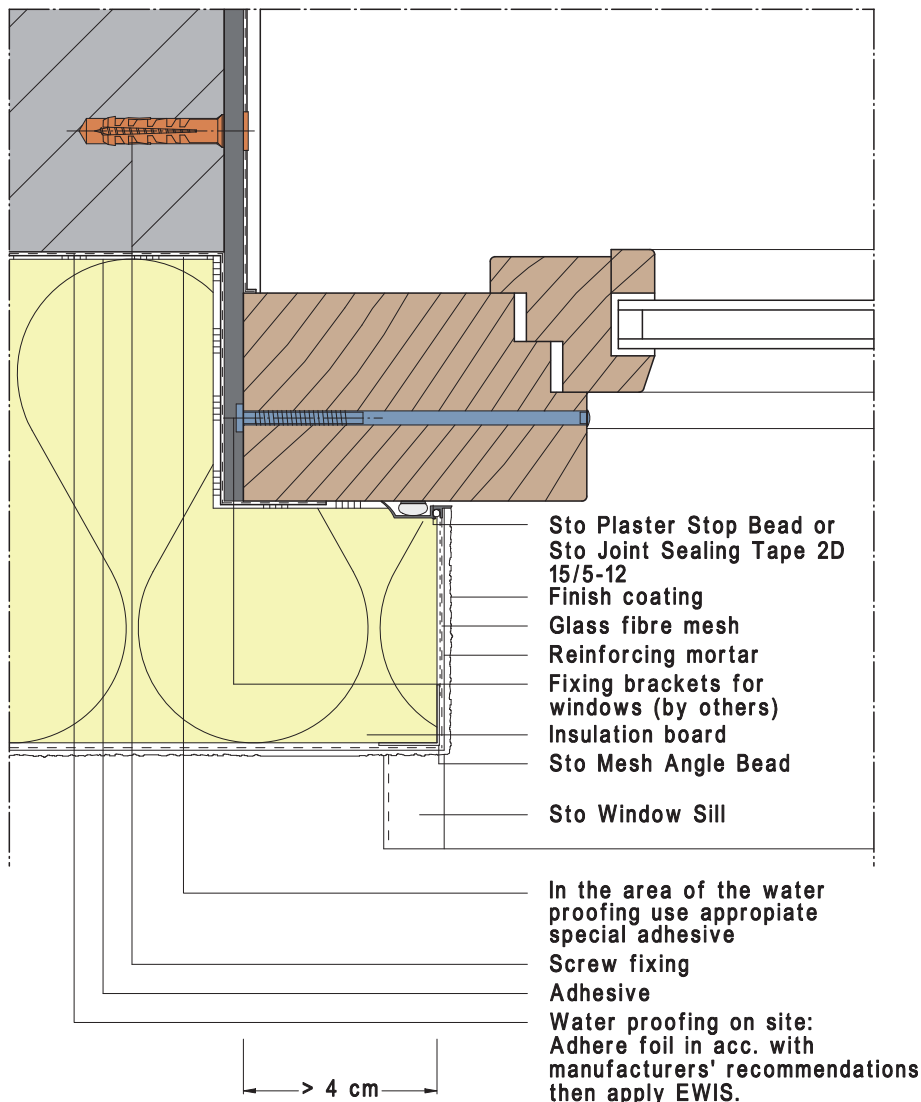
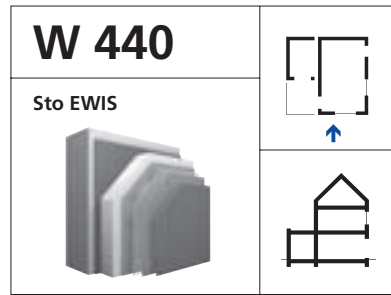


Wind sealing and fixing of the windows in acc. with manufacturers' specifications.



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## Connection to window frame on installation track

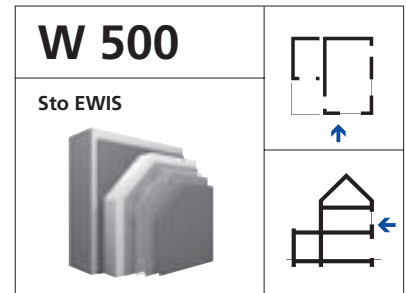


**Wind sealing and fixing of the windows in acc. to manufacturer's specifications.**

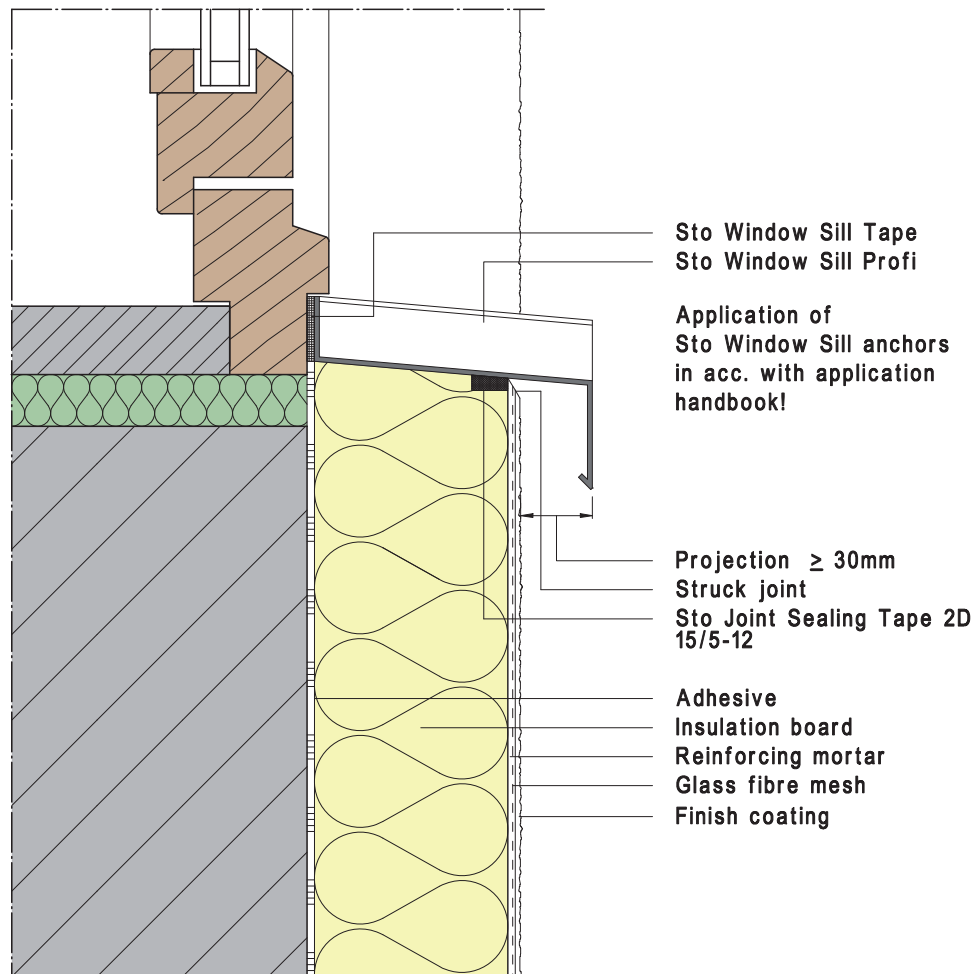
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## Connection Sto Window Sill



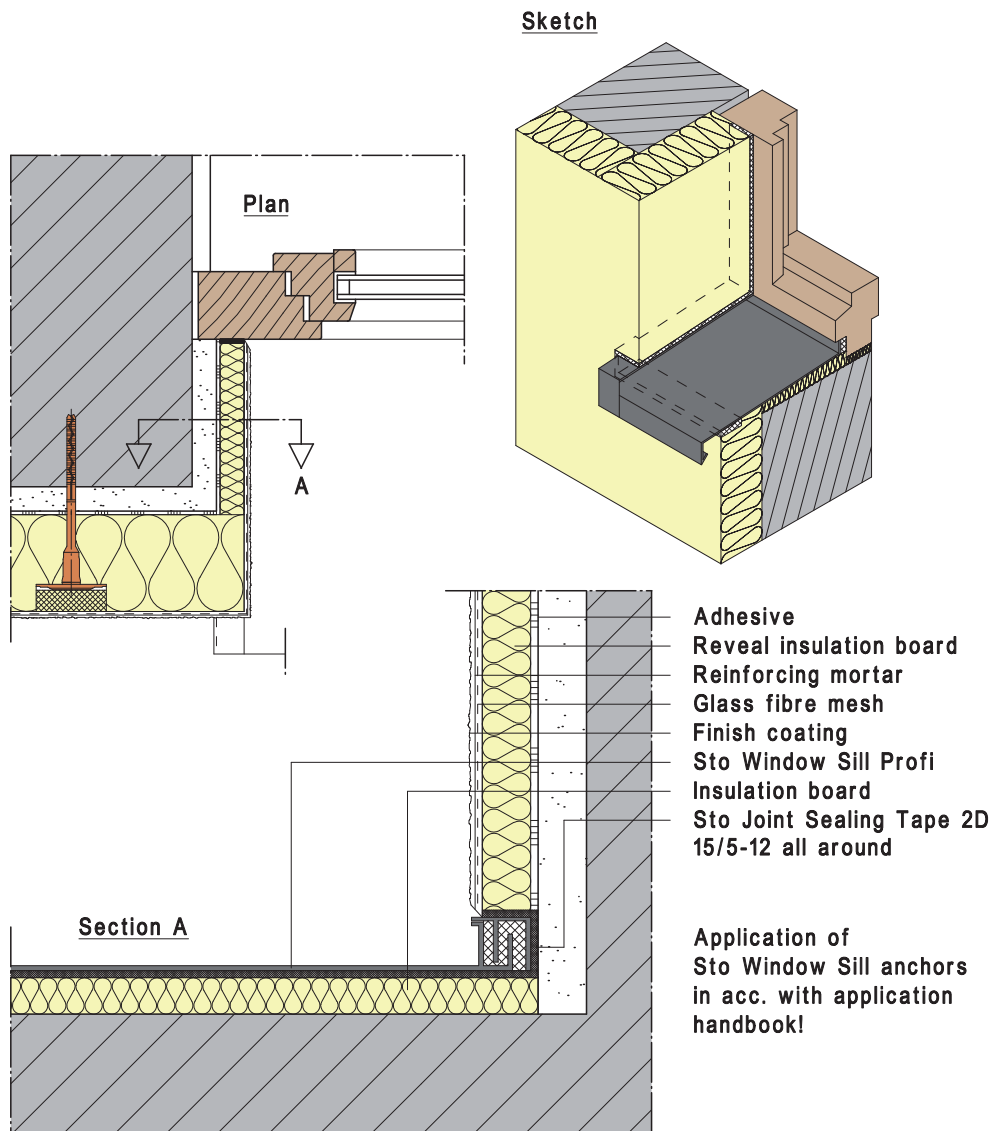
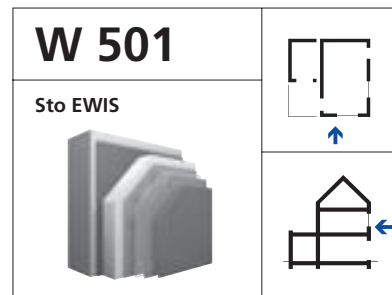
Rev. Nr. 01/08.08



**Wind sealing and fixing of the windows in acc. with manufacturers' specifications.**

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## Connection Sto Window Sill Profi

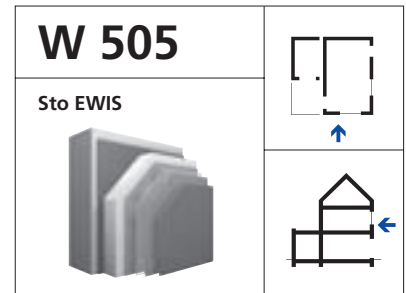


**Wind sealing and fixing of the windows in acc. with manufacturers' specifications.**

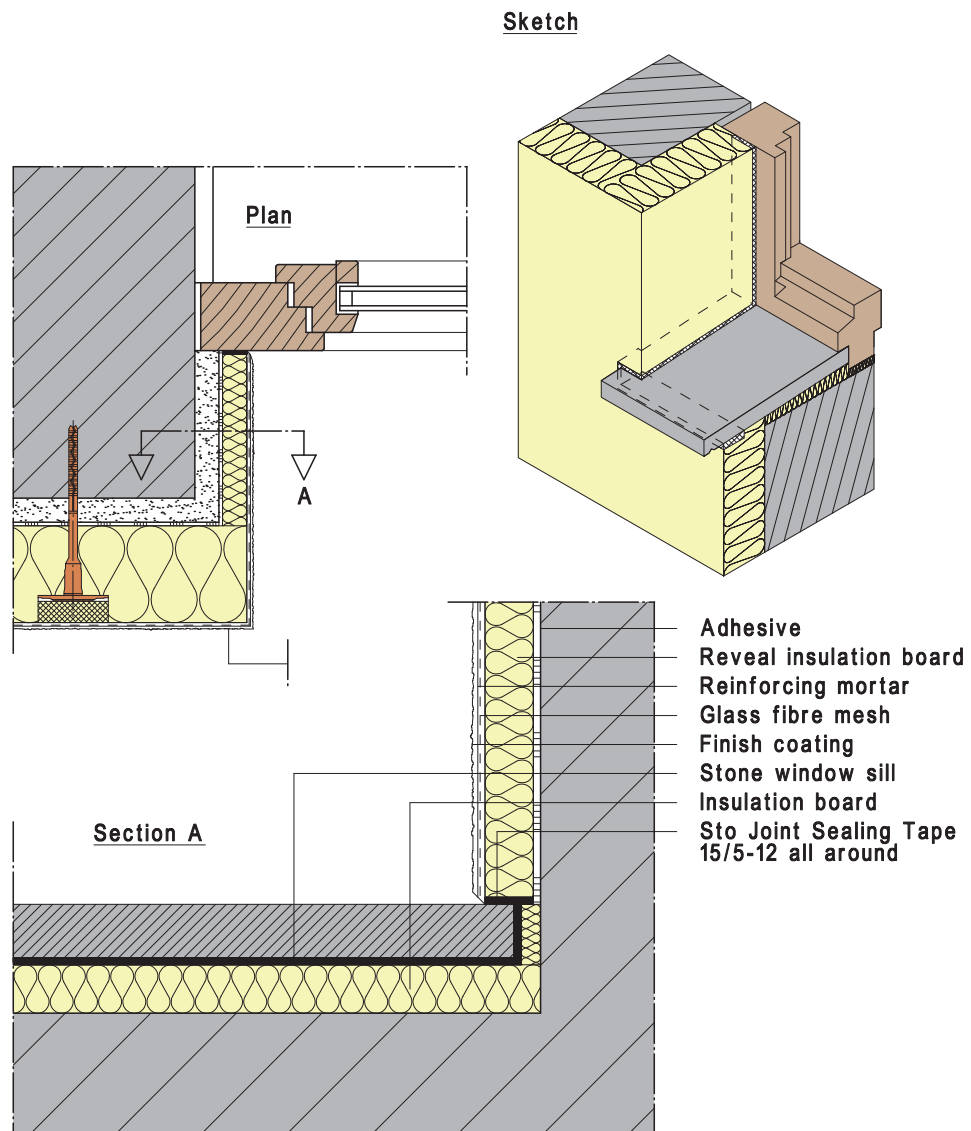
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## Connection monolithic window sill



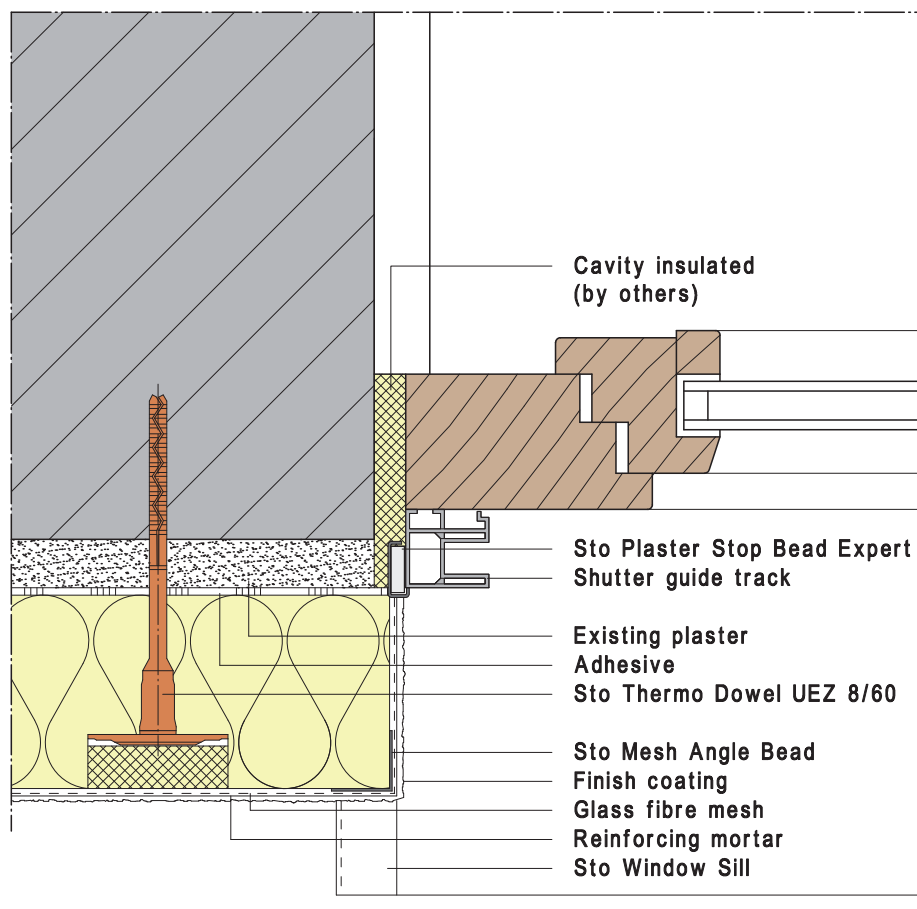
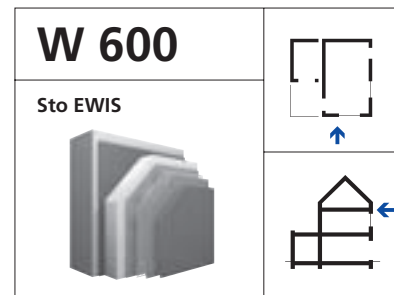
Rev. Nr. 01/08.08



**Wind sealing and fixing of the windows in acc. with manufacturers' specifications.**

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## Shutter guide connection, timber window with existing shutter track

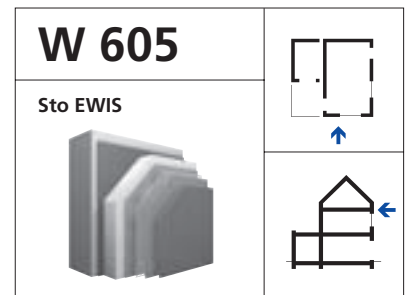


Wind sealing and fixing of the windows in acc. with manufacturers' specifications.

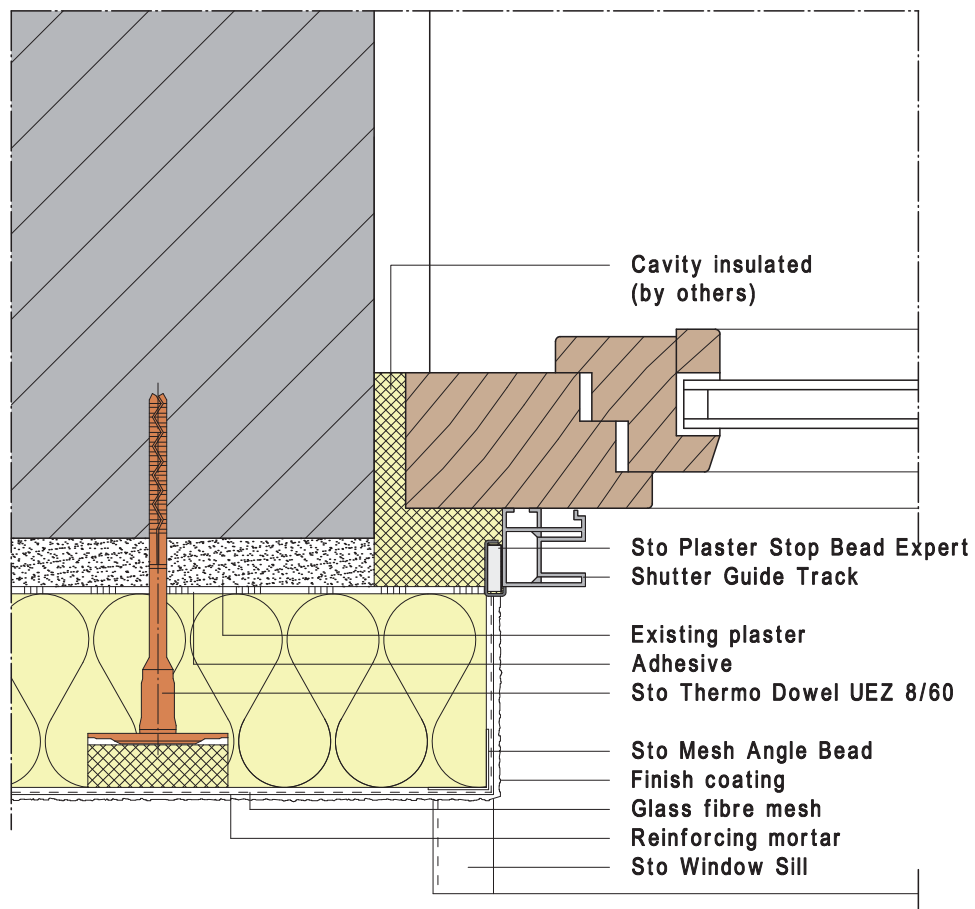
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## Shutter guide connection, timber window with new shutter track



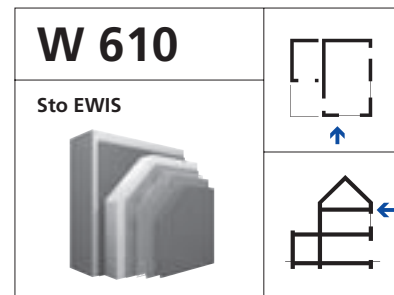
Rev. Nr. 01/08.08



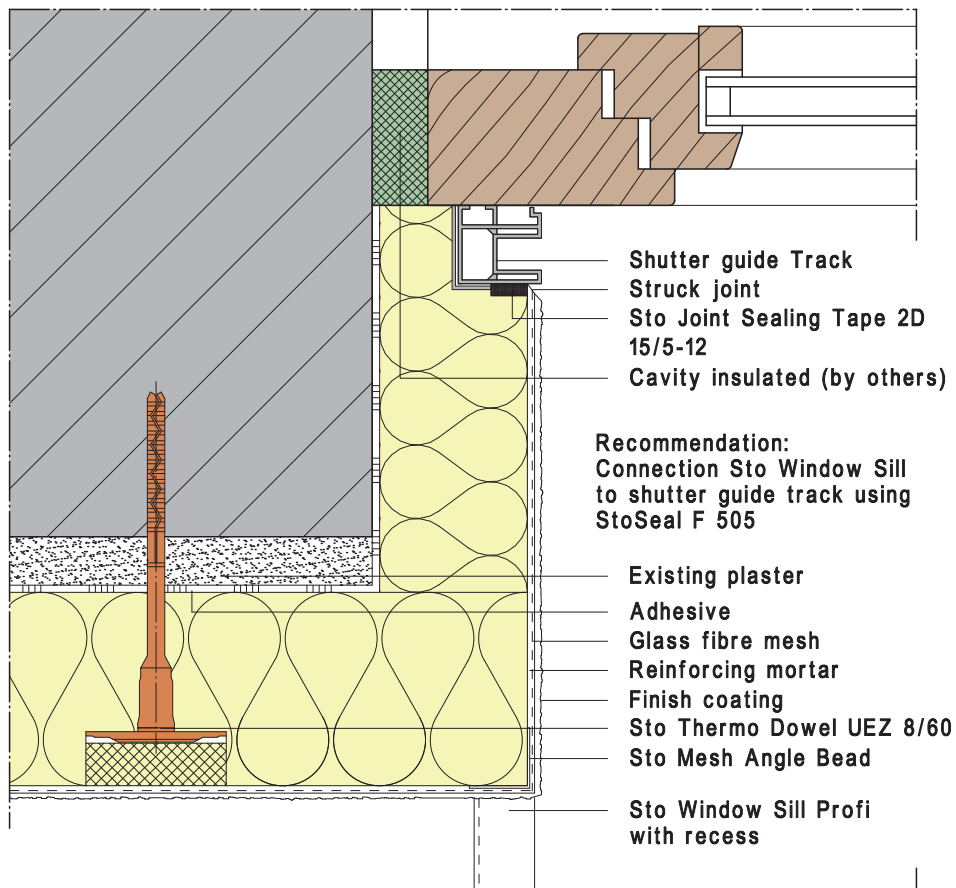
**Wind sealing and fixing of the windows in acc. with manufacturers' specifications.**

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## Sto Window Sill Profi with recess



**Sto Window Sill Profi with recess (as bespoke item)**

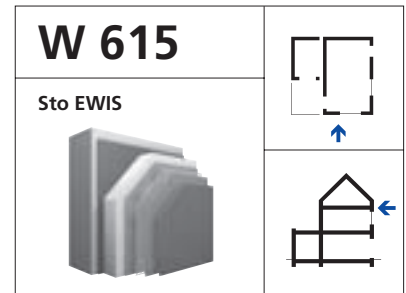


Wind sealing and fixing of the windows in acc. with manufacturers' specifications.

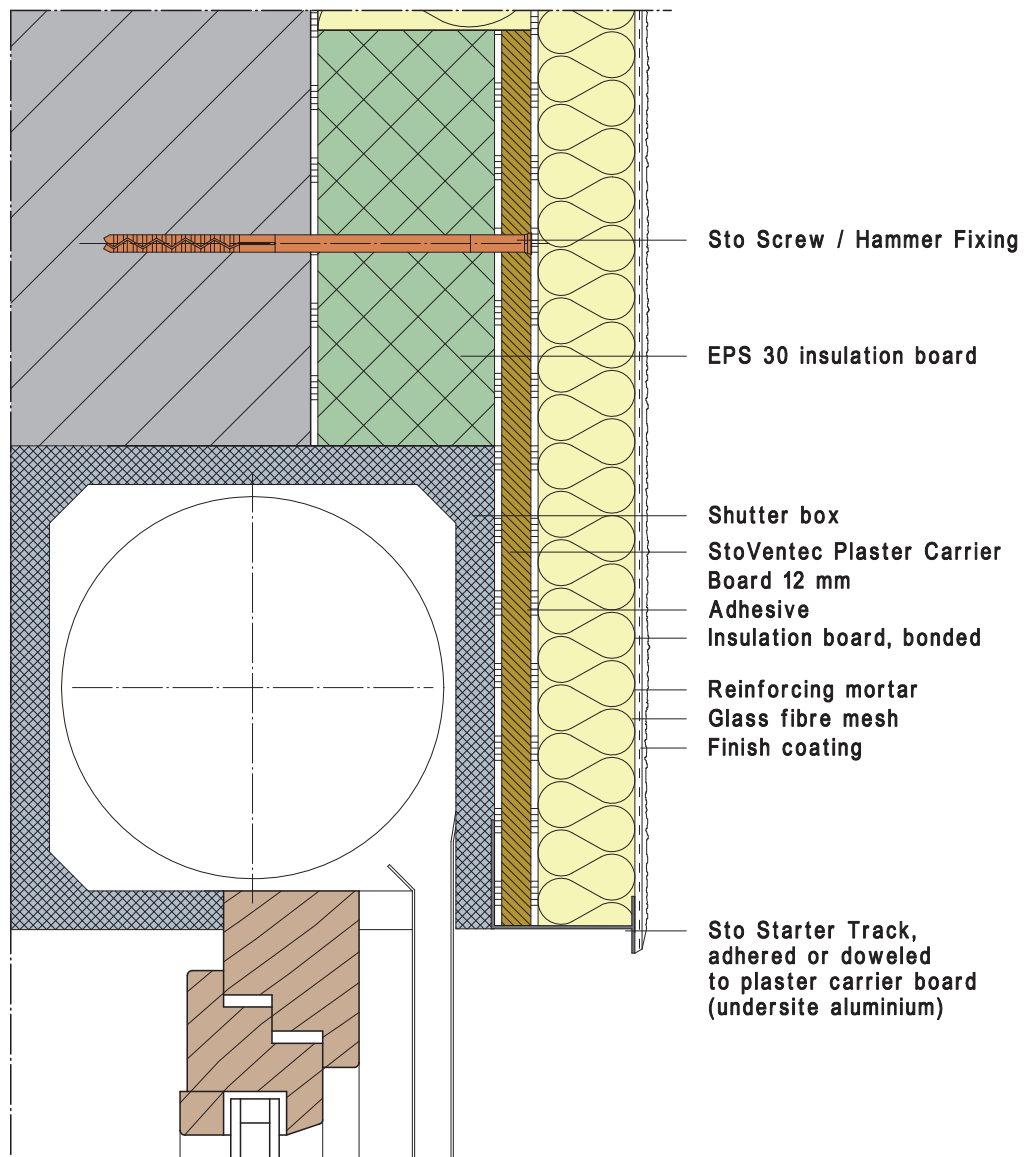
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## Shutter box connection with starter track

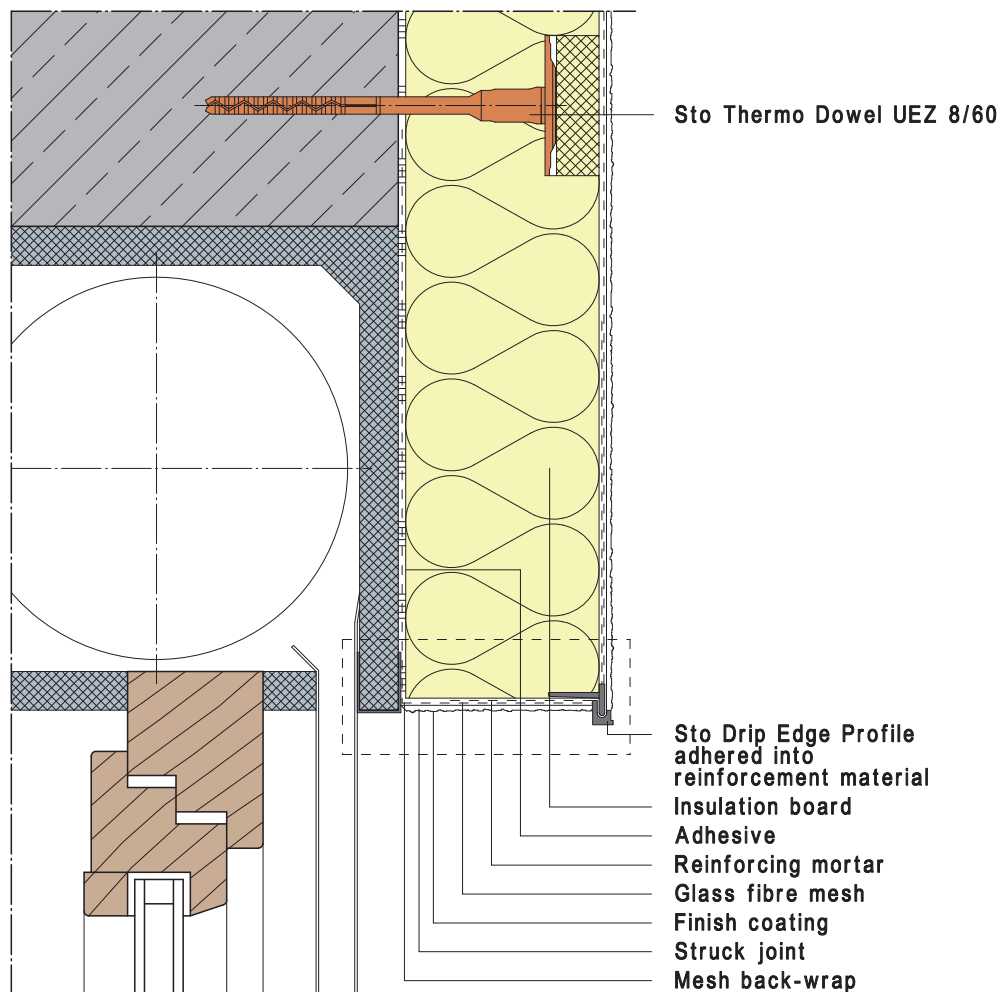
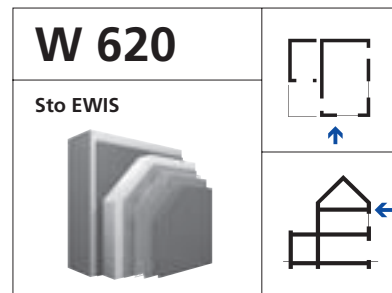


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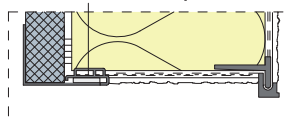


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## Shutter box connection with mesh back-wrap and drip edge profile

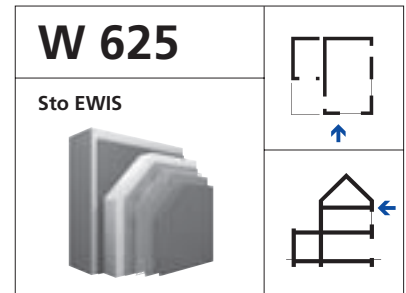


### Alternative with Sto Plaster Stop Bead Expert

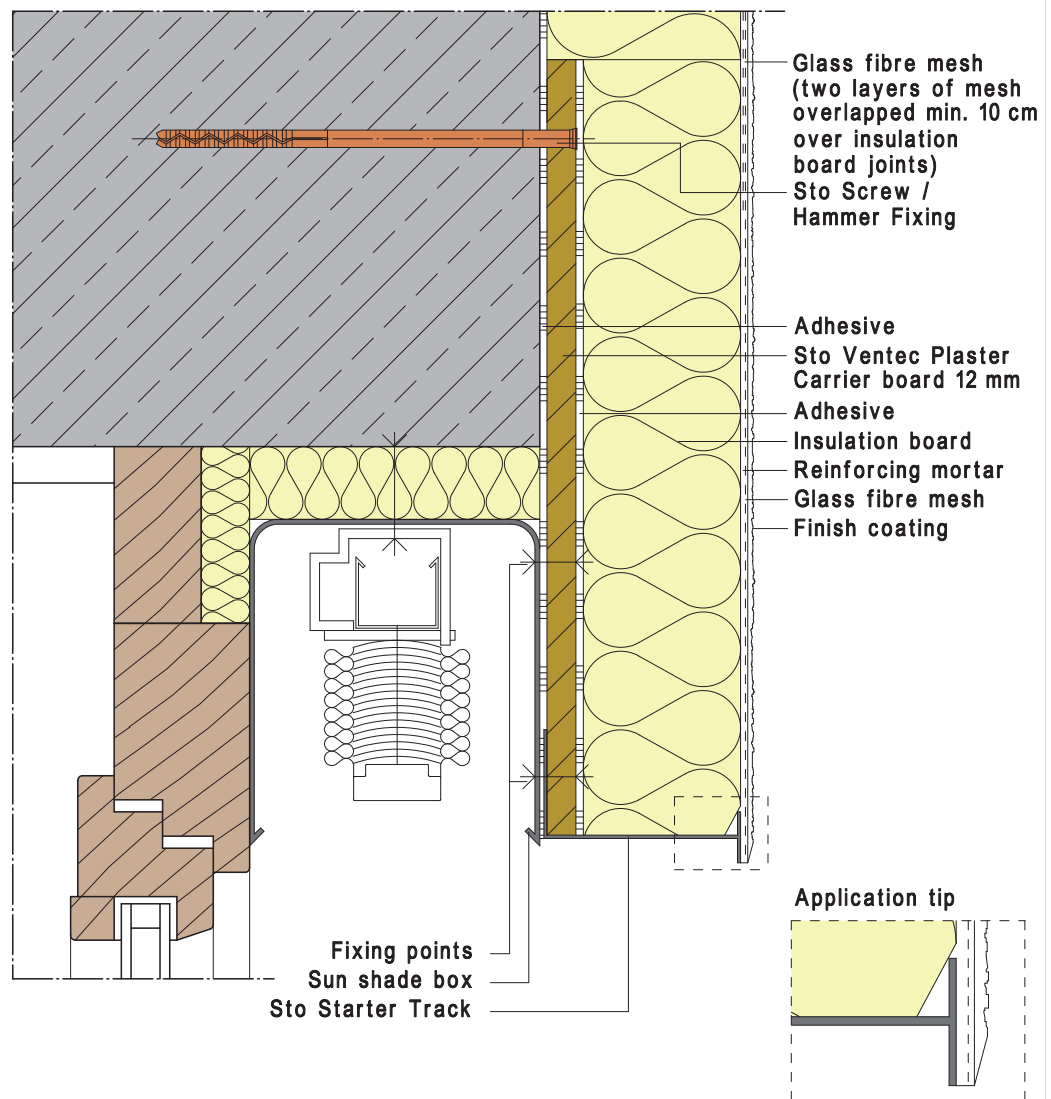


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## Connection to sun shade I

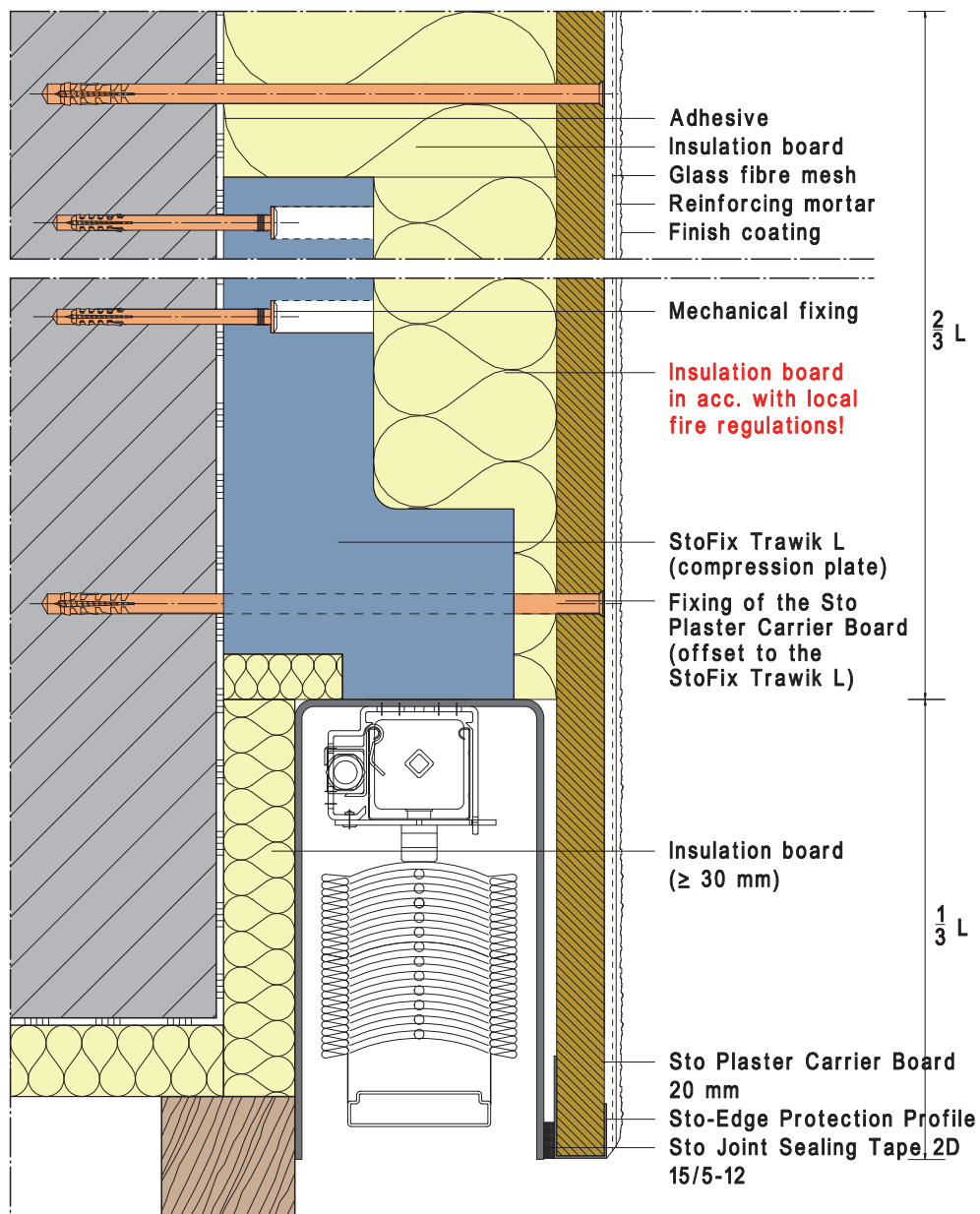
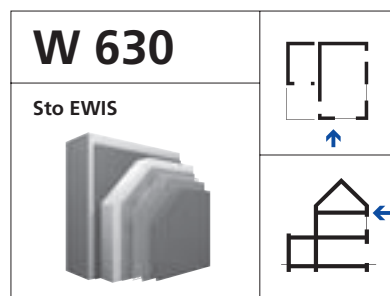


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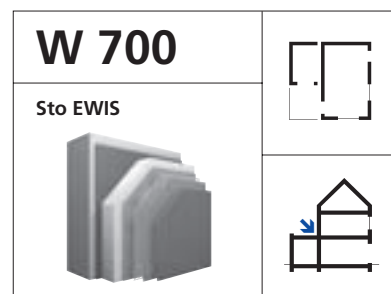
## Connection to sun shade II



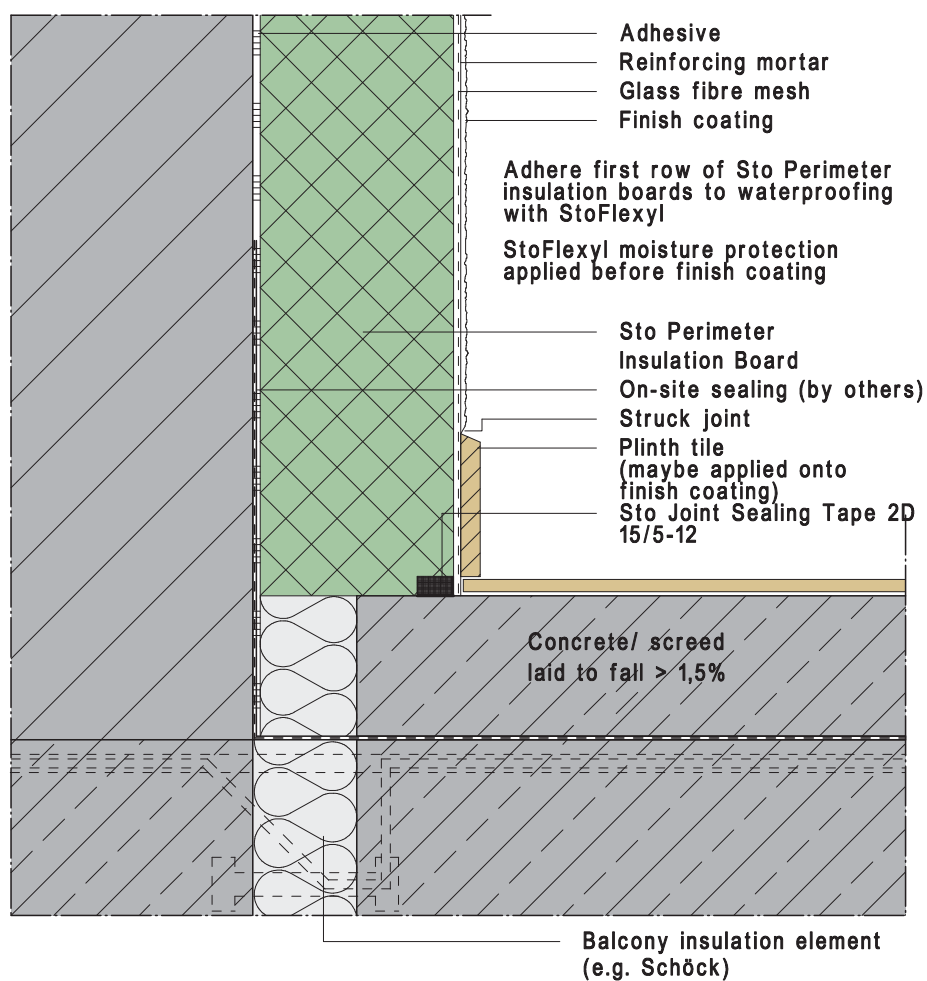
Rev. Nr. 01/08.08

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## Connection to thermal separated balcony element



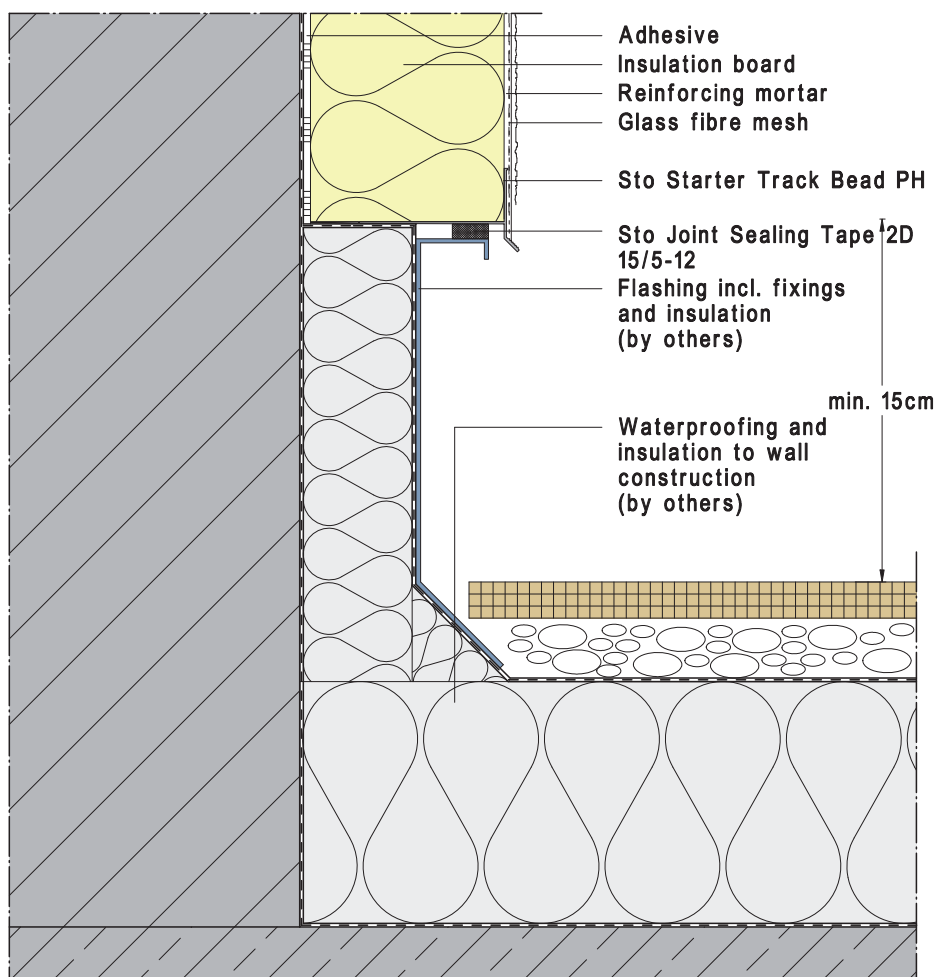
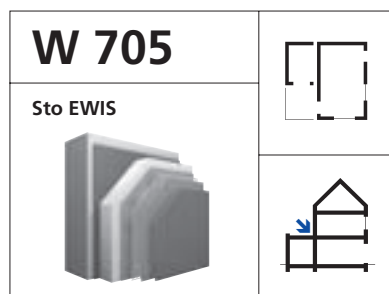
Rev. Nr. 02/08.08



**Balcony construction and waterproofing shown schematically!**

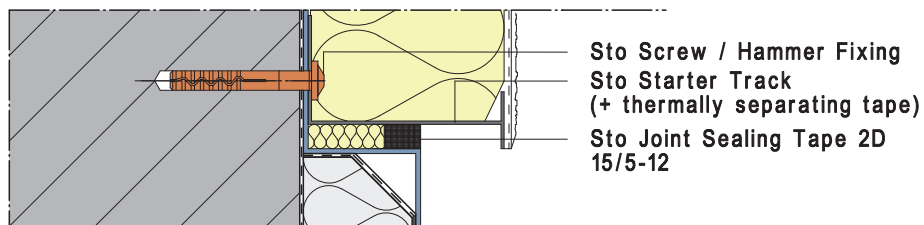
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## Connection to terrace



Alternative with Sto Starter Track

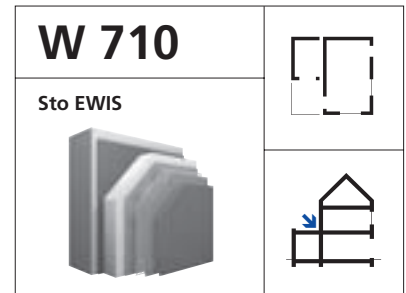
(Caution: cold bridge!)



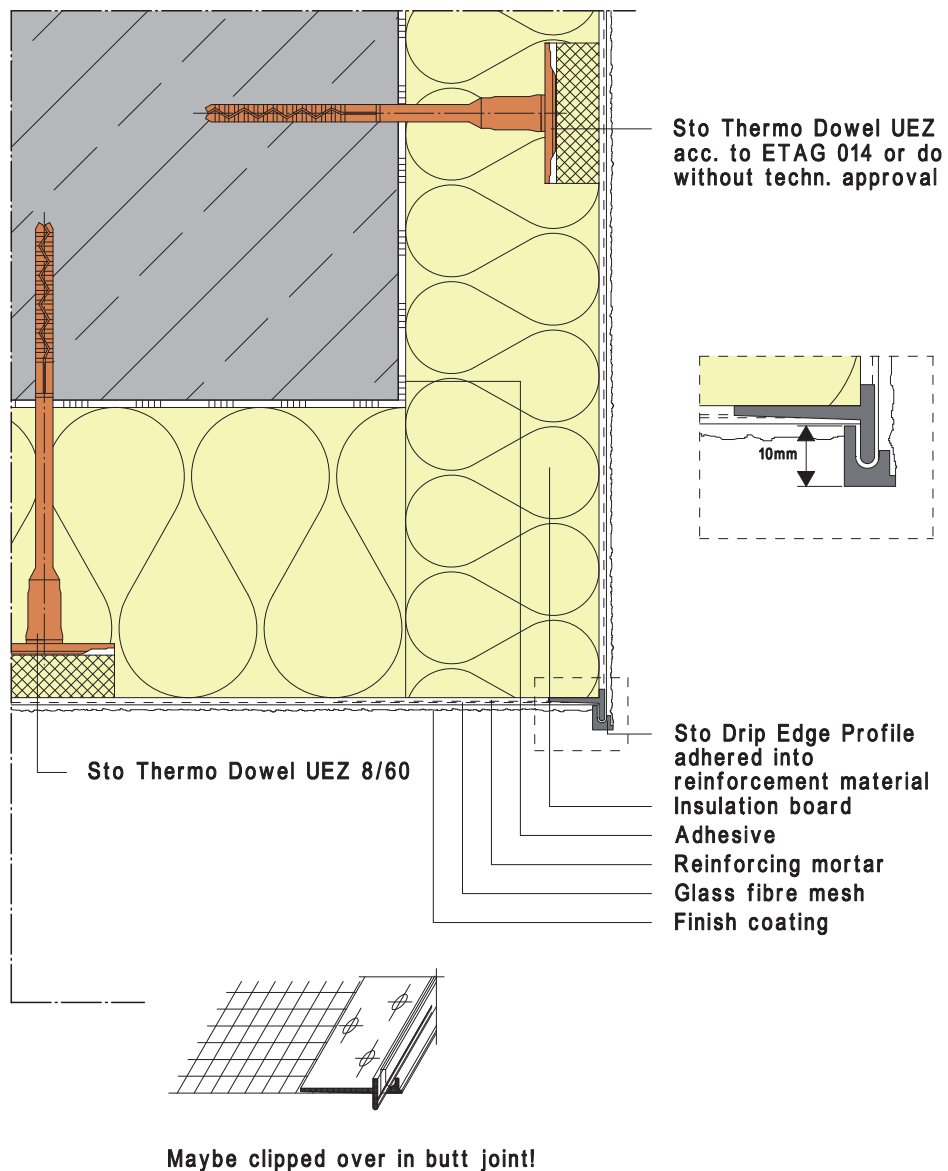
Rev. Nr. 01/08.08

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# Drip edge creation and drip edge profile

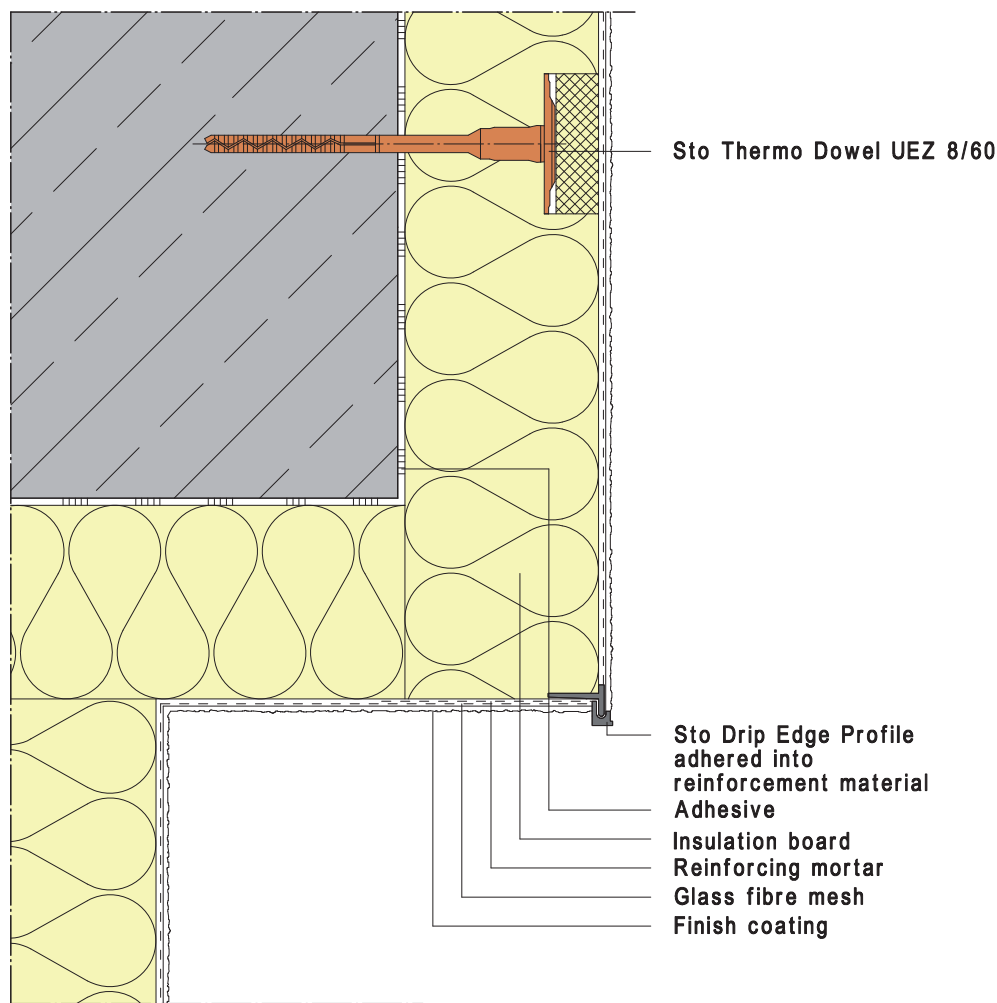
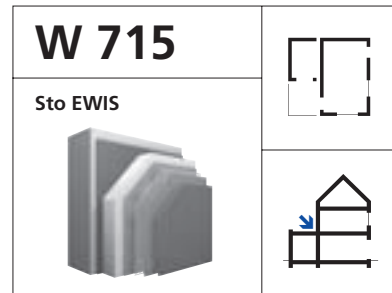


Rev. Nr. 01/08.08



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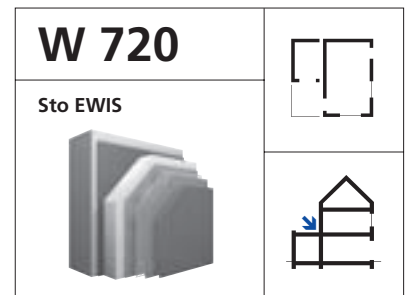
## Sealing projection with drip edge profile



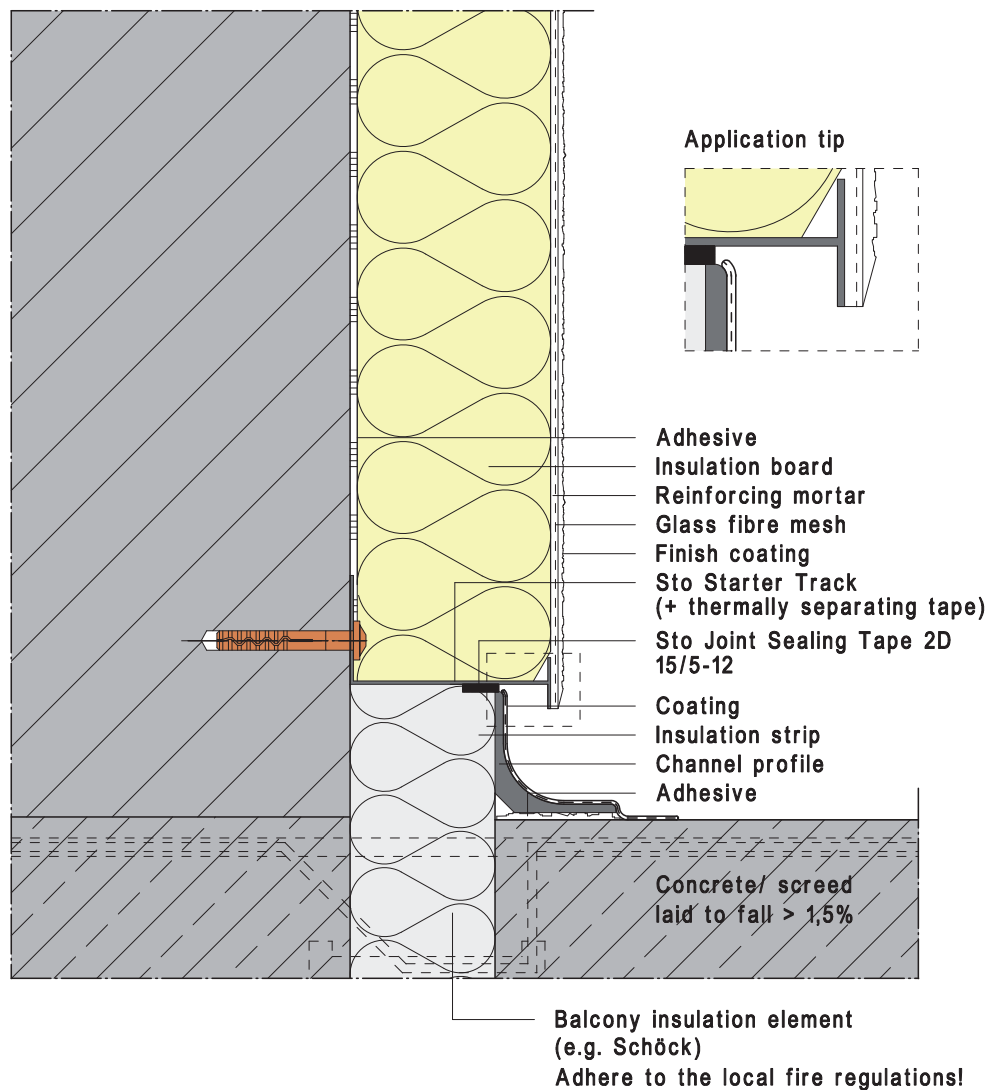
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## Connection to balcony with filet profile

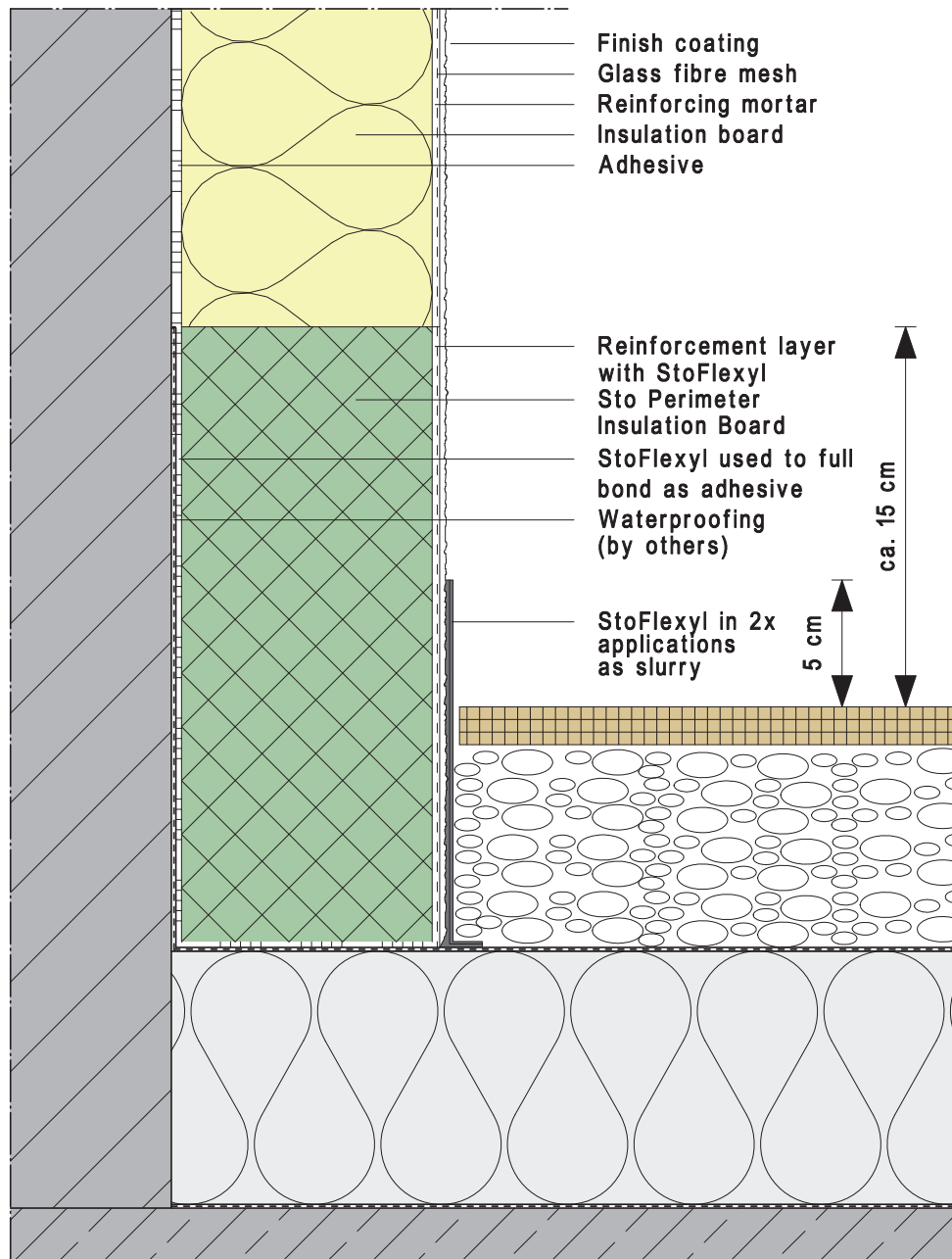
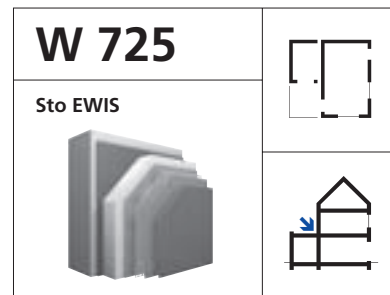


Rev. Nr. 01/08.08



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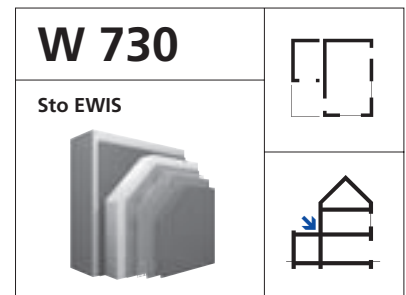
## Connection to terrace



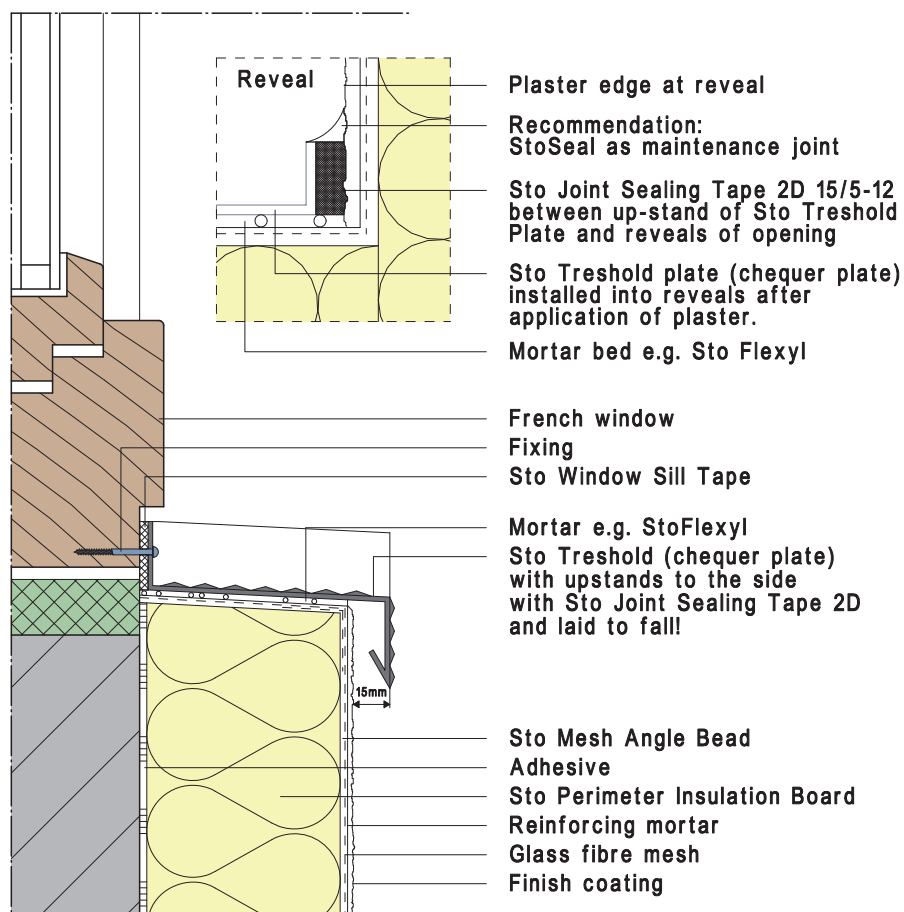
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## Connection to balcony exit



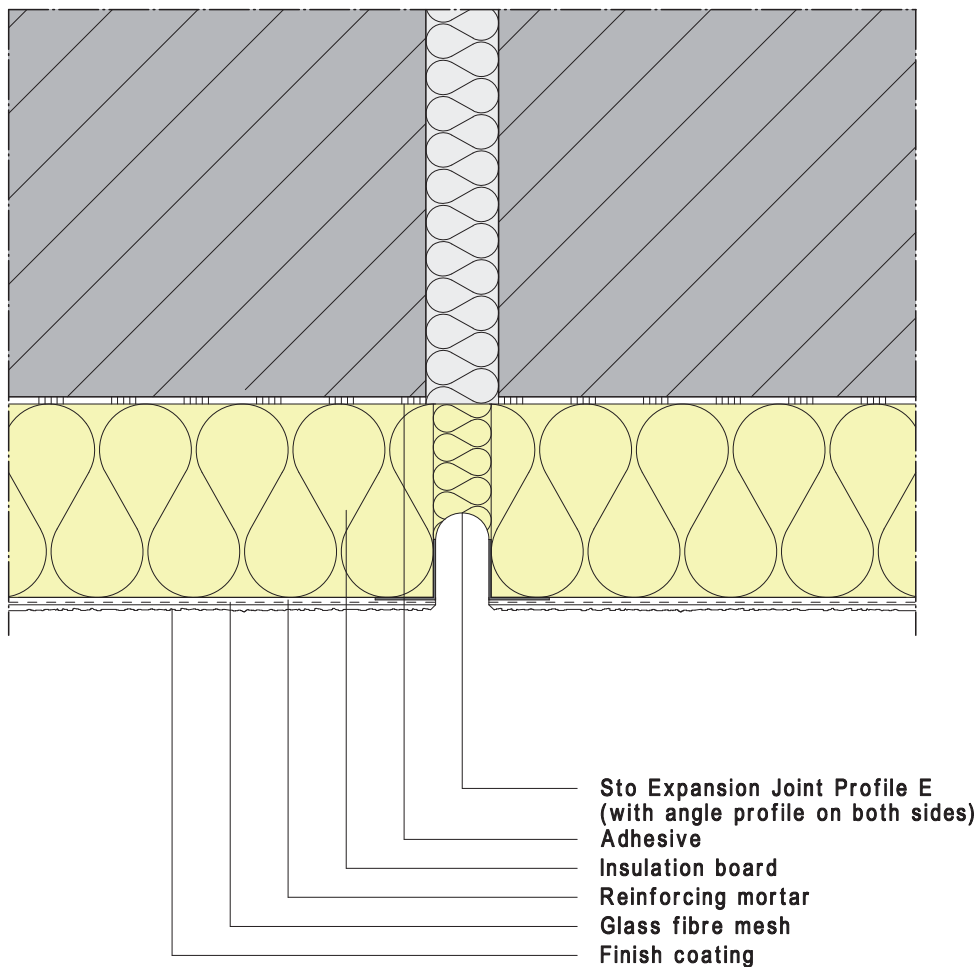
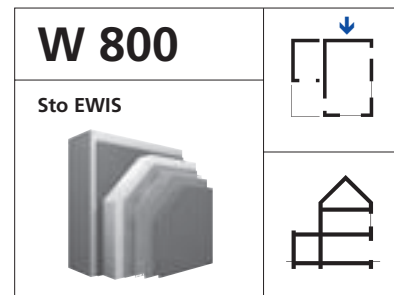
Rev. Nr. 01/08.08



**Note: if Insulation > 100mm use Sto Passive House Window Sill Console !**

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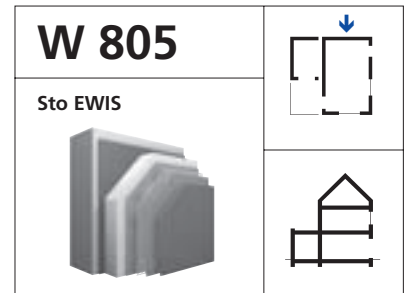
## Joint expansion profile in even wall surface level



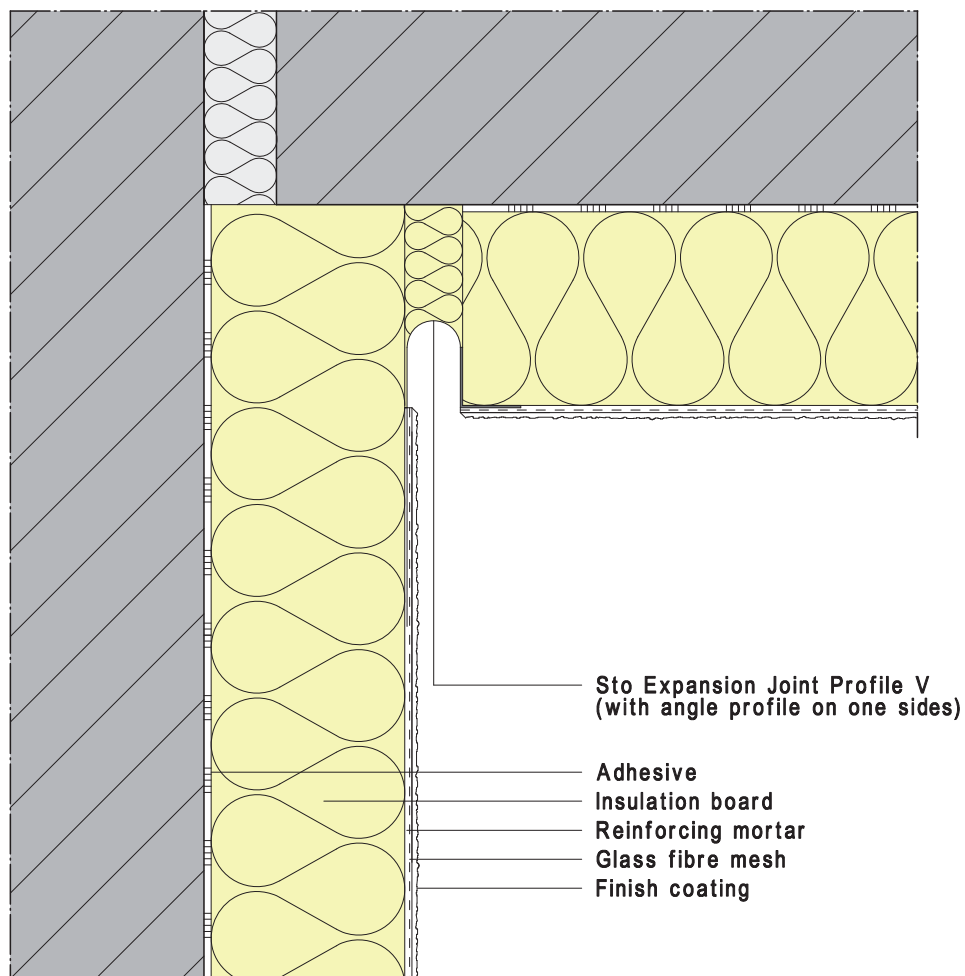
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## Joint expansion profile in staggered wall surface level

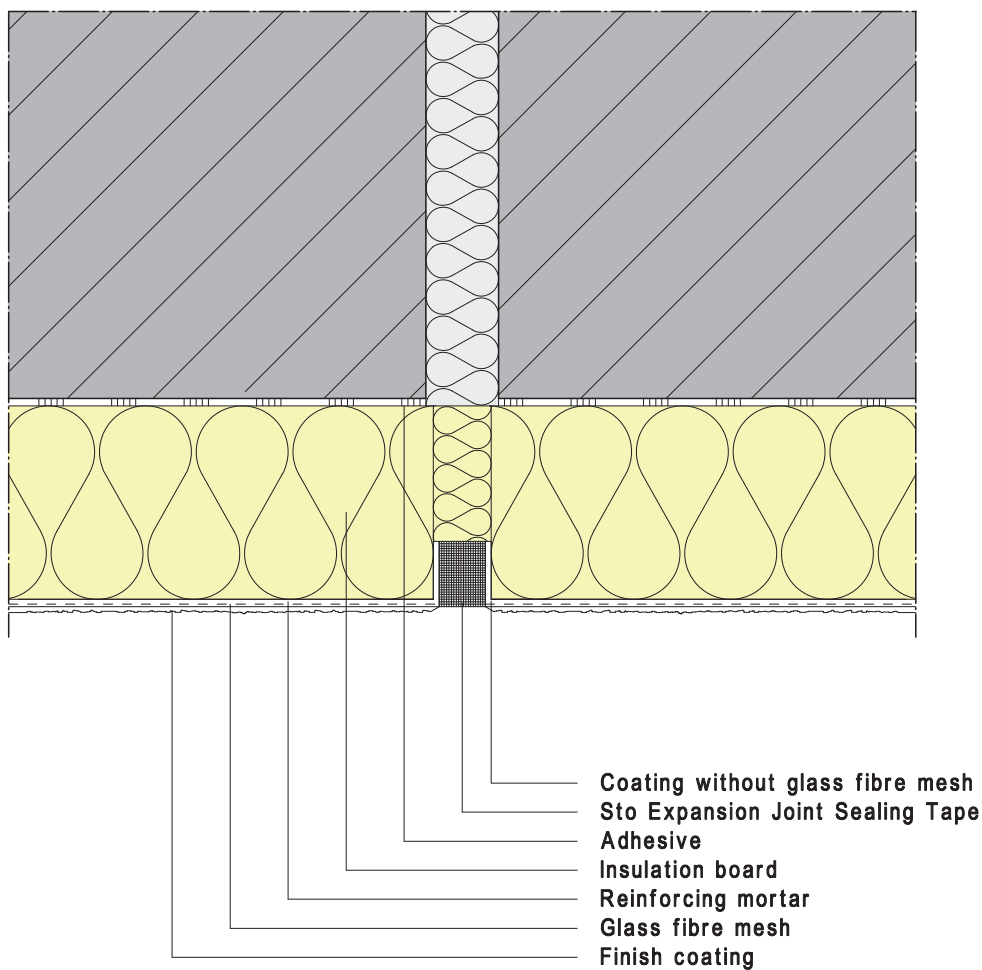
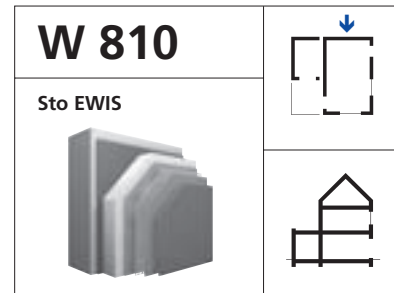


Rev. Nr. 01/08.08



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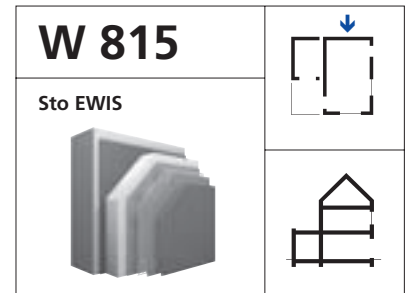
## Expansion joint sealing tape in even wall surface level



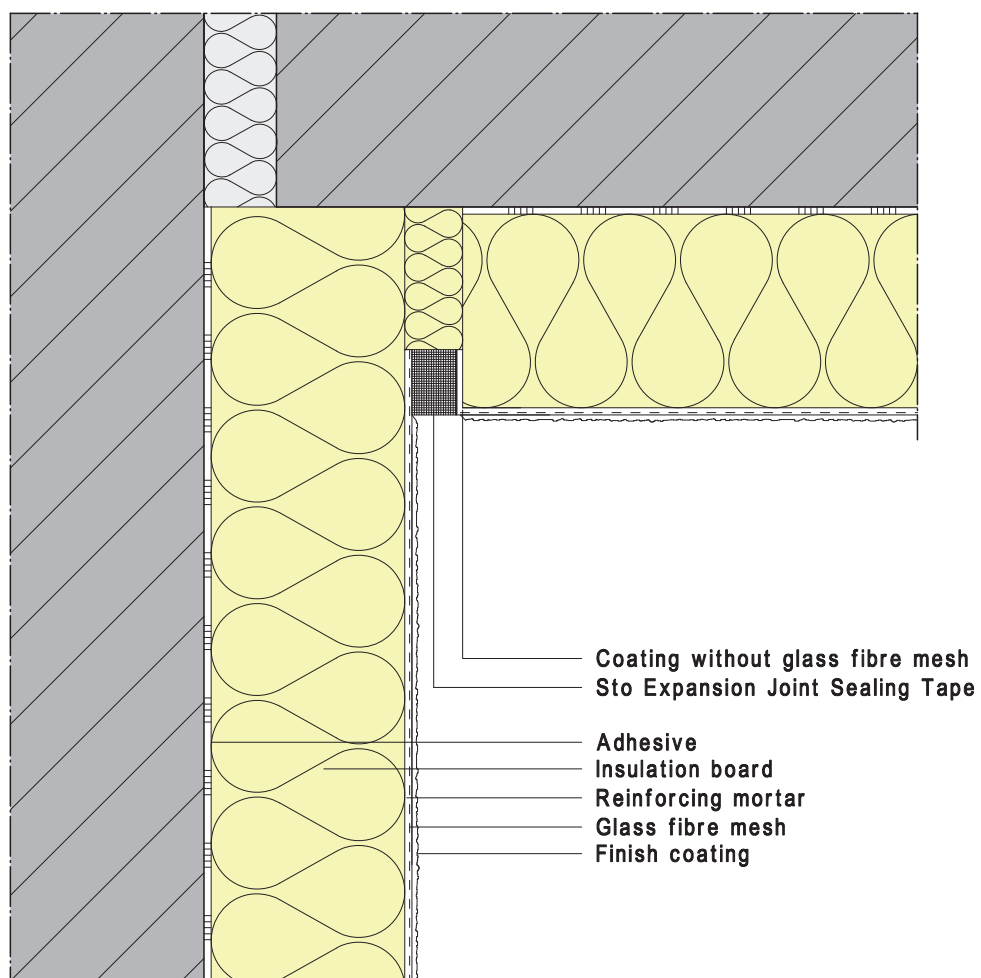
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## Expansion joint sealing tape in staggered wall surface level

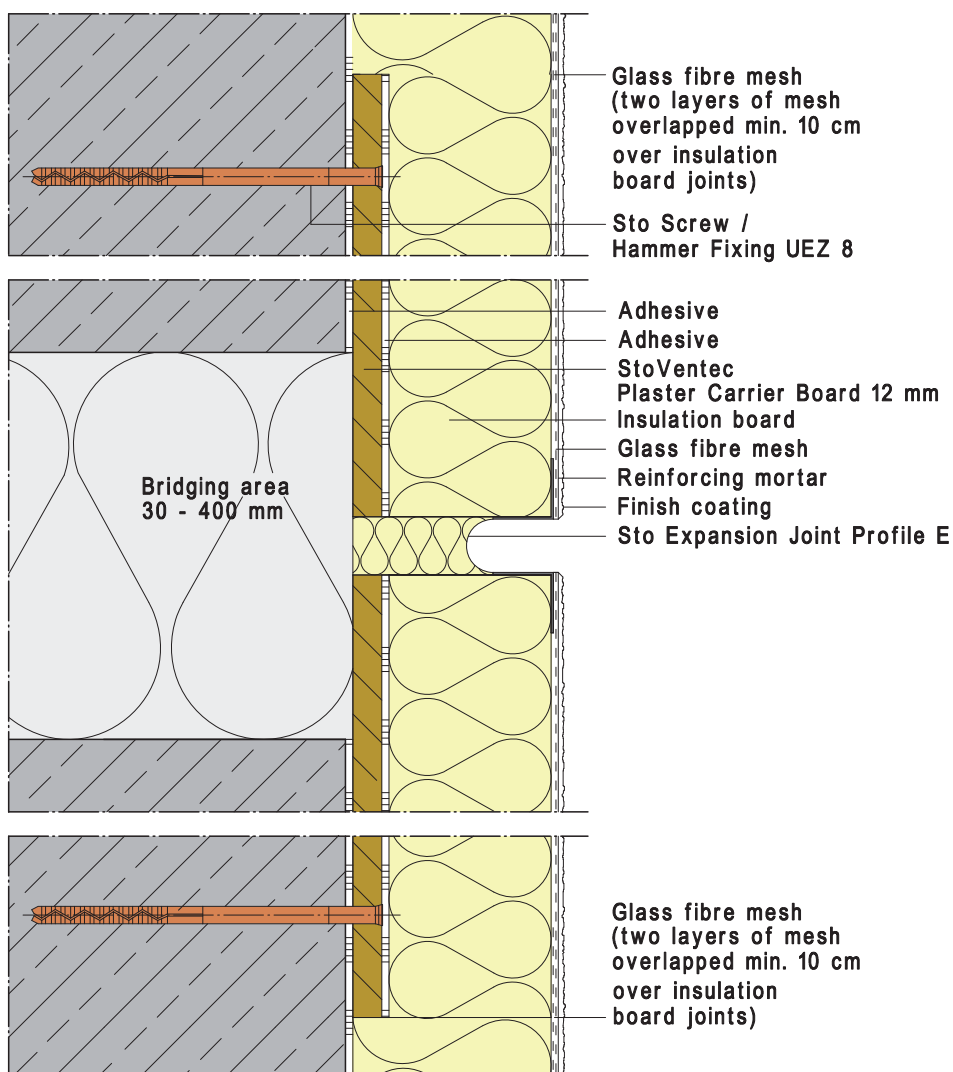
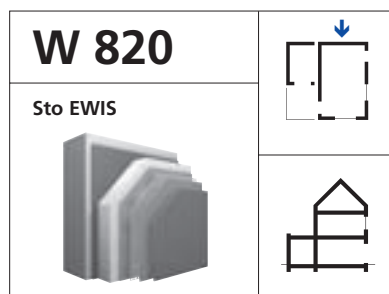


Rev. Nr. 01/08.08



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## Expansion joint bridged with plaster carrier board, 30 - 400 mm



Rev. Nr. 01/08.08

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## Products and systems

Introduction · Textures and finishes from smooth to very coarse · Facade insulation systems  
Facade plasters · Facade paints · Surface design · Lacquers and stains  
Refurbishment projects and protection of historical buildings · Balcony coatings



## Sto references

Examples of architecture employing Sto products and systems



## Details

Detail solutions with external wall insulation systems from Sto



## StoColor System

Colour variety, according to the StoColor System and other colour systems  
The 3-level principle behind the StoColor System: The human colour perception area;  
the colour wheel with 24 basic tones; the five colour rows



## Specifications

Support in project planning

## Background information - Facade

Energy-efficient thermal insulation · Advantages and benefits of the Sto facade insulation systems  
Thermal insulation · Moisture protection · Sound protection · Fire protection · Wind loads  
Indoor climate/healthy home environment · Building physical data (U values) · Glossary

## Further information

Specific information and brochures from Sto

## The StoColor System – emotional and functional



**All matter and energy is colourless. Colour only arises as a sensory perception in the human brain. The StoColor System explicitly takes account of this duality of human perception and the aesthetic aspects of architectural colour design.**

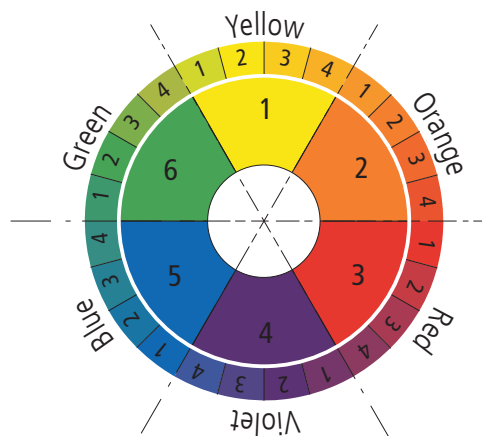
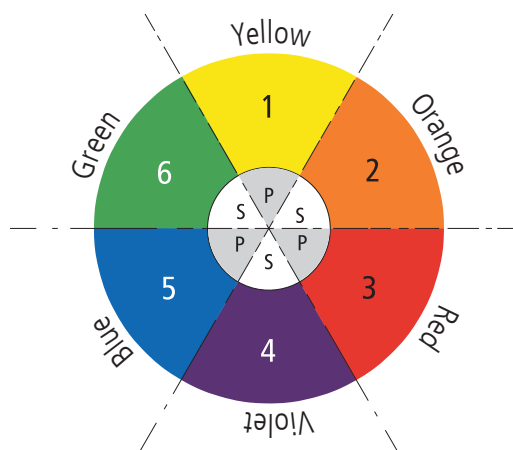


The principle of the same-colour triangle (multiple tinting with white, grey and black) results in 772 colours. 28 grey shades bring the total number of colours in the StoColor System to 800. The various shades are geared to the human perception of colour, rather than to any strict colorimetric system.



## Simple and creative –

## The 3-level principle behind the StoColor System



### Level 1

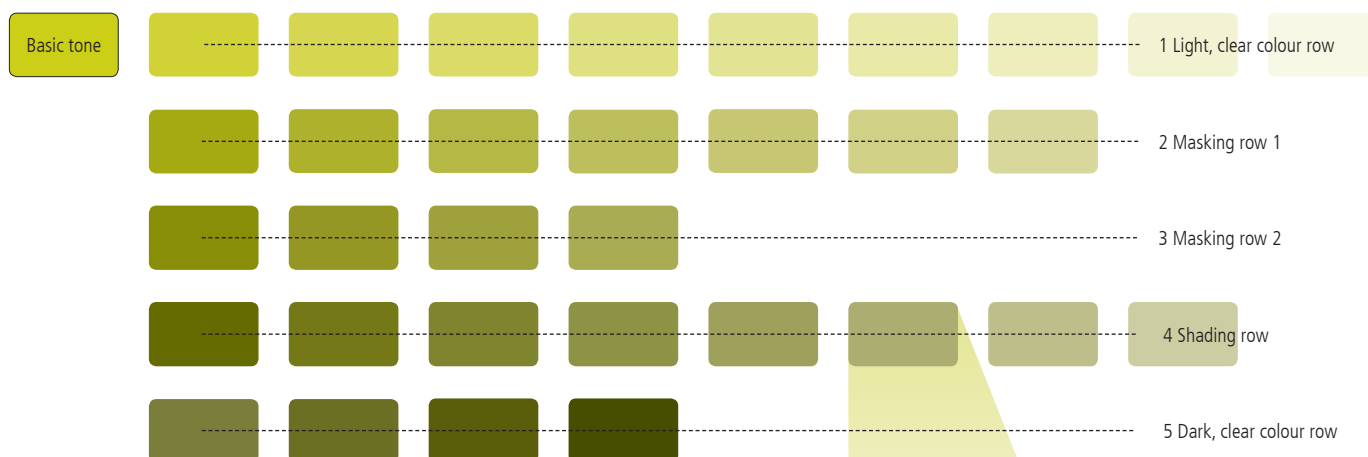
#### The human colour perception area

The human perception of colour primarily distinguishes between yellow, orange, red, violet, blue and green. This perception model forms the basis of the StoColor System.

### Level 2

#### The colour wheel with 24 basic tones

Six colour areas, consisting of the primary and secondary colours yellow, red, blue, orange, violet and green, form the basis of the StoColor System. Each of these colours is differentiated into four hues to produce a 24-part colour wheel – the basic tones.



## Level 3

### The five colour rows of the 24 basic tones

Each basic tone has five colour rows which are tinted according to the principle of the same-colour triangle.

Make-up of the colour rows:

- 1 Light, clear colour row**  
Basic colour tinted towards white
- 2 Masking row**  
Basic colour tinted towards grey
- 3 Masking row**  
Basic colour tinted towards grey
- 4 Shading row**  
A colour shade of the light, clear colour row mixed with a colour shade of the dark, clear colour row.
- 5 Dark, clear colour row**  
Basic colour tinted towards black

31102 ■ 56 C2 ○

37102 ■ 56 C2 ○ △

#### Colour no.

Colour code/order no.

#### Lightness value

Value denoting the quantity of light reflected by a surface.  
Measured in per cent:  
100% = white, 0% = black

#### Colour class

Definition of the colour surcharge –  
see price list

**StoLotusan K/MP, StoSilco K/R/MP**  
**Sto silicate products**

Colour shade is suitable

**StoLotusan Color, StoSilco Color**

Colour shade is suitable

## StoColor presentation media – simple and persuasive

**Professional colour design requires not only a well-balanced colour system, but also the certainty that the evolved design concept can actually be realised precisely as envisaged. The presentation media are designed with this in mind. The main emphasis here is not on colorimetric or theoretical considerations. The primary aim is to develop design tools which are applicable to the most diverse architectures, styles and colour materials.**

Comprehensive service materials, from the CD-ROM to the colour sample box, provide architects with ideal support in their planning and consultation work.

Orders and information:  
**infoservice.export@stoeu.com or**  
**telephone: +49 7744 57-1131**



### Colour fans

The basic tool for choosing colours and combinations of colours. Separating indices sort the colour system into six perception areas. The key items of information are provided on the relevant leaves.



### Colour edition

Six colour fans for planning colour schemes. Each fan presents one of the six perception areas. Each individual leaf presents a colour shade over its entire area, to enable the combination, comparison and selection of shades. Each fan additionally includes the grey rows, representing them over the entire area of the leaves, in the same manner as the colour tones.



### Colour sample box

The sample box assists the designer in evolving colour schemes and collages. It contains all the colour shades of the StoColor System, with each shade presented over the entire area of a relevant A5 leaf. The shades are systematically sorted into the six perception areas by separating indices. Additional leaves can be ordered for each individual colour shade.



### CD-ROM colour ranges

Digital colour ranges for the following computer programmes: Adobe Photoshop, Corel Draw, Micrografx Picture Publisher, Nemetschek Allplan FT, Arcplus, ArCon, AutoCAD and ArribaCAD; the CD also contains the RGB and Lab values of the StoColor System.

## Products and systems

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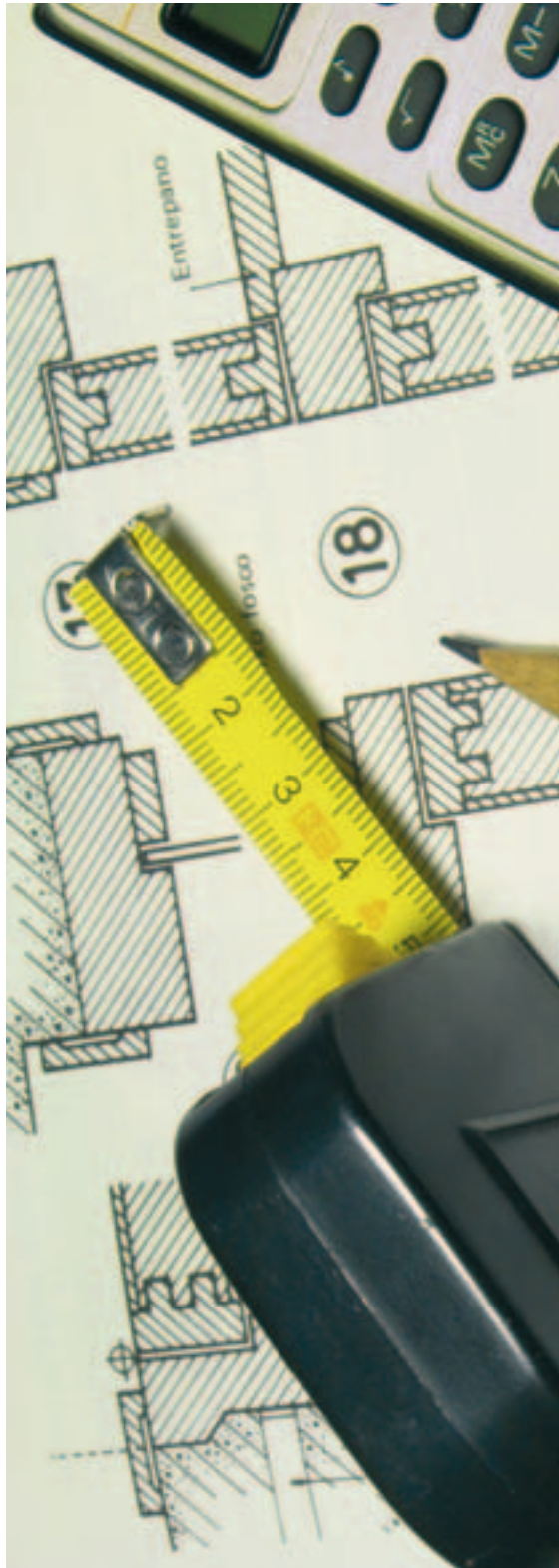
## Further information

Specific information and brochures from Sto



# Specifications

On plan with Sto



**The use of software for planning and tendering purposes is very important to you in your daily work. Sto specification texts can be provided for all standard software solutions.**

For further details, please contact your nearest Sto representative. A list of Sto representatives can be found at [www.sto.com/international](http://www.sto.com/international)

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## Background information – Facade

### Building physics

It is to be noted that the details, illustrations, general technical information and drawings contained in this document are only general proposals and details which merely describe basic functions schematically. No precise dimensions are included. The applicator/client 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 assembly plans. The technical specifications and product information in the Technical Data Sheets and in system descriptions/certificates must be observed.

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# Planning for the future today

## Energy-efficient building

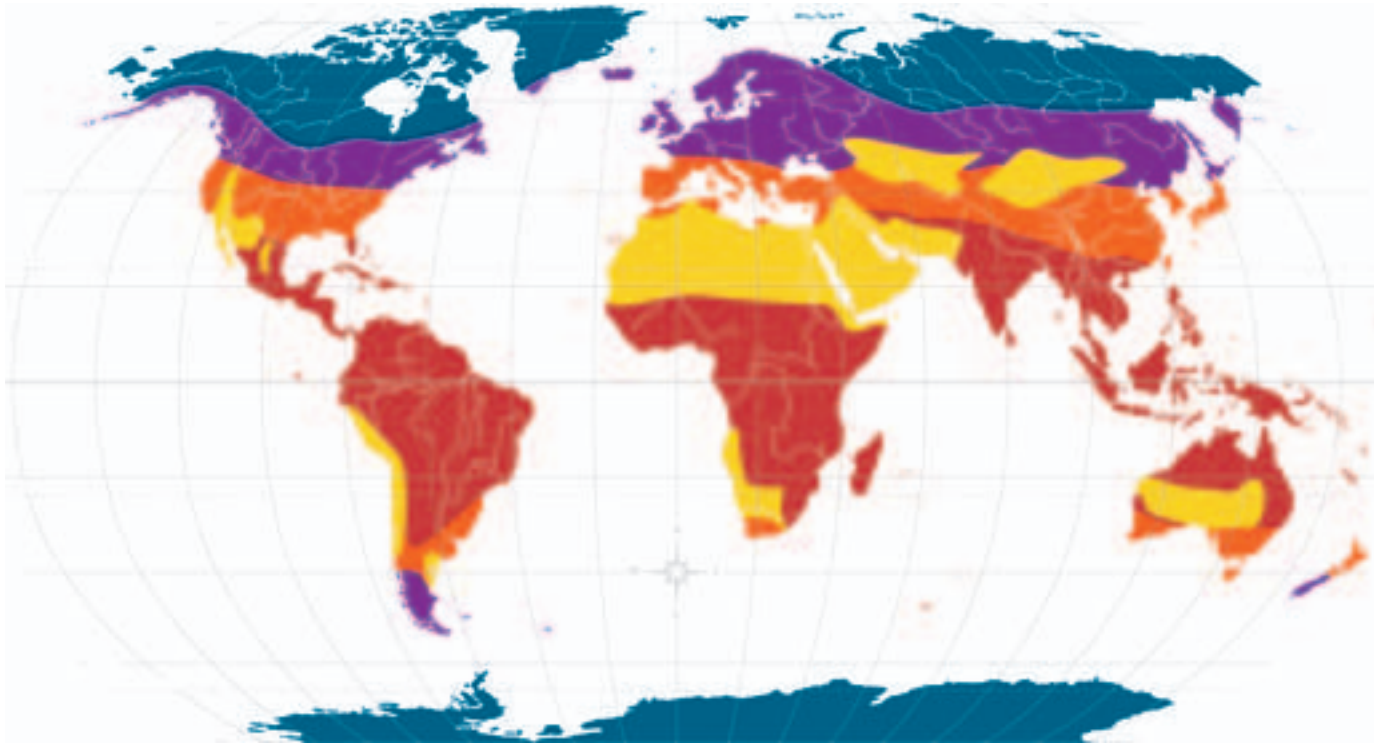


While there is no patent remedy to the greenhouse effect, energy-efficient building and renovation play a major role in helping to avert climatic disaster.

**In the face of rising energy costs, diminishing resources and concern about the global climate, the energy efficiency of both planned and existing buildings is becoming a key focus of architectural debate. And for good reason, as buildings which are carefully planned and erected with due regard to the given building physical requirements not only reduce heating costs considerably but also play an important part in helping to combat global warming, pollution and CO<sub>2</sub> emissions.**

The building physical requirements relating to the energy efficiency of new and existing buildings have risen enormously in recent years. Although the energy consumption of new buildings today is only a third of what it was 30 years ago, the overall energy consumption of all German households has actually risen since 1990. Other European countries have also seen similar developments. The main contributory factors are changes in people's ways of life, the rising amount of living space required per head of population and the large volume of inadequately insulated buildings .

In this brochure, Sto outlines ways and means of optimising the energy efficiency of buildings on a sustainable basis. The brochure provides information on the four key pillars of building physics – thermal insulation, moisture protection, sound protection and fire protection. Furthermore, it presents the latest details on building physical characteristics of external wall insulation systems (EWIS) and offers important tips on how to create a comfortable ambient interior climate and prevent mould.



Thermal insulation for cooler climatic zones – insulation against heat in warmer climates:  
Insulation makes sense in all seasons and every climatic zone.

### **Insulation makes sense in every climatic zone**

Good insulation for buildings is not just about providing protection from the cold. In a worldwide context, protection against heat in the summer plays a predominant role in the south, while in the north the focus is on protection from the cold of winter. Whatever the climatic zone, insulation always makes sense.

### **The aim is a pleasant ambient interior climate throughout the year.**

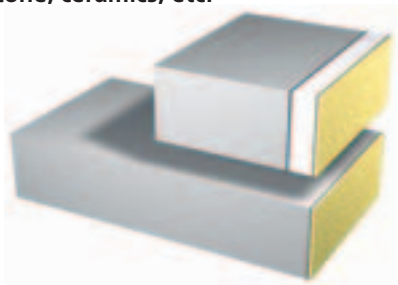
Thermal insulation needs to respond to various climatic influences. A number of measures are available in order to enhance energy efficiency and reduce energy costs while benefiting the environment at the same time:

- Improved thermal insulation – particularly on existing buildings
- The use of regenerative sources of energy, such as photovoltaics (in some instances as an integral part of the facade design process)
- The application of all means of improving energy efficiency (southward orientation, complete insulation of the building envelope, modern heating and windows, etc.)
- Sustainable building (EPDs, seals of approval) – also covering the disposal of materials

# Insulation affords protection from cold and heat

But which system is efficient where?

**External wall insulation system (EWIS) or rainscreen cladding system? The right choice of insulation system is dependent on both structural and climatic considerations. EWIS are among the most effective and economical insulation systems available. They are weather-resistant, stress-resistant and suitable for practically any substrate of adequate load-bearing capacity. Thanks to their separate sub-construction, rainscreen cladding systems can also be installed on uneven walls or loose layers of render such as are encountered when renovating older buildings, for example. They are also the preferred choice for prestigious buildings, on account of the broad design scope they offer with materials such as natural stone, ceramics, etc.**



A facade with an EWIS requires much smaller wall thicknesses than a monolithic wall structure to attain the same insulating effect.

## Modes of functioning of the different types of insulation systems

EWIS are installed directly on the outside wall. External influences acting on the system are transferred to the load-bearing substrate or compensated by the insulation layer. Rainscreen cladding systems are largely decoupled from the supporting wall by the sub-construction. The ventilation airspace between insulation layer and external envelope counteracts overheating in the summer and helps to discharge moisture when physically critical substrates are involved. Rainscreen cladding systems also permit the use of darker colours with lower lightness values.

### Resistance to driving rain means...

the installed window sills must be able to absorb thermally induced changes in length without any problems, in order to avoid joint formation in the area of connection to the EWIS and the resultant entry of water into the latter. Therefore, they should be watertight, welded on all sides, and provided with so-called "expansion strips" at the sides.

### The lightness value...

is important when choosing the colour for a facade. As a measure of a colour's degree of reflection it indicates how far the colour is removed from black (minimum reflection = value 0) or white (maximum reflection = value 100). Colours with values under 20 were long taboo because they absorb too much light (= heat), leading to thermal stress in the system components. Today, systems (e.g. StoTherm Classic) are available which even enable values below 15.



**The benefits of effective facade insulation are by no means limited to reduced heating costs:**

**1) Energy savings**

In times of rising energy costs, insulation is a good investment.

**2) Environmental protection**

Energy consumption impacts on the environment. Insulation reduces heating-related pollutant emissions.

**3) Enhanced value**

Insulation protects building substance. The value of new and older buildings is enhanced or maintained more effectively – rental values rise as a result.

**4) Enhanced home environment**

Insulation provides for a comfortable, well-balanced indoor climate: Through higher wall surface temperatures in the winter (no draught), and through a pleasant coolness in the home during the summertime.

**5) Mould prevention**

Insulation raises the temperature of the interior wall surfaces, thereby preventing condensation, damp wallpaper and mould.

**6) No thermal bridges**

When well insulated, critical details such as radiator niches, lintels, ring beams, ceiling junctions, external corners, etc. no longer represent weak points.

**7) Improved heat storage**

Insulating walls exploits the masonry's heat storage capacity to the full.

**8) Guaranteed weatherproofing**

Insulation provides an ideal means of "breathable" weatherproofing: seamless, resistant to driving rain and permeable to water vapour.

**9) Improved sound protection**

Sto external wall insulation systems enable construction materials with higher volume weights to be used on new buildings.

**10) Reduced thermal stress and cracking**

Thermally induced changes in the lengths of structural elements are reduced substantially. Thermally induced cracking – e.g. on heterogeneous wall constructions – no longer occurs.

**11) Optimised crack repair**

Older buildings which are subject to cracking can also be renovated with Sto.

**12) Attractively designed facades**

A diverse range of insulation systems enables attractive, seamless facade designs on new and existing buildings alike.

**13) Increased living space**

With EWIS the thickness of the outside walls can be reduced to the minimum dimension required for static reasons.

**14) Built-in experience and reliability**

Recommended by specialists, preferred by tradesmen: Sto EWIS have been tried and tested on facades covering a total surface area of over 400 million m<sup>2</sup>.

**Just for the record:  
Efficiency and aesthetics  
go hand in hand**

When discussing the energy balance those who are ultimately responsible for buildings customarily claim that "facade insulation and aesthetics are mutually exclusive". This is quite simply wrong! Diverse surface materials, from glass through natural stone to ceramics and various render textures provide broad design scope for insulated facades today.



Stolit Effect facade render with  
Sto Glass Pearls

# There's no influencing the outdoor climate

The indoor climate is another matter

Walls, ceilings, roofs, floors, windows, doors... buildings and rooms which are in constant use need to be protected both from heat loss and from excessive heat inflow. Buildings and parts of structures should thus be designed to optimise thermal protection in winter and also in summer conditions. To create a healthy and comfortable home environment, an insulation system is required which provides effective protection both from climatic influences (such as damp, frost, etc.) and from damage.

## Insulation leads to drastic reductions in energy consumption.

Heating accounts for around 80 % of a private household's total energy consumption, while hot water, lighting and electrical appliances make up just 20 %. For the most part heat escapes through walls and roofs. Facade insulation drastically reduces such losses. Windows are another weak point: 13 % of heating energy is lost through airing, 20 % through transmission, i.e. heat exchange when the windows are closed.





**Required layer thickness of different building materials to achieve the same insulating effect (in cm)**

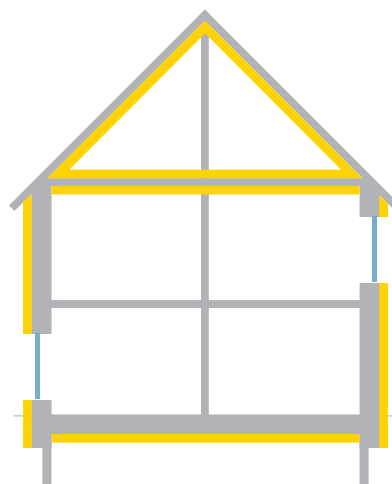
17	Insulant (thermal conductivity group 040)
51	Lightweight concrete blocks
55	Coniferous wood
68	Porous bricks
246	Vertical coring bricks
344	Solid bricks
421	Lime sandstone
892	Concrete

**20 cm of insulant is more effective than 9 m of concrete.**  
The insulating effect hinges not on the thickness, but on the thermal conductivity of the material.

### Effective thermal insulation measures

The term “thermal insulation” refers to all measures which serve to reduce heat transmission between the interiors of buildings and the outside air and between rooms in which different temperatures prevail.

- Insulation of the entire building envelope



- Insulation against unheated rooms (e.g. cellars)
- Avoidance of thermal bridges
- Correct airing and heating
- For new buildings: Orientation of the building (e.g. with regard to solar radiation, wind load, etc.)

### Physical definitions relating to thermal insulation

#### Heat transmission coefficient (U value) and insulant thicknesses

The U value, or heat transmission coefficient, applies as a standard rating throughout Europe today (unit:  $\text{W/m}^2\text{K}$ ). It indicates the heat convection in watts which flows through a surface area of  $1 \text{ m}^2$  at a temperature difference of 1 kelvin ( $1^\circ\text{Celsius}$ ).

#### What does “thermal conductivity” mean?

The more effectively a building material conducts heat, the more heat will escape into the outside environment. Thermal conductivity  $\lambda$  (“lambda”) indicates the heat convection in watts (W) through a building unit of 1 metre (m) in thickness at a temperature difference of 1 kelvin (K). The unit of measure is  $\text{W/mK}$ .

An insulant with a thermal conductivity of only  $0.035 \text{ W/mK}$  is recommendable when building a low-energy house, for example, at insulant thicknesses of over 16 cm.

#### Definition: Thermal resistance R

Thermal resistance R (measured in  $\text{m}^2\text{K/W}$ ) is obtained by dividing a material’s layer thickness (d) by its thermal conductivity,  $\lambda$ :  $R = d/\lambda$

#### Definition: Thermal resistance $R_T$

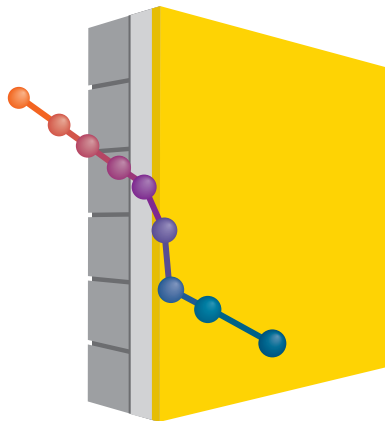
Thermal resistance  $R_T$  (unit:  $\text{m}^2\text{K/W}$ ) is the sum total of the individual thermal resistances of all the various layers and the internal and external surface resistances.

# Keeping walls warm and dry

Thermal insulation against cold and moisture in winter



In winter, thermal insulation reduces heat loss and provides building structures with long-term protection against climate-related dampness effects. Preventing thermal bridging is a minimum requirement for thermal insulation. Properly designed and installed thermal insulation ensures that an adequately high temperature is maintained on the inner surfaces of structural elements during the heating period. This, in turn, prevents condensation from forming on the wall surfaces at a “normal” ambient interior climate.



In terms of building physical considerations, exterior insulation is virtually always the right solution and offers nothing but benefits on a practical level. Cold is kept out – the masonry is kept roughly at room temperature.

# An effective heat shield

Thermal insulation keeps home interiors cool in summer



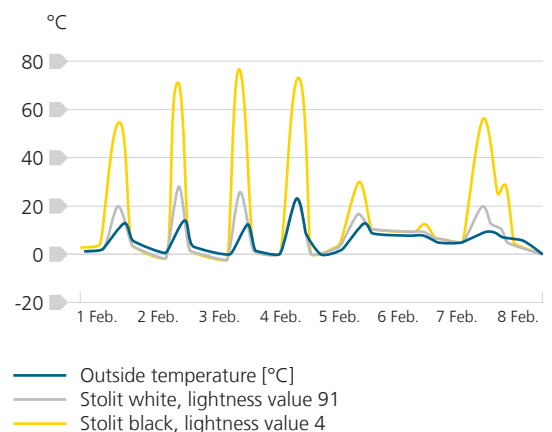
In summer, thermal insulation serves to limit the temperature increase inside rooms which is caused by solar radiation (generally sunlight entering through windows) and thus ensures a comfortable ambient interior climate. As a general rule of thumb, dark outside walls heat up more readily than light-coloured structural elements because they absorb more solar radiation. This may lead to thermal stress in the system components. It is thus recommendable to use light colours for any facades that are likely to be exposed to strong sunlight.

**The colouring of a facade has a substantial effect on its relative humidity and the temperature of its external surfaces.**

The darker a facade, the higher the temperature of its external surface will be. On the inside, temperatures remain comparatively constant. The reflectance of a colour is indicated by the so-called lightness value (cf. p. 6).

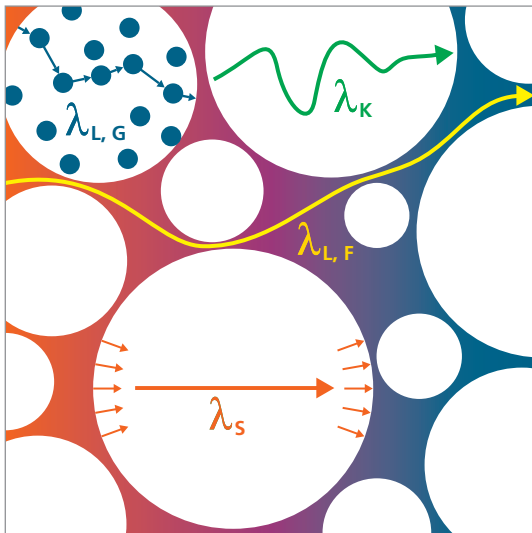
The ventilated rainscreen cladding variant offers the advantage of heated air rising through the ventilation airspace between sub-construction and facade elements and is thus continuously discharged into the atmosphere. This is a particularly useful attribute in the case of dark facades.

Surface temperatures  
Influence of colouring



# Energy-efficient, healthy and ecological

Today's insulants meet every requirement



Air molecules “migrate” through air voids measuring just a few  $\mu\text{m}$  from the warmer to the colder side of the wall, where the heat is transmitted. Insulants whose porous interior walls are laminated reduce infrared radiation transfer, as a result of which less heat escapes.

The importance of thermal insulation for buildings rose substantially in the 1990s in the context of energy conservation. This led to a vast leap forward in the development of insulants in terms of energy efficiency, health aspects and ecological attributes.

## Selection criteria for insulants

### • Thermal conductivity

Thermal conductivity is the crucial aspect in choosing an insulant.

Insulants are classified according to origin (organic or inorganic), composition (name of raw materials) or manufacturing method (e.g. foaming).

The following types of insulants exist:

### • Mineral fibre insulants

Insulants based on minerals, such as glass wool or mineral wool, are non-combustible.

### • Plastic foams

Synthetic materials produced by means of foaming with a cellular structure and low density possess a low dead weight, low thermal conductivity and are virtually free of internal stress.

### • Cork insulants

Cork possesses low thermal conductivity and is suitable for sealing purposes (e.g. as cork panelling, cork filling or spray cork) and for composites with a plastic matrix (cork-plastic composites).

### • Foam glass

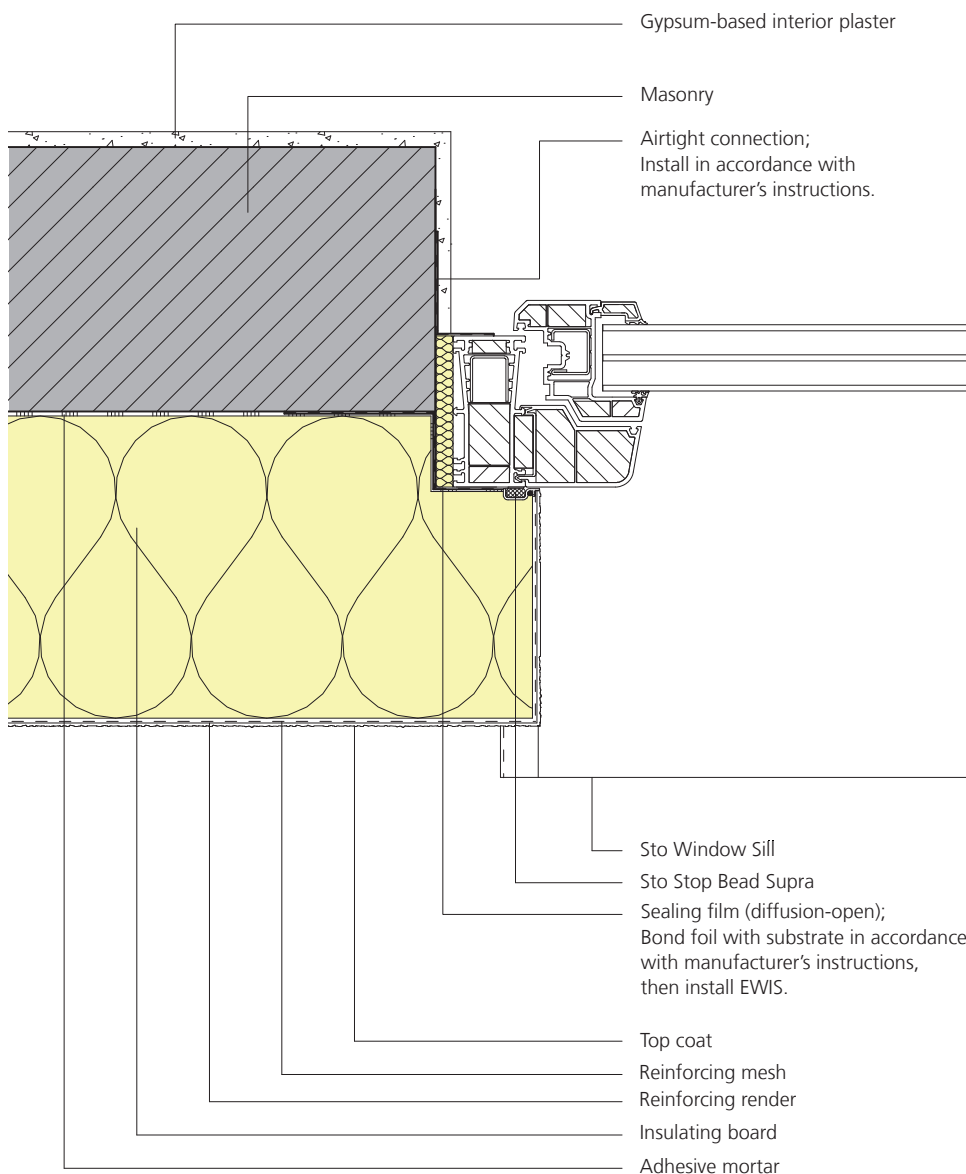
Expanded glass which is used first and foremost in construction and civil engineering and for technical installations on account of its compressive strength, water resistance and impermeability to vapour.

### • Wood wool and laminated lightweight building boards

Wood wool boards are manufactured without the use of any synthetic binding agents or pollutants and are employed for the purposes of thermal and sound insulation. As laminated lightweight building boards they can be combined with rigid foam or mineral fibre boards.

# Keeping the building envelope under wraps

Thermal bridges are conducive to heat transmission



**Thermal bridges are points on or in parts of building elements at which heat escapes into the outside environment during heating periods. These areas generally possess lower thermal resistance and subsequently higher levels of transmission heat loss. Thermal bridges may result from the most diverse causes of a structural, geometric or material-related nature.**

## Structural thermal bridges

...result from structures with varying thermal conductivity.

Examples include connections between reinforced concrete ceilings and outside walls, ring beams, radiator niches, etc.

## Geometric thermal bridges

...result from juts or corners in an otherwise homogeneous building unit – when the internal surface (as in the case of external corners on buildings) faces a larger external surface through which heat is discharged.

## Material-related thermal bridges

...occur when the cross-section incorporates different materials in the direction of thermal flow – as in the case of flush-fit steel girders or lintels in a brick wall, for example.

### Detail drawing – window connection

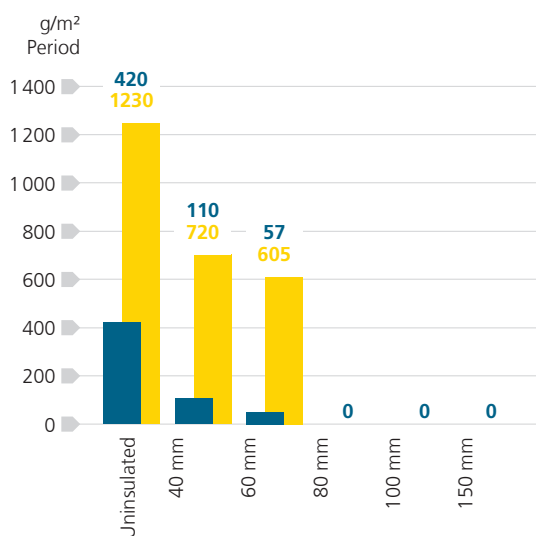
Professional insulation reduces thermal bridging at critical points, such as window reveals, window frames, etc., and ensures that heat does not escape into the outside environment.

# The dry answer to mould and corrosion

Thermal insulation prevents water from condensing

The enhanced thermal insulation which is common today reduces the risk of condensation on and inside structural elements. Insulation thus offers the best means of avoiding consequential damage, such as mould and corrosion.

Water vapour diffusion:



■ Condensation water mass ■ Evaporation mass  
k value: 0.45/0.17 W/(m²K); 700 kg/m³

The condensation water mass which enters into a wall during the cold time of the year is substantially greater on an uninsulated or poorly insulated house than on a well insulated building. Avoiding thermal bridges helps to reduce condensation water.



**Just to put the record straight:**  
**The old wives' tale that well insulated walls can't breathe and cause mould is quite simply false.**

Houses do not "breathe"! The air never passes through the wall, but rather through windows or the ventilation system – taking around 98 % of the moisture with it. What this false claim is actually referring to is vapour diffusion, i.e. the diffusion of moisture through the building's external envelope. However, this only accounts for 2 % of the total moisture mass.

## How condensation water arises

Condensation water arises when water vapour (e.g. in damp air or in porous materials) drops below a certain temperature – the so-called "dew point". Typical areas where condensation water arises are:

- Thermal bridges in walls and ceilings
- Rooms in inadequately ventilated homes
- Kitchen and bathroom
- Poorly insulated external parts of structures and walls
- Surfaces of good thermal conductors, such as metal, glass, natural stone, tiles, etc.



### Requirements

The formation of condensation water is regarded as harmless when following key requirements are met:

- The water which accumulates inside a building unit during the dew period must be released back into the atmosphere during the evaporation period.
- On roof and wall constructions a surface-related condensation water mass of  $1.0 \text{ kg/m}^2$  should not be exceeded.
- If condensation water occurs at areas of contact with a layer without any capillary water absorption capacity, a surface-related condensation water mass of  $0.5 \text{ kg/m}^2$  should not be exceeded.
- In the case of wood, an increase in the moisture content by mass of more than 5 %, or of more than 3 % for timber materials, is inadmissible. Lightweight wood-wool boards and laminated lightweight boards are exempt from this stipulation.



Diffusion-open paints and renders repel water from outside, water vapour from inside is able to escape.

### Product tip: Ventilated rainscreen cladding system

Sto systems such as StoVentec and StoVerotec (special variant: StoVerotec Photovoltaic – with integrated energy-generating elements) combine design variety and moisture protection to the very highest standard.

# Taming fires

## Fire protection as a crucial part of the planning process

**Once a fire has started, flames may escape through openings and spread to the storey above. Fire protection measures are consequently compulsory for multi-storey buildings. With EPS insulation, a non-combustible mineral wool strip prevents flames from spreading over the entire facade.**

### Advantages of a continuous fire strip

A fire strip consists of a fire class A1 mineral wool strip which must be at least 20 cm high. A maximum spacing of 50 cm is permissible between the bottom edge of the fire strip and a lintel. In multi-storey buildings with > 10 to 30 cm of EPS insulation it runs around the entire house as a horizontal strip after every other storey.

Instead of having to apply individual strips over the windows, with this system it is only necessary to insert a continuous strip in the flame-resistant EPS insulation – and the strip only has to be used on every other storey. Conflicts with blind and shutter boxes are a thing of the past.

### General rules:

- In the case of doubled-up insulation, a mineral wool fire strip must be bonded full-surface to the masonry. This means that the old insulation has to be removed along the course of the strip.
- On multi-storey buildings, e.g. with continuous glazed staircases, window strips, loggias or offset openings, the fire strip runs around the openings.



### The fire behaviour of surrounding materials influences the break-out and spreading of a fire in a room.

Combustible and inflammable structural elements can only be kept below their ignition temperature for a limited time. While non-combustible materials remain protected from temperature increases for longer, they may lead to structural changes, cracking and deformation. This means that load-bearing elements must be shielded from hot gases released by fires – e.g. by sheathing with a non-combustible material.



A separate flashover strip over every opening in a facade has been standard to date. The approved continuous fire strip offers a more installation-friendly alternative.

## Classification of fire behaviour according to EN 13501-1

The fire classifications stated in the European technical approvals (ETA) characterise the behaviour of construction products in the event of fire. Alongside the main classification criteria, i.e. ignitability, spread of flame and heat of combustion, which determine the fire rating, the following incidental occurrences during a fire are additionally classified:

- smoke production
- production of flaming droplets/particles

The fire classification of a facade insulation system is stated in the associated European technical approval (ETA). In terms of fire protection, however, due consideration must always be given to the relevant national regulations.

## Euroclass fire ratings according to EN 13501-1

Euroclass	Time to flashover in room corner test
A1	No flashover; calorific potential $\leq 2$ MJ/kg
A2	No flashover; calorific potential $\leq 2$ MJ/kg
B	No flashover
C	10 – 20 min
D	2 – 10 min
E	0 – 2 min
F	No performance determined

## Classification of smoke production as additional criterion

Class	Maximum SMOGRA* in $\text{m}^2/\text{s}^2$	Maximum TSP** 600s in $\text{m}^2$
s1	30	50
s2	180	200
s3	Value exceeding maximum or untested	

\* SMOGRA = **S**moke **G**rowth **R**ate

\*\* TSP = **T**otal **S**moke **P**roduction

## Classification of production of burning droplets/particles as additional criterion

Class	Burning droplets	
	Burning droplets/particles: within 600 seconds: no	Burning droplets/particles: - within 600 seconds: yes - within 10 seconds: no
d0	✓	
d1		✓
d2	Value exceeding maximum, ignition of filter paper or untested	

# Noise is bad for the nerves

## Good insulation brings peace and quiet

Noise can lead to health risks such as stress, impaired hearing or cardiovascular problems. As such, minimising noise pollution is a vital necessity. Sound insulating measures have been feasible since it became possible to measure the extent to which building materials and structural elements transmit or absorb sound. Such measures offer a combination of technical and economic efficiency in accordance with the given requirements of the individual application concerned.

Sound attenuation

The sound attenuation of a building unit is determined by means of comparative measurements on finished parts: High sound attenuation = low degree of transmission and good sound insulation. In the case of solid outside walls the surface-related mass is the crucial factor: The heavier (concrete, lime sandstone, solid brick) and thicker the wall, the better (= higher) its sound attenuation will be.

**Airborne sound protection and sound attenuation**

Road and rail traffic, aircraft noise... The airborne sound protection requirements for external parts of building structures are dependent on the prevailing noise levels and the type of property and rooms. The characteristic for airborne noise insulation is sound attenuation, R<sub>w</sub>,R in dB.



External wall insulation systems (in a two-shell wall structure) may influence sound attenuation in different ways through their vibration behaviour. As for thermal insulation, to be on the safe side it is also better not to skimp on sound protection.

Not every thermal insulation system has a positive effect on sound protection: The resonance vibration frequency determines whether an EWIS has a positive or negative influence on the perception of outside noise.

**The effect of an EWIS on sound protection depends on the type of system involved. Crucial factors are:**

- Dynamic stiffness of the insulant
- Thickness of the insulation (insulant thickness)
- Type of fixing (proportion of bonded surface area/dowels)
- Mass of the render system (render weight)

Sound insulation:  
 "Wall with EWIS" (Here: 20 cm polystyrene (elast.) + 14 kg/m<sup>2</sup> render compound) + window

- 35 dB window
- 55 dB wall (= 50 dB lime sandstone incl. interior plaster + 5 dB EWIS)

Total attenuation with 25 % window surface area = 40.9 dB

### The influence of windows on sound protection

Window areas are the weak points of the facade with regard to sound protection. The windows are thus the crucial factor determining the sound protection of the exterior building unit wall + windows.

This makes sound-insulating windows a must when higher levels of airborne sound insulation are required on external parts of building structures. Additionally, it is advisable to use ventilated rainscreen cladding systems (e.g. Sto Ventec, seamless cladding systems). Improvements in the rated sound attenuation, R<sub>w</sub>, for the wall in the order of +10 to +15 dB can be attained in this way.

Influence of windows on sound protection			
	Sound attenuation		
	Wall	Windows	Total*
Lime sandstone, 1800 kg/m <sup>2</sup> , 17.5 cm thick, incl. 15 mm interior plaster	50 dB	35 dB	40,6 dB
Lime sandstone with 5 dB improvement through EWIS	55 dB	35 dB	40,9 dB
Lime sandstone with 5 dB deterioration through EWIS	45 dB	35 dB	39,9 dB

\*if windows cover 25% of total surface area

# Against the wind

## Factors for calculating the wind load

The wind load is one of the climatically induced forces acting on buildings and parts of structures. It results from the distribution of pressure around a building which is exposed to a wind flow. Wind loads can vary substantially according to a building's size, shape, orientation and location. The wind load also varies on different parts of a structure, with the corners of buildings and edges generally subject to the highest loads.

### Positive or negative wind load?

Every building can be divided into zones of varying size, shape and dimensions. The wind load acting on a building is comprised of (positive) compressive forces and (negative) suction forces. These forces generally act perpendicularly to the exposed surface, as a so-called distributed load.

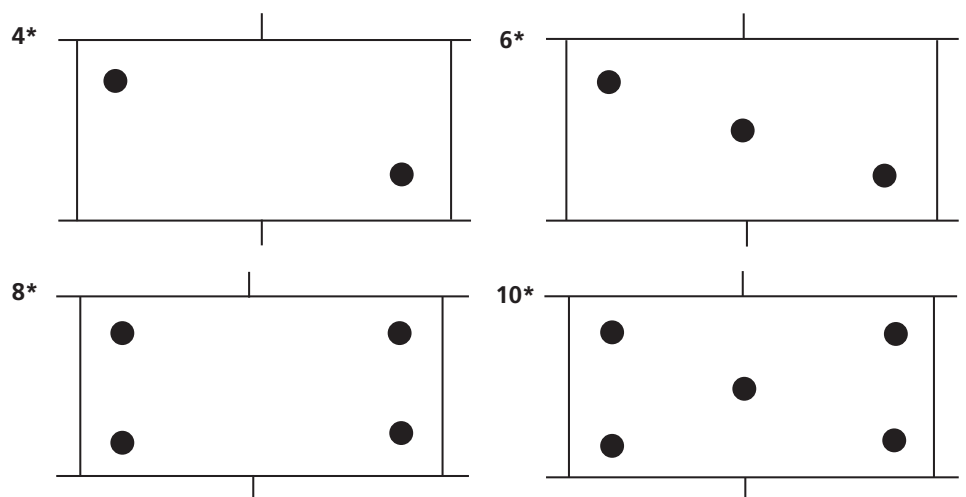
The negative forces (negative pressure) play a particularly important role with regard to the design of a building: The slowing-down of the air flow at the surfaces of a house which are exposed to a frontal air flow gives rise to positive pressure. The air flow falls away at the edges of the building's roof and side surfaces, causing negative pressure (suction). The subsequent wake eddy also generates negative pressure on the rear side of the building.

### Dowelling recommendation

When standard fixing is not sufficient, additional fixing measures (bonding and dowelling) are necessary. The dowel positioning and the required number of dowels depend on the height of the building, its location and the wall material.



Dowelling patterns for board size 0.5 m<sup>2</sup>



Dowels per m<sup>2</sup>

# People are the best “measurement devices”

## Insulation enhances well-being and comfort

Various factors influence our well-being inside buildings. The temperature of the air on the wall surfaces is equally as important to a pleasant ambient interior climate as the air humidity and air movement. The temperature of the surfaces enclosing a room is at least as important as the room temperature. Any differences will be felt directly by those using these rooms.

**Real and perceived temperature**  
Heating/cooling and thermal insulation are the decisive factors determining the room air temperature. A range between 17 °C and 24 °C is considered comfortable. The difference between the temperature of the room air and that of the surfaces enclosing the room should not exceed 3 °C.

At a room temperature of 20 °C a normally dressed person has a skin temperature of 33 °C. The skin loses heat continually as a result of the temperature difference between the body surface (skin) and the ambient air. The “perceived” temperature is not identical to the room air temperature, but is the mean of the room air and the wall surface temperature.

Example:  
**Room air temperature** = 20 °C  
**Wall surface temperature** = 18 °C  
**Perceived temperature**  
 = (20 + 18) : 2 = 19 °C

Air movement (convection)

Rising warm (= lighter) air and falling cold (= heavier) air leads to continuous air movement in closed rooms (convection). Air moving at less than 0.2 m/sec generally remains unnoticed. At a temperature difference of more than 3 °C between wall surfaces and room air the air cools to such an extent that it becomes noticeable, however – in the form of unpleasant draughts.

Wall structures					
Wall structure	Thermal conductivity [W/mK]	Heat transmission coefficient		Wall surface temperature	
Concrete B 25	2.10	2.75	0.35	+9.3	+18.6
Vertical coring bricks	0.58	1.36	0.31	+14.7	+18.8
Lime sandstone	0.70	1.54	0.32	+14.0	+18.8
Porous lightweight bricks, apparent density 800 kg/m²	0.33	0.89	0.27	+16.5	+18.9

■ Wall structures without additional insulation, 30 cm (with 1.5 cm of interior plaster on either side)  
■ Wall structures with 10 cm Sto EWIS (rendered on either side with 10 cm of PS 15 SE)

Improved thermal insulation leads to an increase in surface temperature. The table shows the wall surface temperatures which are attained with and without insulation at a room air temperature of + 20 °C and an outside air temperature of – 10 °C.





### How the relative air humidity affects conditions in the home

A relative air humidity of 40-60 % is normal in home interiors at a temperature of 18–22 °C. Humidity levels outside of this range impair our well-being.

#### Excessively dry air

(relative air humidity < 40 %)

- The mucous membranes dry out
- Promotes the formation of dust and distribution of dust in the room air

#### Excessively humid air

(relative air humidity > 60 %)

- Causes breathing difficulties
- Affects skin evaporation (sweating)
- Conducive to soiling and mould formation
- Increases the risk of water vapour condensation on walls
- Promotes the spread of pathogens

### Mould and countermeasures

The microclimate inside and outside of a building is rarely identical. During cold times of the year in particular, temperature differences of 30 °C and more prevail. The external walls play an important role, forming the boundary between these two zones. Incorrectly designed structures or inappropriate heating and airing practices inevitably lead to problems.

#### Key causes of mould

- Inadequate thermal insulation
- Incorrect heating or airing

#### Suitable countermeasures

- Adequate thermal values for the enclosing surfaces (outside walls, windows, ceilings)
- Avoid thermal bridges
- Use insulating glass windows
- Heat cold rooms in good time prior to use
- Ensure adequate airing
- Avoid positioning furniture with large surface areas at outside walls

### Product tip: The Sto interior silicate programme

The Sto interior silicate programme banishes mould for good. The natural interior products\* from Sto offer the ideal basis for a healthy indoor climate and effective protection against mould.

\*A comprehensive overview is to be found in our Interiors programme overview

# The starting point

## Mineral and organic substrates

Every coating and every external wall insulation system is installed on an existing substrate. In addition to the load-bearing capacity of this substrate, its material properties are also an important factor. In order to prevent damage and cracking as a result of temperature fluctuations, for example, the general rule applies that the substrate must possess greater stability than the subsequent layer. Damage is otherwise likely to occur. It is thus important that the components of a facade insulation system be precisely coordinated.

**A basic distinction is made between two types of substrate:**

- Organic substrates: are flexible and thus cannot be coated with mineral materials, which by definition are rigid.
- Mineral substrates: are relatively rigid, making them suitable for coating with both mineral and organic materials.



Concrete is a mineral substrate. Concrete can be overworked with rigid, mineral or flexible, organic materials.

Material	Type of substrate
Concrete	mineral
Lime paint/lime plaster	mineral
Lime plaster/cement plaster	mineral
Lime sandstone	mineral
Porous concrete	mineral
Sandstone	mineral
Dispersion resin/silicone resin	organic
Silicate paint/plaster	mineral

# A crucial ingredient that makes all the difference

## Binders for facade paints and renders

**The binder contained in paints and renders is crucial to the properties of the coating. It is the most important element in the facade coating, binding minute solid constituents (e.g. pigments) together and defining the most important properties. The type and quantity of binder, for example, determines whether a facade paint is particularly weather-resistant or a facade render is particularly diffusion.**

### The different types of binders:

- **Facade paints and renders with Lotus-Effect®**

These have a particularly water-repellent binder matrix. Their micro-textured surface, similar to that of a lotus leaf, substantially reduces the available contact surface for dirt, algae, fungi, etc.. Dirt simply runs off with the rain. At the same time, these coatings are also particularly water vapour-permeable.

- **Silicone resin**

Using silicone resin as a binder (silicone resin is based on pure silicon) combines the best properties of dispersion and silicate paints and renders. Water is permanently repelled from the outside, while at the same time maintaining good permeability for water vapour and carbon dioxide from inside

the building. This results in high weather resistance and long-term protection from dirt, algae and fungi.

- **Dispersions**

In the case of dispersion paints and renders, which are also referred to as organic paints and renders, the binder is a synthetic resin dispersion obtained from crude oil. Dispersion renders and paints are highly durable and water vapour-permeable, repel water and offer good protection from algae and fungi. They come in a broad choice of colours (including very rich options), textures and grain sizes, offering superior design scope.

- **Pure silicates**

In the traditional pure silicate paints, potassium silicate is employed as the binder. These paints and renders are highly water vapour-permeable, but also absorb large quantities of water when exposed to rain. As a consequence, they require overworking more frequently than modern types of render and paint.

- **Silicates with dispersions**

Potassium silicate is employed as the binder together with a dispersion. These renders and paints combine the advantages of both types of binder, absorbing less water than pure silicates. With

regard to algae and fungal attack they offer a basic natural protection but are not as effective in this respect as silicone or dispersion paints and renders.

- **Mineral binders**

The main binders employed consist of lime or cement or a finely balanced mixture of the two. Mineral products are non-combustible and offer good value for money. They are water-repellent and afford protection from algae and fungi. The choice of colours is very restricted, however. As a result of their rigid surface structure they are not always able to withstand mechanical and thermal stress.

### Fake paints

A comparison of 55 silicone resin paints revealed that it is common practice to use only minimal quantities of high-quality silicone resin and/or to use silicone oils of inferior quality. These "fake" silicone resin paints are substantially more susceptible to soiling.

Formulate with binders	Substrate	Water-repellent effect	Water vapour-permeability	CO <sub>2</sub> permeability	Crack resistance	Pastel shades	Rich colours	Homogeneous surface finish	Self-cleaning effect
Lotus-Effect®	Organic, Mineral	●● <sup>*)</sup>	●●	●●	●	●	●	●● <sup>*)</sup>	●● <sup>*)</sup>
Silicone resin	Organic, Mineral	●●	●●	●●	●	●	●	●●	●●
Dispersion/organic	Organic, Mineral	●●	●	●	●● <sup>*)</sup>	●● <sup>*)</sup>	●● <sup>*)</sup>	●●	●
Pure silicate	Mineral		●●	●●		●	●	●	●
Silicate with dispersion	Mineral	●	●●	●	●	●	●	●	●
mineral	Mineral	●	●●	●● <sup>*)</sup>	●	●		●	●

<sup>\*)</sup> Most effective binder technology in this area

● = limited   ● = good   ●● = excellent

# Building physics data

## Thermal insulation

Wall material [24 cm]	Thermal conductivity $\lambda^*)$ [W/mK]	U value [W/m²K] without insulation **)	Thermal conductivity $\lambda^*)$ [W/mK] insulation	U value – thermal conductivity [W/m²K] with insulation							
				6 cm	8 cm	10 cm	12 cm	14 cm	16 cm	18 cm	20 cm
<b>Concrete</b> 2.400 kg/m³	2.10	3.00	45	0.59	0.47	0.39	0.33	0.29	0.26	0.23	0.21
			40	0.54	0.43	0.35	0.30	0.26	0.23	0.21	0.19
			35	0.48	0.38	0.31	0.26	0.23	0.20	0.18	0.16
			32	0.45	0.35	0.29	0.24	0.21	0.19	0.17	0.15
			22	0.33	0.25	0.20	0.17	0.15	0.13	0.12	0.11
<b>Solid brick</b> 1.800 kg/m³	0.81	1.96	45	0.54	0.44	0.36	0.31	0.28	0.25	0.22	0.20
			40	0.50	0.40	0.33	0.28	0.25	0.22	0.20	0.18
			35	0.45	0.36	0.30	0.25	0.22	0.20	0.18	0.16
			32	0.42	0.33	0.27	0.23	0.20	0.18	0.16	0.15
			22	0.29	0.23	0.19	0.16	0.15	0.13	0.11	0.10
<b>Vertical coring brick</b> 1.000 kg/m³	0.45	1.34	45	0.48	0.39	0.33	0.29	0.26	0.23	0.21	0.19
			40	0.44	0.36	0.31	0.27	0.23	0.21	0.19	0.17
			35	0.40	0.33	0.28	0.24	0.21	0.19	0.17	0.15
			32	0.38	0.31	0.26	0.22	0.19	0.17	0.16	0.14
			22	0.29	0.23	0.19	0.16	0.14	0.12	0.11	0.10
<b>Lime sandstone KSV</b> 1.800 kg/m³	0.99	2.19	45	0.56	0.45	0.37	0.32	0.28	0.25	0.22	0.20
			40	0.51	0.41	0.34	0.29	0.25	0.22	0.20	0.18
			35	0.46	0.36	0.30	0.26	0.22	0.20	0.18	0.16
			32	0.43	0.34	0.28	0.24	0.21	0.18	0.16	0.15
			22	0.31	0.24	0.20	0.17	0.15	0.13	0.12	0.10
<b>Lime sandstone KSL</b> 1.400 kg/m³	0.70	1.80	45	0.53	0.43	0.36	0.31	0.27	0.24	0.22	0.20
			40	0.48	0.39	0.33	0.28	0.25	0.22	0.20	0.18
			35	0.44	0.35	0.29	0.25	0.22	0.19	0.18	0.16
			32	0.41	0.33	0.27	0.23	0.20	0.18	0.16	0.15
			22	0.30	0.24	0.20	0.17	0.14	0.13	0.11	0.10
<b>Hollow lightweight concrete block</b> 1.000 kg/m³	0.49	1.42	45	0.49	0.40	0.34	0.30	0.26	0.23	0.21	0.19
			40	0.45	0.37	0.31	0.27	0.24	0.21	0.19	0.18
			35	0.41	0.33	0.28	0.24	0.21	0.19	0.17	0.16
			32	0.39	0.31	0.26	0.22	0.20	0.18	0.16	0.14
			22	0.29	0.23	0.19	0.16	0.14	0.13	0.11	0.10
<b>Hollow lightweight concrete block</b> 600 kg/m³	0.32	1.04	45	0.43	0.36	0.31	0.27	0.24	0.22	0.20	0.18
			40	0.40	0.34	0.29	0.25	0.22	0.20	0.18	0.17
			35	0.37	0.31	0.26	0.23	0.20	0.18	0.16	0.15
			32	0.35	0.29	0.24	0.21	0.19	0.17	0.15	0.14
			22	0.27	0.22	0.18	0.16	0.14	0.12	0.11	0.10
<b>Solid lightweight concrete block</b> 1.000 kg/m³	0.46	1.36	45	0.48	0.40	0.34	0.29	0.26	0.23	0.21	0.19
			40	0.45	0.36	0.31	0.27	0.24	0.21	0.19	0.17
			35	0.41	0.33	0.28	0.24	0.21	0.19	0.17	0.15
			32	0.38	0.31	0.26	0.22	0.20	0.17	0.16	0.14
			22	0.29	0.23	0.19	0.16	0.14	0.12	0.11	0.10
<b>Hollow conventional concrete block</b> 1.800 kg/m³	0.92	2.11	45	0.55	0.44	0.37	0.32	0.28	0.25	0.22	0.20
			40	0.50	0.40	0.34	0.29	0.25	0.22	0.20	0.18
			35	0.45	0.36	0.30	0.26	0.22	0.20	0.18	0.16
			32	0.42	0.34	0.28	0.24	0.21	0.18	0.16	0.15
			22	0.31	0.24	0.20	0.17	0.15	0.13	0.12	0.10
<b>Aerated concrete slab GP6</b>	0.27	0.91	45	0.41	0.35	0.30	0.26	0.24	0.21	0.20	0.18
			40	0.38	0.32	0.28	0.24	0.22	0.20	0.18	0.16
			35	0.35	0.29	0.25	0.22	0.20	0.18	0.16	0.15
			32	0.33	0.28	0.24	0.21	0.18	0.16	0.15	0.14
			22	0.26	0.21	0.18	0.15	0.13	0.12	0.11	0.10
<b>Lightweight vertical coring brick</b> 800 kg/m³	0.33	1.06	45	0.44	0.37	0.32	0.28	0.25	0.22	0.20	0.19
			40	0.41	0.34	0.29	0.25	0.22	0.20	0.18	0.17
			35	0.38	0.31	0.26	0.23	0.20	0.18	0.16	0.15
			32	0.35	0.29	0.25	0.21	0.19	0.17	0.15	0.14
			22	0.27	0.22	0.18	0.16	0.14	0.12	0.11	0.10

\*) in acc. with EN ISO 7345 "Thermal insulation – Physical quantities and definitions"

\*\*) All wall structures with 1.5 cm interior plaster and 2 cm exterior render (old render)

# Glossary

## **Airborne sound**

Transmission of sound waves in the air.

## **Blower door method**

Method to detect air permeability in a building's exterior finish, employing a fan to generate a pressure difference between the interior and ambient atmosphere. Usually carried out in unrendered state.

## **Building moisture**

Moisture content of a structural element

## **Capillary conduction**

Capillary conduction involves water being transported in fine capillary conductors to the hydrophilic walls of the capillary tubes as a result of interfacial tension. The forces acting on a capillary and the rate of transportation in a water-filled capillary tube increase strongly as the capillary diameter decreases, whereby the resultant pressure has an adverse effect on the surrounding building materials.

## **Coefficient of permeability, $\mu$**

The coefficient of permeability (in accordance with EN ISO 12572: 2001 CDI) indicates the factor by which a substance is more impermeable to water vapour than a stationary air layer of identical thickness. The greater the  $\mu$  factor [dimensionless], the less permeable a building material is. The diffusion resistance of a material is determined by the  $s_D$  value, which is calculated as the product of  $\mu$  and the layer thickness of the building material concerned.

## **Convection**

Heat transport due to the flow behaviour of liquids and gases (fluids). Fluids heat up on warm bodies and release heat again on cold bodies. When temperature differences prevail in a room, the air is circulated automatically (free convection). When a uniform temperature is established in a room, the flow stops.

## **Core insulation**

Insulation between two walls (load-carrying wall and facing masonry). Mineral wool or polystyrene are generally used as the insulating material.

## **Dew point/condensation water formation**

Dew point = air temperature at which the relative air humidity attains a value of 100 %. Upon the humidity level exceeding this limit, precipitation occurs (condensation water).

## **Dynamic stiffness (MN/m<sup>3</sup>)**

Characterises elasticity, e.g. of an insulating board. In external wall insulation systems, the use of insulating boards with low dynamic stiffness leads to improved airborne sound insulation on the outside wall.

## **Efflorescence**

As a result of moisture penetration (e.g. due to driving rain or rising moisture), water-soluble salts in render substrates or render coatings dissolve and are transported to the render surface. Following evaporation of the moisture the salts remain deposited on the surface of the render. Salt crystals then appear as unsightly white stains on the surface of the structure. If crystallisation of the salts occurs in the separating layer between masonry and render, this may lead to mechanical destruction of the render surface.

## **Environmental Product Declaration (EPD)**

The voluntary Environmental Product Declaration (EPD) covers a building product's entire life cycle – including potential health risks and all pollutive impacts resulting from its manufacture and use.

## **European technical approval (ETA)**

The European technical approval is a proof for the fitness for use of a construction product within the meaning of the Construction Products Directive. The ETA is based on tests, examinations and a technical assessment by approval bodies designated by the EU Member States for this purpose. It covers all product characteristics which can be important for the fulfillment of the legal requirements in the Member States, with the relevant levels of performance required being different in each Member State.

A European technical approval can be granted for construction products for which harmonised specifications according to the Construction Products Directive do not (yet) exist or which deviate substantially from a harmonised standard. Bases for the assessment of the fitness for use are either Guidelines for European Technical Approvals (ETAGs) prepared by EOTA for the relevant product area, or criteria for assessment procedures that are agreed on with other EOTA bodies for issue of an approval of a specific request.

The European technical approval enables the manufacturer to place the CE marking on the construction product and thus the access to the European market. With the CE marking the manufacturer confirms that he carried out the prescribed verification method and that the conformity of the product is given with the approval.

**Expanded polystyrene (EPS)**

Expanded polystyrenes – or foams – are synthetically manufactured materials with a cellular structure and low density. Components and units made of foam are virtually free of internal stress and possess very low density (volume weight) combined with extremely low thermal conductivity.

**External wall insulation systems (EWIS)**

External wall insulation systems are employed for the external insulation of the outside walls on buildings. The insulating material (insulant) in the form of boarding or lamellae is fixed to the sub-construction by means of adhesive and/or dowels and subsequently provided with a reinforcing or exterior render coat.

**Heat conduction**

Transfer of kinetic energy (= heat) from one molecule to another. The capacity to conduct heat is dependent on the matter concerned and its structure.

**Heating degree days**

Measure to calculate the heat consumption of a heating period. Result of the number of heating days multiplied by the difference between mean outside temperature and mean ambient room temperature.

**Heat transmission coefficient/ U value**

The U value or heat transmission coefficient which applies as a standard rating throughout Europe today (unit:  $W/m^2K$ ) indicates the heat convection in watts which flows through a surface area of  $1 m^2$  at a temperature difference of 1 kelvin ( $1^\circ\text{Celsius}$ ).

**Heat transmission loss**

Heat loss through solid bodies or structural elements such as roof, ceilings, cellar, windows and external walls.

**Heat transport/heat convection**

Flow of thermal energy through a building unit due to a temperature difference from the warm to the cold side (generally from the inside of a building to the outside).

**High-rise building threshold**

The high-rise building threshold is 22 m from the ground to the floor of the highest occupied storey. Country-specific deviations are possible.

**Hydrophobicising**

Hydrophobicising (water-repellent finishing) entails treating the surface of a building with a coating or impregnating agent to reduce the building material's capillary absorbency.

**Lightness value**

The lightness value is important when choosing the colour for a facade. As a measure of a colour's degree of reflection it indicates how far the colour is removed from black (minimum reflection = value 0) or white (maximum reflection = value 100).

**Low-energy house**

A standard definition of the term "low-energy house" does not exist. The term refers to buildings which fall below statutory maximum energy consumption limits for heating the interior of a building and its water supply. These maximum values are defined e.g. for Germany in the energy conservation ordinance.

**Osmosis/capillary conduction**

Osmosis provides for the transport of water in building materials when areas of different salt concentrations meet. Water migrates from zones of lower salt concentration to zones of higher salt concentration, in order to equalise the salt concentration.

**Perimeter insulation**

Thermal insulation which is installed in the ground, protected from mechanical damage and pressing water. Only possible with special insulants which are technically approved for this purpose.

**Rainproofing**

Protection of a building material used on the building's exterior finish from moisture in the form of rain.

**Relative air humidity**

Air normally only contains a fraction of the maximum possible moisture. The relative air humidity is equivalent to the water vapour present in the air divided by the maximum possible water vapour mass. It is expressed in per cent.

**sD value/coefficient of diffusion resistance**

Resistance of a layer of a building element to water vapour diffusion.  
 $sD [m] = \mu \times d$   
 $d$  = layer thickness of the building material [m]  
 $\mu$  = coefficient of permeability [dimensionless]

**Solar energy gains (windows)**

Energy gains from solar radiation.

**Sound attenuation**

The sound attenuation of a building unit is determined by means of comparative measurements on finished

parts: High sound attenuation = low degree of transmission and good sound insulation. In the case of solid outside walls the surface-related mass is the crucial factor: The heavier (concrete, lime sandstone, solid brick) and thicker the wall, the better (= higher) its sound attenuation will be.

#### **Stability verification**

Stability verification is to be carried out for all components of external wall insulation systems. The suitability for use of the individual components is to be assessed. Load cases to be tested are dead load, hygrothermal deformation and wind suction.

#### **Thermal bridges**

Localised points in walls and covers which have a lower level of thermal insulation and a subsequently higher level of heat loss, e.g. window lintels, columns, shutter boxes, corners of buildings, etc.

#### **Thermal conductivity**

The more effectively a building material conducts heat, the more heat will escape into the outside environment. Thermal conductivity  $\lambda$  indicates the heat convection in watts (W) through a building unit of 1 metre (m) in thickness at a temperature difference of 1 kelvin (K). The unit of measure is W/mK.

#### **Thermal expansion**

Temperature-dependent change in the length of a fixed building unit.

#### **Thermal insulating render**

Render with lightweight aggregates (e.g. polystyrene pellets, perlite) to increase the thermal insulation effect.

#### **Thermal radiation**

Transport of energy from a warmer to a colder body via the emission and absorption of electromagnetic waves in the non-visible infrared range.

#### **Thermal resistance R**

Thermal resistance R (measured in  $\text{m}^2\text{K/W}$ ) is obtained by dividing a material's layer thickness (d) by its thermal conductivity,  $\lambda$ :  $R = d/\lambda$

#### **Thermal resistance $R_T$**

Thermal resistance  $R_T$  (unit:  $\text{m}^2\text{K/W}$ ) is the sum total of the individual thermal resistances of all the various layers and the internal and external surface resistances.

#### **Thermography**

Non-contact method to identify thermal bridges on the completed exterior finish of a building using an infrared camera.

#### **Ventilated rainscreen cladding systems**

Ventilated rainscreen cladding systems are multi-layer external wall constructions. They consist of facade embellishment, ventilation airspace and the sub-construction insulation. The outermost layer, which affords protection from driving rain, is separated from the layers behind by means of an air layer.

#### **Water absorption coefficient, W**

Indicates how many kg of water are absorbed by 1  $\text{m}^2$  of a specific building material in 24 hours (DIN EN ISO 15148: 2002 CDI).

#### **Water vapour diffusion**

The gaseous water molecules (water vapour) contained in the air migrate (diffuse) in the direction of lower vapour pressure, e.g. from the humid room air through structural elements to the dry outside air.

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## Products and systems

Introduction · Textures and finishes from smooth to very coarse · Facade insulation systems  
Facade plasters · Facade paints · Surface design · Lacquers and stains  
Refurbishment projects and protection of historical buildings · Balcony coatings



## Sto references

Examples of architecture employing Sto products and systems



## Details

Detail solutions with external wall insulation systems from Sto



## StoColor System

Colour variety, according to the StoColor System and other colour systems  
The 3-level principle behind the StoColor System: The human colour perception area;  
the colour wheel with 24 basic tones; the five colour rows



## Specifications

Support in project planning



## Background information - Facade

Energy-efficient thermal insulation · Advantages and benefits of the Sto facade insulation systems  
Thermal insulation · Moisture protection · Sound protection · Fire protection · Wind loads  
Indoor climate/healthy home environment · Building physical data (U values) · Glossary



## Further information

Specific information and brochures from Sto

